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ACKNOWLEDGEMENT OF LOSS OF ENTITLEMENT TO ENTITY STATUS DISCOUNT

APPLICATION #	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET #	REQUEST ID
16/687,649	11/18/2019	Michael S Smith	SMITH070AY	129144

The entity status change request below filed through Patent Center on 11/21/2023 has been accepted.

Certifications

APPLICANT CHANGING TO REGULAR UNDISCOUNTED FEE STATUS

Signature

I certify, in accordance with 37 CFR 1.4(d)(4), that I am one of the signatories making the entity status change.

Signature	Name	Registration #
/Patrick Caldwell/	Patrick Caldwell	44580

APPLE 1002

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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/687,649	07/28/2020	10725581	SMITH070AY	6079

92045 7590 07/08/2020

The Caldwell Firm, LLC
PO Box 59655
Dept. SVIPGP
Dallas, TX 75229

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

P4TENTS1 LLC, Wilmington, GERMANY;
Michael S Smith, Palo Alto, CA;

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IR103 (Rev. 10/09)

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	
Filing Date	
First Named Inventor	Michael S Smith
Art Unit	
Examiner Name	
Attorney Docket Number	SMITH070AY

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	3358493	A	1967-12-19	Erich	
Change(s) applied to document, /M.H.E./ 6/22/2020	2	3524169	A	1970-08-11	~~K et al.~~ McAuliffe et al.	
	3	3633322	A	1972-01-11	Morcom	
	4	3659229	A	1972-04-25	Milton	
	5	3738166	A	1973-06-12	Fisher	
	6	3772685	A	1973-11-13	Masi	
	7	3777222	A	1973-12-04	Harris	
	8	3956986	A	1976-05-18	Wirz et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /AX/

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Michael S. Smith Application No.: 16/687,649 File Date: 2019-11-18 Title: DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK	Confirmation No.: 6079 Examiner: Antonio J XAVIER Art Unit: 2623 Docket No.: SMITH070AY Date: May 18, 2020

EXAMINER INTERVIEW

Date of Interview	March 24, 2020
Type of Interview	Email and Telephonic
Name of Participants	Patrick Caldwell, Antonio J XAVIER
Exhibit shown?	Appendix A
Claims Discussed	Independent Claims
Prior Art Discussed	N/a
Substance of Interview	Reviewed proposed amendments with Examiner.
Agreement Reached?	Yes

- - APPENDIX A - -

For Filing

From: Patrick E. Caldwell <pcaldwell@thecaldwellfirm.com>
Sent: Tuesday, March 24, 2020 10:38 AM
To: Antonio.xavier@uspto.gov
Subject: 16/687,649 (SMITH070AY) Proposed Amendment

Examiner Xavier,
Please consider the following proposed amendment:

22. (New) An electronic device, comprising:

a display;

a touch-sensitive interaction surface;

an actuator;

one or more processors;

memory; and

one or more programs, wherein the one or more programs are stored in the memory and configured to be executed by the one or more processors, the one or more programs including instructions to:

display, on the display and via a user interface of a network browser application, a first web page including a hyperlink that identifies a second web page;

detect a first contact starting at a first contact point at a first contact time on the touch-sensitive interaction surface;

detect an end of the first contact at a second contact time;

determine a duration of the first contact as a difference between the first contact time and the second contact time;

determine whether there is a contact movement of the first contact between the first contact point and a second contact point;

determine whether the first contact point of the first contact corresponds with a location of the hyperlink of the first web page;

when: the first web page is displayed via the user interface of the network browser application, the duration of the first contact is determined to be less than a first user-configurable predefined duration, and the end of the first contact is detected: avoid display, on the first web page, a result of any operation based on the first contact;

when: the first web page is displayed via the user interface of the network browser application, the duration of the first contact is determined to be greater than the first user-configurable predefined duration and less than the second user-configurable predefined duration, the first contact point of the first contact is determined to correspond with the location of the hyperlink of the first web page, it is not determined that there is the contact movement of the first contact between the first contact point and the second contact point, and the end of the first contact is detected: replace the display of the first web page with the second web page via the user interface of the network browser application; and

when: the first web page is displayed via the user interface of the network browser application, the duration of the first contact is determined to be greater than the second user-configurable predefined duration, the first contact point of the first contact is determined to correspond with the location of the hyperlink of the first web page, it is not determined that there is the contact movement of the first contact between the first contact point and the second contact point, and the end of the first contact is not detected: output, utilizing the actuator, a first feedback that is perceptible by touch and display a menu including at least one option for, in response to detection of a selection thereof, performing an operation on a web address associated with the hyperlink of the first web page, and further display at least a portion of the second web page, such that at least the at least portion of the second web page is displayed in at least one first virtual display layer which appears above at least one second virtual display layer that includes at least a portion of the user interface of the network browser application that remains at least partially visible.

--

Thanks,
Patrick

Patrick E. Caldwell, Esq.
The Caldwell Firm, LLC

- - APPENDIX A - -

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PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
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By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

92845 7598 05/07/2020
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I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/687,649	11/18/2019	Michael S Smith	SMITH070AY	6079

TITLE OF INVENTION: DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$500	$0.00	$0.00	$500	08/07/2020

EXAMINER	ART UNIT	CLASS-SUBCLASS
XAVIER, ANTONIO J	2623	345-174000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Patrick E. Caldwell, Esq.
2 The Caldwell Firm, LLC
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: P4TENTS1, LLC

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Wilmington DE

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. Fees submitted: ☒ Issue Fee ☒ Publication Fee (if required) ☐ Advance Order - # of Copies _____

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5. **Change in Entity Status** (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Patrick Caldwell/ Date 18 May 2020

Typed or printed name Patrick Caldwell Registration No. 44580

Electronic Patent Application Fee Transmittal

Application Number:	16687649
Filing Date:	18-Nov-2019
Title of Invention:	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK
First Named Inventor/Applicant Name:	Michael S Smith
Filer:	Patrick Edgar Caldwell
Attorney Docket Number:	SMITH070AY

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
UTILITY APPL ISSUE FEE	2501	1	500	500

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**500**

Electronic Acknowledgement Receipt	
EFS ID:	39473955
Application Number:	16687649
International Application Number:	
Confirmation Number:	6079
Title of Invention:	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK
First Named Inventor/Applicant Name:	Michael S Smith
Customer Number:	92045
Filer:	Patrick Edgar Caldwell
Filer Authorized By:	
Attorney Docket Number:	SMITH070AY
Receipt Date:	18-MAY-2020
Filing Date:	18-NOV-2019
Time Stamp:	22:42:21
Application Type:	Utility under 35 USC 111(a)

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Submitted with Payment	yes
Payment Type	CARD
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RAM confirmation Number	E20205HM42410136
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1	Post Allowance Communication - Incoming	SMITH070AY_Comments_vF_18-May-2020.pdf	309526 2d4393d45816958ff890c19843defe4a27bb2449	no	9
Warnings:					
Information:					
2	Applicant summary of interview with examiner	SMITH070AY_ExaminerInterview_vF_18-May-2020.pdf	668166 df4fee8d63e85ad3ba94d17cf307f85119fdbd46	no	4
Warnings:					
Information:					
3	Issue Fee Payment (PTO-85B)	SMITH070AY_fee-transmittal_vF_18-May-2020.pdf	128627 89258f753432305892 6fda8ed03f4f08eafd28da	no	1
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	30741 057b54ae4d7898c250bfe26398326e0d38a01738	no	2
Warnings:					
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		Total Files Size (in bytes):	1137060		

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Michael S. Smith Application No.: 16/687,649 File Date: 2019-11-18 Title: DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK	Confirmation No.: 6079 Examiner: Antonio J XAVIER Art Unit: 2623 Docket No.: SMITH070AY Date: May 18, 2020

COMMENTS ON STATEMENT OF REASONS FOR ALLOWANCE UNDER 37 C.F.R. § 1.104(e)

Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Examiner:

In response to the Notice of Allowance dated 05/07/2020, please enter the following remarks.

Remarks:

The Examiner has stated the following in the Examiner's Statement of Reasons for Allowance:

The prior art of record teaches context sensitive gesture combinations including movement and different durations of contact (see at least paragraphs [0047]-[0053] of Montague USPN 2008/0204476).

However, the prior art of record fails to teach or suggest Applicant's specifically claimed "electronic device, comprising: a display;

a touch-sensitive interaction surface;

an actuator;

one or more processors;

memory; and

one or more programs, wherein the one or more programs are stored in the memory and configured to be executed by the one or more processors, the one or more programs including instructions to:

display, on the display and via a user interface of a network browser application, a first web page including a hyperlink that identifies a second web page;

detect a first contact starting at a first contact point at a first contact time on the touch-sensitive interaction surface;

detect an end of the first contact at a second contact time;

determine a duration of the first contact as a difference between the first contact time and the second contact time;

determine whether there is a contact movement of the first contact between the first contact point and a second contact point;

determine whether the first contact point of the first contact corresponds with a location of the hyperlink of the first web page;

when: the first web page is displayed via the user interface of the network browser application, **the duration of the first contact is determined to be less than a first user-configurable predefined duration, and the end of the first contact is detected**: avoid display, on the first web page, a result of any operation based on the first contact;

when: the first web page is displayed via the user interface of the network browser application, **the duration of the first contact is determined to be greater than the first user-configurable predefined duration and less than a second user-configurable predefined duration, the first contact point of the first contact is determined to correspond with the location of the hyperlink of the first web page, it is not determined that there is the contact movement of the first contact between the first contact point and the second contact point, and the end of the first contact is detected**: replace the display of the first web page with the second web page via the user interface of the network browser application; and

when: the first web page is displayed via the user interface of the network browser application, **the duration of the first contact is determined to be greater than the second user-configurable predefined duration, the first contact point of**

the first contact is determined to correspond with the location of the hyperlink of the first web page, it is not determined that there is the contact movement of the first contact between the first contact point and the second contact point, and the end of the first contact is not detected: output, utilizing the actuator, a first feedback that is perceptible by touch and display a menu including at least one option for, in response to detection of a selection thereof, performing an operation on a web address associated with the hyperlink of the first web page, and further display at least a portion of the second web page, such that at least the at least portion of the second web page is displayed in at least one first virtual display layer which appears above at least one second virtual display layer that includes at least a portion of the user interface of the network browser application that remains at least partially visible" (see at least Claim 22 – emphasis added).

In response, applicant respectfully points out that features of at least some of the independent claims (e.g., 22 and 63) are not necessarily the same as those the Examiner has highlighted above. For example, Claim 63 includes "based on detected usage where: the first web page is displayed via the user interface of the network browser application, the duration of the first contact is determined to be less than a first user-configurable predefined duration, and the end of the first contact is detected: avoiding display, on the first web page, a result of any operation based on the first contact," in the context claimed.

As additional, non-exhaustive examples, Claims 22 and 63 recite the following, respectively:

22. An electronic device, comprising:

a display;

a touch-sensitive interaction surface;

an actuator;

one or more processors;

memory; and

one or more programs, wherein the one or more programs are stored in the memory and configured to be executed by the one or more processors, the one or more programs including instructions to:

display, on the display and via a user interface of a network browser application, a first web page including a hyperlink that identifies a second web page;

detect a first contact starting at a first contact point at a first contact time on the touch-sensitive interaction surface;

detect an end of the first contact at a second contact time;

determine a duration of the first contact as a difference between the first contact time and the second contact time;

determine whether there is a contact movement of the first contact between the first contact point and a second contact point;

determine whether the first contact point of the first contact corresponds with a location of the hyperlink of the first web page;

when: the first web page is displayed via the user interface of the network browser application, the duration of the first contact is determined to be less than a first user-configurable predefined duration, and the end of the first contact is detected: avoid display, on the first web page, a result of any operation based on the first contact;

when: the first web page is displayed via the user interface of the network browser application, the duration of the first contact is determined to be greater than the first user-configurable predefined duration and less than a second user-configurable predefined duration, the first contact point of the first contact is determined to correspond with the location of the hyperlink of the first web page, it is not determined that there is the contact movement of the first contact between the first contact point and the second contact point, and the end of the first contact is detected: replace the display of the first web page with the second web page via the user interface of the network browser application; and

when: the first web page is displayed via the user interface of the network browser application, the duration of the first contact is determined to be greater than the second user-configurable predefined duration, the first contact point of the first contact is determined to correspond with the location of the hyperlink of the first web page, it is not determined that there is the contact movement of the first contact between the first contact point and the second contact point, and the end of the first contact is not detected: output, utilizing the actuator, a first feedback that is perceptible by touch and display a menu including at least one option for, in response to detection of a selection thereof, performing an operation on a web address associated with the hyperlink of the first web page, and further display at least a portion of the second web page, such that at least the at least portion of the second web page is displayed in at least one first virtual display layer which appears above at least one second virtual display layer that includes at least a portion of the user interface of the network browser application that remains at least partially visible.

63. A method, comprising:

at an electronic device including a display, a touch-sensitive interaction surface, an actuator, one or more processors, and memory:

displaying, on the display and via a user interface of a network browser application, a first web page including a hyperlink that identifies a second web page;

detecting a first contact starting at a first contact point at a first contact time on the touch-sensitive interaction surface;

detecting an end of the first contact at a second contact time;

determining a duration of the first contact as a difference between the first contact time and the second contact time;

determining whether there is a contact movement of the first contact between the first contact point and a second contact point;

determining whether the first contact point of the first contact corresponds with a location of the hyperlink of the first web page;

based on detected usage where: the first web page is displayed via the user interface of the network browser application, the duration of the first contact is determined to be less than a first user-configurable predefined duration, and the end of the first contact is detected: avoiding display, on the first web page, a result of any operation based on the first contact;

based on detected usage where: the first web page is displayed via the user interface of the network browser application, the duration of the first contact is determined to be greater than the first user-configurable predefined duration and less than a second user-configurable predefined duration, the first contact point of the first contact is determined to correspond with the location of the hyperlink of the first web page, it is not determined that there is the contact movement of the first contact between the first contact point and the second contact point, and the end of the first contact is detected: replacing the display of the first web page with the second web page via the user interface of the network browser application; and

based on detected usage where: the first web page is displayed via the user interface of the network browser application, the duration of the first contact is determined to be greater than the second user-configurable predefined duration, the first contact point of the first contact is determined to correspond with the location of the hyperlink of the first web page, it is not determined that there is the contact movement of the first contact between the first contact point and the second contact point, and the end of the first contact is not detected: outputting, utilizing the actuator, a first feedback that is perceptible by touch and displaying a context menu including at least one option for, in response to detection of a selection thereof, performing an operation on a web address associated with the hyperlink of the first web page, and further displaying at least a portion of the second web page, such that at least the at least portion of the second web page is displayed in at least one first virtual display layer which appears above at least one second virtual display layer that includes at least a portion of the user interface of the network browser application that remains at least partially visible.

Clearly, at least some of the independent claims are not necessarily limited to the features that the Examiner has noted in the Examiner's Statement of Reasons for Allowance, as noted above

(by way of example only). Instead, each of the claims should only be limited by the language existing therein.

Further, although Applicant agrees with the Examiner's conclusion that these claims are allowable, Applicant notes that the claims may be allowable for reasons other than those identified by the Examiner and does not concede that the Examiner's characterizations of the terms of the claims and the prior art are correct. Each of the claims stands on its own merits and is patentable because of the combination it recites and not because of the presence or absence of any one particular element.

The Examiner's Statement was not prepared by Applicant and only contains the Examiner's possible positions in one or more reasons for allowability. Thus, any interpretation with respect to the Examiner's Statement of Reasons for Allowance should not be imputed to the Applicant.

Respectfully submitted,



Dated: 18 May 2020

The Caldwell Firm, LLC
PO Box 59655
Dallas, Texas 75229-0655
Telephone: (214) 734-2313
pcaldwell@thecaldwellfirm.com

Patrick E. Caldwell, Esq.
Reg. No. 44,580

UNITED STATES PATENT AND TRADEMARK OFFICE

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NOTICE OF ALLOWANCE AND FEE(S) DUE

92045 7590 05/07/2020

The Caldwell Firm, LLC
PO Box 59655
Dept. SVIPGP
Dallas, TX 75229

EXAMINER	
XAVIER, ANTONIO J	
ART UNIT	PAPER NUMBER
2623	

DATE MAILED: 05/07/2020

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/687,649	11/18/2019	Michael S Smith	SMITH070AY	6079

TITLE OF INVENTION: DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$500	$0.00	$0.00	$500	08/07/2020

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

92045 7590 05/07/2020

The Caldwell Firm, LLC
PO Box 59655
Dept. SVIPGP
Dallas, TX 75229

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/687,649	11/18/2019	Michael S Smith	SMITH070AY	6079

TITLE OF INVENTION: DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$500	$0.00	$0.00	$500	08/07/2020

EXAMINER	ART UNIT	CLASS-SUBCLASS
XAVIER, ANTONIO J	2623	345-174000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1_____

2_____

3_____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑Issue Fee ❑Publication Fee (if required) ❑Advance Order - # of Copies _____

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

❑ Applicant asserting small entity status. See 37 CFR 1.27

❑ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/687,649	11/18/2019	Michael S Smith	SMITH070AY	6079

92045 7590 05/07/2020

The Caldwell Firm, LLC
PO Box 59655
Dept. SVIPGP
Dallas, TX 75229

EXAMINER	
XAVIER, ANTONIO J	
ART UNIT	**PAPER NUMBER**
2623	

DATE MAILED: 05/07/2020

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	**Application No.** 16/687,649	**Applicant(s)** Smith, Michael S	
	Examiner ANTONIO J XAVIER	**Art Unit** 2623	**AIA (FITF) Status** No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to 4/27/20.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are 22-94 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☑ Notice of References Cited (PTO-892)
2. ☑ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☑ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☑ Examiner's Statement of Reasons for Allowance
7. ☑ Other Preliminary Amendments.

/Antonio Xavier/
Primary Examiner, Art Unit 2623

Allowable Subject Matter

1. Claims 22-94 are allowed.

2. The following is an examiner's statement of reasons for allowance:

The prior art of record teaches context sensitive gesture combinations including movement and different durations of contact (see at least paragraphs [0047]-[0053] of Montague USPN 2008/0204476).

However, the prior art of record fails to teach or suggest Applicant's specifically claimed "electronic device, comprising: a display;

a touch-sensitive interaction surface;

an actuator;

one or more processors;

memory; and

one or more programs, wherein the one or more programs are stored in the memory and configured to be executed by the one or more processors, the one or more programs including instructions to:

display, on the display and via a user interface of a network browser application, a first web page including a hyperlink that identifies a second web page;

detect a first contact starting at a first contact point at a first contact time on the touch-sensitive interaction surface;

detect an end of the first contact at a second contact time;

determine a duration of the first contact as a difference between the first contact time and the second contact time;

determine whether there is a contact movement of the first contact between the first contact point and a second contact point;

determine whether the first contact point of the first contact corresponds with a location of the hyperlink of the first web page;

when: the first web page is displayed via the user interface of the network browser application, **the duration of the first contact is determined to be less than a first user-configurable predefined duration, and the end of the first contact is detected**: avoid display, on the first web page, a result of any operation based on the first contact;

when: the first web page is displayed via the user interface of the network browser application, **the duration of the first contact is determined to be greater than the first user-configurable predefined duration and less than a second user-configurable predefined duration, the first contact point of the first contact is determined to correspond with the location of the hyperlink of the first web page, it is not determined that there is the contact movement of the first contact between the first contact point and the second contact point, and the end of the first contact is detected**: replace the display of the first web page with the second web page via the user interface of the network browser application; and

when: the first web page is displayed via the user interface of the network browser application, **the duration of the first contact is determined to be greater than the second user-configurable predefined duration, the first contact point of**

the first contact is determined to correspond with the location of the hyperlink of the first web page, it is not determined that there is the contact movement of the first contact between the first contact point and the second contact point, and the end of the first contact is not detected: output, utilizing the actuator, a first feedback that is perceptible by touch and display a menu including at least one option for, in response to detection of a selection thereof, performing an operation on a web address associated with the hyperlink of the first web page, and further display at least a portion of the second web page, such that at least the at least portion of the second web page is displayed in at least one first virtual display layer which appears above at least one second virtual display layer that includes at least a portion of the user interface of the network browser application that remains at least partially visible" (see at least Claim 22 – emphasis added).

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Pertinent Art

3. The prior art made of record and not relied upon is considered pertinent to Applicant's disclosure:

a. Montague (USPN 2008/0204476) teaches context sensitive gesture combinations including movement and different durations of contact.

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANTONIO J XAVIER whose telephone number is (571)270-7688. The examiner can normally be reached on M-F 530am-2pm PST.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amare Mengistu can be reached on 571-272-7674. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see https://ppair-my.uspto.gov/pair/PrivatePair. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access

to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Antonio Xavier/
Primary Examiner, Art Unit 2623

Examiner-Initiated Interview Summary	Application No. 16/687,649	Applicant(s) Smith, Michael S	
	Examiner ANTONIO J XAVIER	Art Unit 2623	AIA (FITF) Status No

All participants (applicant, applicant's representative, PTO personnel):

(1) ANTONIO J. XAVIER. (3) _____.

(2) Patrick E. Caldwell (Reg. No.: 44,580). (4) _____.

Date of Interview: 30 April 2020.

Type: ☑ Telephonic ☐ Video Conference
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☑ No.
If Yes, brief description: _____.

Issues Discussed ☐ 101 ☐ 112 ☐ 102 ☐ 103 ☑ Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: 22.

Identification of prior art discussed: _____.

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

See Continuation Sheet.

Applicant recordation instructions: It is not necessary for applicant to provide a separate record of the substance of interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☑ Attachment

/Antonio Xavier/ Primary Examiner, Art Unit 2623	

Continuation of Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments:

Examiner called to clarify interpretation of Claim 22.

Applicant directed Examiner to claim terms which were overlooked by the Examiner initially.

Examiner acknowledged both a FIRST user-configurable predefined duration and SECOND user-configurable predefined duration present in the claim.

*Please ignore the attachment box. It was required by internal systems to avoid an error. There is no attachment specific to this interview

Notice of References Cited	Application/Control No. 16/687,649	Applicant(s)/Patent Under Reexamination Smith, Michael S	
	Examiner ANTONIO J XAVIER	Art Unit 2623	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20080204476-A1	08-2008	Montague; Roland Wescott	G06F3/04845	345/661
	B					
	C					
	D					
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/687,649	Smith, Michael S
	Examiner	Art Unit
	ANTONIO J XAVIER	2623

CPC - Searched*		
Symbol	**Date**	**Examiner**
G06F3/04847	05/01/2020	AX
G06F3/04817	05/01/2020	AX
G06F3/0482	05/01/2020	AX
G06F3/04883	05/01/2020	AX

CPC Combination Sets - Searched*		
Symbol	**Date**	**Examiner**

US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	**Date**	**Examiner**
G06F3/04847	05/01/2020	AX
G06F3/04817	05/01/2020	AX
G06F3/0482	05/01/2020	AX
G06F3/04883	05/01/2020	AX
Inventor	05/01/2020	AX
EAST	05/01/2020	AX
Reviewed patent family	05/01/2020	AX

/Antonio Xavier/ Primary Examiner, Art Unit 2623	

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/687,649	Smith, Michael S
	Examiner	Art Unit
	ANTONIO J XAVIER	2623

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
	Searched all listed above	05/01/2020	AX

/Antonio Xavier/ Primary Examiner, Art Unit 2623	

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/687,649	Smith, Michael S
	Examiner	Art Unit
	ANTONIO J XAVIER	2623

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	05/01/2020								
-	1	-								
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21	42	=								

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/687,649	Smith, Michael S
	Examiner	Art Unit
	ANTONIO J XAVIER	2623

CLAIM		DATE								
Final	Original	05/01/2020								
22	43	=								
23	44	=								
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73	94	=								

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
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CPC						
Symbol					**Type**	**Version**
G06F	/	3	/	0416	F	2013-01-01
G06F	/	3	/	044	I	2013-01-01
G06F	/	3	/	016	I	2013-01-01
G06F	/	3	/	045	I	2013-01-01
G06F	/	3	/	0412	I	2013-01-01
G06F	/	3	/	0414	I	2013-01-01
G06F	/	3	/	04883	I	2013-01-01
G06F	/	2203	/	04104	A	2013-01-01

CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
	/		/					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	73	
/Antonio Xavier/ Primary Examiner, Art Unit 2623	01 May 2020	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	18

U.S. Patent and Trademark Office — Part of Paper No.: 20200430A

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INTERNATIONAL CLASSIFICATION				
CLAIMED				
G06F	/	3	/	041
G06F	/	3	/	0488

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**

CROSS REFERENCES(S)						
CLASS	**SUBCLASS (ONE SUBCLASS PER BLOCK)**					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	73	
/Antonio Xavier/ Primary Examiner, Art Unit 2623	01 May 2020	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	18

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	16/687,649	Smith, Michael S
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☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
-	1	-	13	4	25	13	37	28	49	40	61	51	73	64	85
-	2	-	14	5	26	17	38	29	50	41	62	53	74	65	86
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NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	73	
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(Primary Examiner)	(Date)	1	18

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Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

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First Named Inventor	Michael S Smith
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Examiner Name	
Attorney Docket Number	SMITH070AY

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	75	6526133	B1	2003-02-25	Izaki et al.	
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	98	6776546	B2	2004-08-17	Kraus et al.	
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	109	6919927	B1	2005-07-19	Hyodo	
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	119	6967903	B2	2005-11-22	Guanter	
	120	6968208	B2	2005-11-22	Kacines	
	121	6975853	B2	2005-12-13	Fang et al.	
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	124	7003316	B1	2006-02-21	Elias et al.	
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	131	7031670	B2	2006-04-18	May	
	132	7046230	B2	2006-05-16	Zadesky et al.	
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	138	7098776	B2	2006-08-29	Chang et al.	
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	178	7398105	B2	2008-07-08	Kalogeropoulos	
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Signature	/Patrick Caldwell/	Date (YYYY-MM-DD)	2019-11-18
Name/Print	Patrick Caldwell	Registration Number	44580

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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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First Named Inventor	Michael S Smith
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Examiner Signature	/Antonio Xavier/	Date Considered	04/30/2020

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CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Patrick Caldwell/	Date (YYYY-MM-DD)	2019-11-18
Name/Print	Patrick Caldwell	Registration Number	44580

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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First Named Inventor	Michael S Smith
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	Application Number	16687649
	Filing Date	
	First Named Inventor	Michael S Smith
	Art Unit	
	Examiner Name	
	Attorney Docket Number	SMITH070AY

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CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

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See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Patrick Caldwell/	Date (YYYY-MM-DD)	2019-11-19
Name/Print	Patrick Caldwell	Registration Number	44580

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:	Confirmation No.: 6079
Michael S. Smith	Examiner: AWAD, AMR A
Application No.: 16/687,649	Art Unit: 2621
Filed: 11-18-2019	Atty. Docket No.: SMITH070AY
For: DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK	Date: 1/30/2020

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	1	10101898	B2	2018-10-16	AMELINE	
	2	10222891	B1	2019-03-05	Smith	

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	Examiner Name	
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	Attorney Docket Number	SMITH070AY

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	Examiner Name	
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CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

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The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

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A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Patrick Caldwell/	Date (YYYY-MM-DD)	2019-11-18
Name/Print	Patrick Caldwell	Registration Number	44580

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CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Patrick Caldwell/	Date (YYYY-MM-DD)	2019-11-18
Name/Print	Patrick Caldwell	Registration Number	44580

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:	Confirmation No.: 6079
Michael S. Smith	Examiner: XAVIER, ANTONIO J
Application No.: 16/687,649	Art Unit: 2623
Filed: 11-18-2019	Atty. Docket No.: SMITH070AY
For: DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK	Date: 4/27/2020

PRELIMINARY AMENDMENT C

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	2	20090014876	A1	2009-01-15	Youn et al.	
	3	20090022256	A1	2009-01-22	Fitzgerald	
	4	2009002312	A1	2009-01-01	Son	
	5	20090024789	A1	2009-01-22	Rajan et al.	

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Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

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See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Patrick Caldwell/	Date (YYYY-MM-DD)	2019-11-18
Name/Print	Patrick Caldwell	Registration Number	44580

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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /AX/

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	155	(("SMITH") near3 ("Michael")).INV. AND (duration).clm.	US-PGPUB; USPAT; USOCR	ADJ	ON	2020/05/01 15:43
S1	0	"15719406"	US-PGPUB; USPAT	ADJ	ON	2017/12/12 12:33
S2	0	"15072351"	US-PGPUB; USPAT	ADJ	ON	2017/12/12 12:36
S3	2	"13567004"	US-PGPUB; USPAT	ADJ	ON	2017/12/12 12:36
S4	3560	(("SMITH") near3 ("Michael")).INV.	US-PGPUB; USPAT; USOCR	ADJ	ON	2017/12/12 12:40
S5	19	(US-20090231290-$ or US-20070268261-$ or US-20060197750-$ or US-20060044281-$ or US-20030234768-$ or US-20080259046-$ or US-20110059777-$ or US-20080088602-$ or US-20110260984-$ or US-20100328230-$ or US-20070273671-$ or US-20070236470-$ or US-20110084921-$ or US-20110057889-$ or US-20110045813-$ or US-20100045621-$).did. or (US-6020878-$ or US-5729219-$ or US-8730199-$).did.	US-PGPUB; USPAT	ADJ	ON	2017/12/12 13:21
S6	9	(US-20100058211-$ or US-20130076649-$ or US-20110261002-$ or US-20080146285-$ or US-20100035656-$ or US-20120060123-$ or US-20110059777-$ or US-20130321340-$ or US-20110291945-$).did.	US-PGPUB; USPAT	ADJ	ON	2017/12/12 13:21

S7	27	S5 or S6	US-PGPUB; USPAT	ADJ	ON	2017/12/12 13:21
S8	990	touch screen AND (vibrate or vibrator) AND (pressure) AND (menu) AND ((launch$3 or open$3) WITH (program or application or software))	US-PGPUB; USPAT	ADJ	ON	2017/12/12 13:25
S9	782	S8 AND ((electronic$1mail or electronic mail or e$1mail) or (SMS or short message) or (social network))	US-PGPUB; USPAT	ADJ	ON	2017/12/12 13:26
S10	0	S4 AND S9	US-PGPUB; USPAT	ADJ	ON	2017/12/12 13:26
S11	0	S4 AND S8	US-PGPUB; USPAT	ADJ	ON	2017/12/12 13:27
S12	901	S4 AND touch	US-PGPUB; USPAT	ADJ	ON	2017/12/12 13:27
S13	508	S12 AND pressure	US-PGPUB; USPAT	ADJ	ON	2017/12/12 13:27
S14	36	S13 AND menu	US-PGPUB; USPAT	ADJ	ON	2017/12/12 13:27
S15	244	S4 AND menu	US-PGPUB; USPAT	ADJ	ON	2017/12/12 13:27
S16	133	S4 AND menu AND touch	US-PGPUB; USPAT	ADJ	ON	2017/12/12 13:27
S17	97	S16 NOT S14	US-PGPUB; USPAT	ADJ	ON	2017/12/12 13:41
S18	0	(back$1touch settings)	US-PGPUB; USPAT	ADJ	ON	2017/12/13 12:27

S19	2	(back$1touch near settings)	US-PGPUB; USPAT	ADJ	ON	2017/12/13 12:31
S20	3561	(("SMITH") near3 ("Michael")).INV.	US-PGPUB; USPAT; USOCR	ADJ	ON	2017/12/14 09:58
S21	82	S20 AND (touch$3 AND menu AND (social or sharing))	US-PGPUB; USPAT; USOCR	ADJ	ON	2017/12/14 09:58
S22	6	(US-20140053116-$ or US-20110302493-$ or US-20110153653-$ or US-20110096174-$ or US-20110025842-$ or US-20080177662-$).did.	US-PGPUB	ADJ	ON	2017/12/14 11:30
S23	0	S22 AND ((pressure or magnitude) WITH (touch))	US-PGPUB; USPAT	ADJ	ON	2017/12/14 11:30
S24	0	S22 AND ((pressure or magnitude))	US-PGPUB; USPAT	ADJ	ON	2017/12/14 11:30
S25	120	(menu) WITH (social media) WITH (shar$3)	US-PGPUB; USPAT	ADJ	ON	2017/12/14 13:58
S26	73418	(custom or programmable) WITH (gesture or input) WITH (application or program or function)	US-PGPUB; USPAT	ADJ	ON	2017/12/14 18:39
S27	3561	(("SMITH") near3 ("Michael")).INV.	US-PGPUB; USPAT; USOCR	ADJ	ON	2017/12/14 18:40
S28	69	S26 AND S27	US-PGPUB; USPAT	ADJ	ON	2017/12/14 18:40
S29	1879	touch WITH (pressure or magnitude) WITH thresholds	US-PGPUB; USPAT	ADJ	ON	2017/12/14 18:59

S30	4	touch WITH (pressure or magnitude) WITH thresholds WITH (context)	US-PGPUB; USPAT	ADJ	ON	2017/12/14 18:59
S31	62	("5745719").URPN.	USPAT	ADJ	ON	2017/12/14 19:20
S32	5	"11038590"	USPAT	ADJ	ON	2017/12/14 19:21
S33	1	"20060161871".pn.	US-PGPUB; USPAT	ADJ	ON	2017/12/14 19:22
S34	1	"20060026535".pn.	US-PGPUB; USPAT	ADJ	ON	2017/12/14 19:24
S35	15	(US-20140053116-$ or US-20110302493-$ or US-20110153653-$ or US-20110096174-$ or US-20110025842-$ or US-20080177662-$ or US-20130291126-$ or US-20060161871-$ or US-20060026535-$ or US-20090058829-$ or US-20090085881-$ or US-20100090982-$ or US-20100188327-$).did. or (US-9524042-$ or US-5745719-$).did.	US-PGPUB; USPAT	ADJ	ON	2017/12/14 19:51
S36	57422	(touch WITH pressure)	US-PGPUB; USPAT	ADJ	ON	2017/12/14 19:51
S37	5	S35 and S36	US-PGPUB; USPAT	ADJ	ON	2017/12/14 19:51
S38	45	(social network or social application) WITH (shar$3 object)	US-PGPUB; USPAT	ADJ	ON	2017/12/15 20:22
S39	9596	(social network or social application) WITH (post)	US-PGPUB; USPAT	ADJ	ON	2017/12/15 20:37
S40	2866	S39 AND (SMS and e$1mail)	US-PGPUB; USPAT	ADJ	ON	2017/12/15 20:37

S41	196	S40 AND (menu WITH GUI)	US-PGPUB; USPAT	ADJ	ON	2017/12/15 20:37
S42	18	S41 AND (touch WITH (pressure or magnitude))	US-PGPUB; USPAT	ADJ	ON	2017/12/15 20:38
S43	37	(GUI or menu) WITH (pressure or magnitude) WITH (context)	US-PGPUB; USPAT	ADJ	ON	2017/12/15 20:50
S44	3	"12597684"	US-PGPUB; USPAT	ADJ	ON	2017/12/15 20:52
S45	581	((context sensitive or context$1sensitive) WITH (icon))	US-PGPUB; USPAT	ADJ	ON	2017/12/16 16:13
S46	7	S45 AND (pressure WITH touch)	US-PGPUB; USPAT	ADJ	ON	2017/12/16 16:15
S47	13	menu WITH historical usage	US-PGPUB; USPAT	ADJ	ON	2017/12/18 13:40
S48	1	"8191015".pn.	US-PGPUB; USPAT	ADJ	ON	2017/12/18 13:44
S49	1	"20080065991".pn. AND (menu WITH usage)	US-PGPUB; USPAT	ADJ	ON	2017/12/18 13:44
S50	6827	(social network or social media) WITH (shar$3 WITH (object or link or image or photo))	US-PGPUB; USPAT	ADJ	ON	2017/12/18 19:20
S51	6	S50 WITH (touch$3 WITH menu)	US-PGPUB; USPAT	ADJ	ON	2017/12/18 19:21
S52	12	S50 SAME (touch$3 WITH menu)	US-PGPUB; USPAT	ADJ	ON	2017/12/18 19:22

S53	233	S50 AND (touch$3 WITH menu)	US-PGPUB; USPAT	ADJ	ON	2017/12/18 19:39
S54	165	S50 AND (touch WITH pressure)	US-PGPUB; USPAT	ADJ	ON	2017/12/18 20:34
S55	8887	G06F3/04847.cpc.	US-PGPUB; USPAT	ADJ	ON	2017/12/18 21:43
S56	10393	G06F3/04817.cpc.	US-PGPUB; USPAT	ADJ	ON	2017/12/18 21:44
S57	23568	g06f3/0482.cpc.	US-PGPUB; USPAT	ADJ	ON	2017/12/18 21:44
S58	18904	g06f3/04883.cpc.	US-PGPUB; USPAT	ADJ	ON	2017/12/18 21:44
S59	46941	S55 or S56 or S57 or S58	US-PGPUB; USPAT	ADJ	ON	2017/12/18 21:44
S60	6344	S59 AND (pressure WITH touch)	US-PGPUB; USPAT	ADJ	ON	2017/12/18 21:44
S61	2168	S60 AND (touch WITH menu)	US-PGPUB; USPAT	ADJ	ON	2017/12/18 21:44
S62	141649	(pressure WITH (magnitude or threshold))	US-PGPUB; USPAT	ADJ	ON	2017/12/18 21:45
S63	465	S62 AND S61	US-PGPUB; USPAT	ADJ	ON	2017/12/18 21:45
S64	30	S63 AND S50	US-PGPUB; USPAT	ADJ	ON	2017/12/18 21:47

S65	100	(slide WITH gesture WITH menu)	US-PGPUB; USPAT	ADJ	ON	2017/12/22 21:32
S66	3	S65 AND (slide WITH pressure)	US-PGPUB; USPAT	ADJ	ON	2017/12/22 21:39
S67	6	S65 AND (slide SAME pressure)	US-PGPUB; USPAT	ADJ	ON	2017/12/22 21:41
S68	0	"15072354"	US-PGPUB; USPAT	ADJ	ON	2018/01/20 17:52
S69	3580	(("SMITH") near3 ("Michael")).INV.	US-PGPUB; USPAT; USOCR	ADJ	ON	2018/01/20 17:52
S70	11	S69 AND (intermediate state)	US-PGPUB; USPAT	ADJ	ON	2018/01/20 17:52
S71	19	S69 AND (gesture WITH menu)	US-PGPUB; USPAT	ADJ	ON	2018/01/20 17:54
S72	9007	G06F3/04847.cpc.	US-PGPUB; USPAT	ADJ	ON	2018/01/20 17:56
S73	10547	G06F3/04817.cpc.	US-PGPUB; USPAT	ADJ	ON	2018/01/20 17:56
S74	23888	g06f3/0482.cpc.	US-PGPUB; USPAT	ADJ	ON	2018/01/20 17:56
S75	19105	g06f3/04883.cpc.	US-PGPUB; USPAT	ADJ	ON	2018/01/20 17:56
S76	47534	(S72 or S73 or S74 or S75)	US-PGPUB; USPAT	ADJ	ON	2018/01/20 17:56

S77	843	S76 AND (intermediate WITH (pressure or signal or state))	US-PGPUB; USPAT	ADJ	ON	2018/01/20 17:57
S78	15	S76 AND (intermediate WITH (pressure or signal or state) WITH menu)	US-PGPUB; USPAT	ADJ	ON	2018/01/20 17:57
S79	208	("20010005692" | "20010043291" | "20020002629" | "20020005111" | "20020008691" | "20020033919" | "20020045854" | "20020085952" | "20020116952" | "20020116959" | "20020118180" | "20020130832" | "20020180763" | "20030117408" | "20030123328" | "20030147041" | "20030151589" | "20030217972" | "20030232192" | "20030235452" | "20040084372" | "20040108995" | "20040109788" | "20040121855" | "20040191509" | "20040207542" | "20040212598" | "20040239624" | "20040263488" | "20050045540" | "20050099403" | "20050231461" | "20050242034" | "20050264521" | "20050280746" | "20060001654" | "20060001800" | "20060033701" | "20060077186" | "20060107719" | "20060138983" | "20060146032" | "20060167400" | "20060179088" | "20060195064" | "20060197736" | "20060197737" | "20060209039" | "20060238495" | "20060260711" | "20060262099" | "20060284874" | "20070008064" | "20070035526" | "20070040814" | "20070070047" | "20070085837" | "20070103454" | "20070137901" | "20070146313" | "20070148371" | "20070153215" | "20070176902" | "20070182864" | "20070195029" | "20070229477" | "20070237170" | "20070262967" | "20080007675" | "20080018613" | "20080024459" | "20080024712" | "20080060854" | "20080062169" | "20080068343" | "20080094367" | "20080100584" | "20080105600" | "20080130910" | "20080136790" | "20080158171" | "20080204427" |	US-PGPUB; USPAT	ADJ	ON	2018/01/20 18:23

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		"20080215192" | "20080252607" |				
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		"20080295839" | "20080304431" |				
		"20090002312" | "20090022256" |				
		"20090036176" | "20090046110" |				
		"20090051659" | "20090066660" |				
		"20090073138" | "20090086420" |				
		"20090091536" | "20090143652" |				
		"20090158152" | "20090160781" |				
		"20090213066" | "20090225053" |				
		"20090271731" | "20090289912" |				
		"20090295747" | "20100005390" |				
		"20100017872" | "20100020039" |				
		"20100026640" | "20100035656" |				
		"20100045612" | "20100053103" |				
		"20100053532" | "20100077829" |				
		"20100079398" | "20100085500" |				
		"20100097347" | "20100134429" |				
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		"20100149124" | "20100164884" |				
		"20100188365" | "20100194709" |				
		"20100201651" | "20100206560" |				
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		"20110037726" | "20110044064" |				
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		"20110115738" | "20110118029" |				
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		"20120044172" | "20120056846" |				
		"20120086670" | "20120105367" |				

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S80	234	("20130124993" | "20130125322" | "20130127765" | "20130132838" | "20130141388" | "20130181928" | "20130181931" | "20130188336" | "20130215064" | "20130307809" | "20130307827" | "20130321317" | "20130332876" | "20130335357" | "20140028601" | "20140057102" | "20140066139" | "20140096092" | "20140099235" | "20140104219" | "20140104220" | "20140132548" | "20140132549" | "20140134433" | "20140134434" | "20140139473" | "20140168128" | "20140191962" | "20140208248" | "20140210786" | "20140340358" | "20140368455" | "20150068526" | "20150197670" | "20150234518" | "20150253609" | "3633322" | "3738166" | "3772685" | "3777222" | "4293734" | "4296756" | "4302011" | "4353552" | "4524421" | "4554419" | "4636632" | "4644101" | "4770281" | "5241308" | "5247434" | "5276787" | "5305423" | "5309172" | "5311302" | "5343650" | "5386219" | "5448263" | "5486286" | "5487827" | "5566096" | "5680160" | "5742894" | "5743859" | "5744027" | "5838244" | "5856822" | "5947334" | "5999892" | "6108064" | "6118435" | "6141000" | "6193152" | "6283763" | "6284131" | "6337681" | "6351271" | "6392638" | "6417845" | "6441807" | "6509847" | "6526315" | "6533757" | "6567102" | "6626013" |	US-PGPUB; USPAT	ADJ	ON	2018/01/20 18:24

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		"9130651" | "9134880" | "9152258" | "9152288" | "RE41716").PN.				
S81	442	S79 or S80	US-PGPUB; USPAT	ADJ	ON	2018/01/20 18:24
S82	17	S81 AND (intermediate WITH (pressure or signal or state))	US-PGPUB; USPAT	ADJ	ON	2018/01/20 18:24
S83	297	S81 AND (second WITH (pressure or signal or state))	US-PGPUB; USPAT	ADJ	ON	2018/01/20 18:26
S84	58	S81 AND (second WITH (pressure or signal or state) WITH third)	US-PGPUB; USPAT	ADJ	ON	2018/01/20 18:26
S85	1	S81 AND (second WITH (pressure or signal or state) WITH third) WITH menu	US-PGPUB; USPAT	ADJ	ON	2018/01/20 18:26
S86	1632	g06f2203/04105.cpc.	US-PGPUB; USPAT	ADJ	ON	2018/01/20 19:35
S87	302	S86 AND (second WITH (pressure or signal or state) WITH third)	US-PGPUB; USPAT	ADJ	ON	2018/01/20 19:35
S88	302	S86 AND (second WITH (pressure or signal or state) WITH third)	US-PGPUB; USPAT	ADJ	ON	2018/01/20 19:35
S89	1	S86 AND (second WITH (pressure or signal or state) WITH third) WITH menu	US-PGPUB; USPAT	ADJ	ON	2018/01/20 19:35
S90	50	S86 AND (intermediate WITH (pressure or signal or state))	US-PGPUB; USPAT	ADJ	ON	2018/01/20 19:36
S91	0	"15072354"	US-PGPUB; USPAT	ADJ	ON	2018/08/08 14:49

S92	14	(US-20130162667-$ or US-20110145764-$ or US-20100313166-$ or US-20080219493-$ or US-20040150644-$ or US-20120306788-$ or US-20110175805-$ or US-20100026640-$ or US-20080178126-$ or US-20110196935-$ or US-20090207175-$ or US-20120225413-$ or US-20080204427-$ or US-20080024459-$).did.	US-PGPUB; USPAT	ADJ	ON	2018/09/07 17:56
S97	1	"3659229".pn.	US-PGPUB; USPAT	ADJ	ON	2018/12/28 10:31
S98	1	"15072354"	US-PGPUB; USPAT	ADJ	ON	2018/12/28 11:22
S101	1	"10133397".pn.	US-PGPUB; USPAT	ADJ	ON	2019/01/04 13:09
S102	3794	(("SMITH") near3 ("Michael")).INV.	US-PGPUB; USPAT; USOCR	ADJ	ON	2019/01/04 17:47
S111	0	"16377142"	US-PGPUB; USPAT	ADJ	ON	2019/07/05 17:13
S112	10	(antonio near2 xavier).xa,xp. AND (virtual layer).clm.	US-PGPUB; USPAT	ADJ	ON	2019/07/07 11:06
S113	344	(virtual layer).clm.	US-PGPUB; USPAT	ADJ	ON	2019/07/07 11:45
S114	1	"3659229".pn.	US-PGPUB; USPAT	ADJ	ON	2019/08/23 12:32
S115	0	"2010175805".pn.	US-PGPUB; USPAT	ADJ	ON	2019/08/23 12:35
S116	1	"20110175805".pn.	US-PGPUB; USPAT	ADJ	ON	2019/08/23 12:35

S117	2647	(pressure or magnitude) WITH (selection WITH (size))	US-PGPUB; USPAT	ADJ	ON	2019/08/26 12:38
S118	87	(pressure or magnitude or intensity) WITH (selection WITH (size)) WITH (touch or finger)	US-PGPUB; USPAT	ADJ	ON	2019/08/26 12:39
S119	2	"14144140"	US-PGPUB; USPAT	ADJ	ON	2019/08/26 12:52
S120	8	("20010024195" | "20080189629" | "20100153879" | "20110239110" | "20130147718" | "20130191785" | "20150149964" | "9244601").PN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2019/08/26 12:52
S121	3953	(("SMITH") near3 ("Michael")).INV.	US-PGPUB; USPAT; USOCR	ADJ	ON	2019/08/27 10:25
S122	33	S121 AND (scal$3).clm.	US-PGPUB; USPAT	ADJ	ON	2019/08/27 10:25
S123	12635	G06F3/04847.cpc.	US-PGPUB; USPAT	ADJ	ON	2019/08/27 10:29
S124	14233	G06F3/04817.cpc.	US-PGPUB; USPAT	ADJ	ON	2019/08/27 10:29
S125	32534	g06f3/0482.cpc.	US-PGPUB; USPAT	ADJ	ON	2019/08/27 10:29
S126	24788	g06f3/04883.cpc.	US-PGPUB; USPAT	ADJ	ON	2019/08/27 10:29
S127	62711	(S123 or S124 or S125 or S126)	US-PGPUB; USPAT	ADJ	ON	2019/08/27 10:29
S128	2317	S127 AND (scal$3).clm.	US-PGPUB; USPAT	ADJ	ON	2019/08/27 10:29

S129	82	S127 AND (scal$3 near object).clm.	US-PGPUB; USPAT	ADJ	ON	2019/08/27 10:30
S130	1	(pressure or magnitude) WITH (touch or gesture) WITH (invers$2 near proportional)	US-PGPUB; USPAT	ADJ	ON	2019/11/29 10:41
S131	570	(pressure or magnitude) WITH (invers$2 near proportional)	US-PGPUB; USPAT	ADJ	ON	2019/11/29 10:41
S132	5	S131 SAME (touch or gesture)	US-PGPUB; USPAT	ADJ	ON	2019/11/29 10:41
S133	2751	(pressure or magnitude or touch) WITH (threshold) WITH (invers$3 or revers$3)	US-PGPUB; USPAT	ADJ	ON	2019/11/29 11:01
S134	2645	(pressure or magnitude) WITH (threshold) WITH (invers$3 or revers$3)	US-PGPUB; USPAT	ADJ	ON	2019/11/29 11:14
S135	14	(pressure or magnitude) WITH (threshold) WITH (invers$3 or revers$3) WITH (touch)	US-PGPUB; USPAT	ADJ	ON	2019/11/29 11:14
S136	0	"13567004".an.	US-PGPUB; USPAT	ADJ	ON	2019/11/29 11:15
S137	26	"13567004"	US-PGPUB; USPAT	ADJ	ON	2019/11/29 11:15
S138	13453	(inversely near (related or proportional)) WITH (pressure or magnitude)	US-PGPUB; USPAT	ADJ	ON	2019/12/03 19:22
S139	212	(inversely near (related or proportional)) WITH (pressure or magnitude) WITH (zoom$3 or scal$3)	US-PGPUB; USPAT	ADJ	ON	2019/12/03 19:23
S140	0	"6323846".pn. AND (invers$2)	US-PGPUB; USPAT	ADJ	ON	2019/12/03 19:34

S141	0	"09236513".an. AND (invers$2)	US-PGPUB; USPAT	ADJ	ON	2019/12/03 19:34
S142	1	"6323846".pn.	US-PGPUB; USPAT	ADJ	ON	2019/12/03 19:35
S143	0	"6323846".pn. AND (invers$2)	US-PGPUB; USPAT	ADJ	ON	2019/12/03 19:35
S144	1	"6323846".pn. AND (inversely)	US-PGPUB; USPAT	ADJ	ON	2019/12/03 19:35
S152	1	"6323846".pn. AND (invers$3)	US-PGPUB; USPAT	ADJ	ON	2019/12/05 23:29
S153	1	"9417754".pn.	US-PGPUB; USPAT; USOCR	ADJ	ON	2020/01/16 20:06
S154	1	"16377142" AND watch	US-PGPUB; USPAT; USOCR	ADJ	ON	2020/01/29 12:20
S155	1	"15719406"	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S156	16	"15072351"	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S157	29	"13567004"	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S158	4073	(("SMITH") near3 ("Michael")).INV.	US-PGPUB; USPAT; USOCR	ADJ	ON	2020/02/01 10:44

S159	19	(US-20090231290-$ or US-20070268261-$ or US-20060197750-$ or US-20060044281-$ or US-20030234768-$ or US-20080259046-$ or US-20110059777-$ or US-20080088602-$ or US-20110260984-$ or US-20100328230-$ or US-20070273671-$ or US-20070236470-$ or US-20110084921-$ or US-20110057889-$ or US-20110045813-$ or US-20100045621-$).did. or (US-6020878-$ or US-5729219-$ or US-8730199-$).did.	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S160	9	(US-20100058211-$ or US-20130076649-$ or US-20110261002-$ or US-20080146285-$ or US-20100035656-$ or US-20120060123-$ or US-20110059777-$ or US-20130321340-$ or US-20110291945-$).did.	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S161	27	S159 or S160	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S162	1511	touch screen AND (vibrate or vibrator) AND (pressure) AND (menu) AND ((launch$3 or open$3) WITH (program or application or software))	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S163	1221	S162 AND ((electronic$1mail or electronic mail or e$1mail) or (SMS or short message) or (social network))	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S164	18	S158 AND S163	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S165	18	S158 AND S162	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S166	1079	S158 AND touch	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S167	606	S166 AND pressure	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S168	67	S167 AND menu	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44

S169	295	S158 AND menu	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S170	178	S158 AND menu AND touch	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S171	111	S170 NOT S168	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S172	0	(back$1touch settings)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S173	29	(back$1touch near settings)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S174	4073	(("SMITH") near3 ("Michael")).INV.	US-PGPUB; USPAT; USOCR	ADJ	ON	2020/02/01 10:44
S175	123	S174 AND (touch$3 AND menu AND (social or sharing))	US-PGPUB; USPAT; USOCR	ADJ	ON	2020/02/01 10:44
S176	6	(US-20140053116-$ or US-20110302493-$ or US-20110153653-$ or US-20110096174-$ or US-20110025842-$ or US-20080177662-$).did.	US-PGPUB	ADJ	ON	2020/02/01 10:44
S177	0	S176 AND ((pressure or magnitude) WITH (touch))	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S178	0	S176 AND ((pressure or magnitude))	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S179	209	(menu) WITH (social media) WITH (shar$3)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44

S180	95945	(custom or programmable) WITH (gesture or input) WITH (application or program or function)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S181	4073	(("SMITH") near3 ("Michael")).INV.	US-PGPUB; USPAT; USOCR	ADJ	ON	2020/02/01 10:44
S182	83	S180 AND S181	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S183	2900	touch WITH (pressure or magnitude) WITH thresholds	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S184	10	touch WITH (pressure or magnitude) WITH thresholds WITH (context)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S185	71	("5745719").URPN.	USPAT	ADJ	ON	2020/02/01 10:44
S186	6	"11038590"	USPAT	ADJ	ON	2020/02/01 10:44
S187	1	"20060161871".pn.	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S188	1	"20060026535".pn.	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S189	15	(US-20140053116-$ or US-20110302493-$ or US-20110153653-$ or US-20110096174-$ or US-20110025842-$ or US-20080177662-$ or US-20130291126-$ or US-20060161871-$ or US-20060026535-$ or US-20090058829-$ or US-20090085881-$ or US-20100090982-$ or US-20100188327-$).did. or (US-9524042-$ or US-5745719-$).did.	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S190	76329	(touch WITH pressure)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44

S191	5	S189 and S190	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S192	57	(social network or social application) WITH (shar$3 object)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S193	14100	(social network or social application) WITH (post)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S194	4005	S193 AND (SMS and e$1mail)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S195	268	S194 AND (menu WITH GUI)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S196	29	S195 AND (touch WITH (pressure or magnitude))	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S197	51	(GUI or menu) WITH (pressure or magnitude) WITH (context)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S198	3	"12597684"	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S199	626	((context sensitive or context$1sensitive) WITH (icon))	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S200	8	S199 AND (pressure WITH touch)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S201	18	menu WITH historical usage	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S202	1	"8191015".pn.	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44

S203	1	"20080065991".pn. AND (menu WITH usage)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S204	10465	(social network or social media) WITH (shar$3 WITH (object or link or image or photo))	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:44
S205	9	S204 WITH (touch$3 WITH menu)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S206	19	S204 SAME (touch$3 WITH menu)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S207	396	S204 AND (touch$3 WITH menu)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S208	278	S204 AND (touch WITH pressure)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S209	13783	G06F3/04847.cpc.	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S210	15352	G06F3/04817.cpc.	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S211	35168	g06f3/0482.cpc.	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S212	26419	g06f3/04883.cpc.	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S213	67346	S209 or S210 or S211 or S212	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S214	9404	S213 AND (pressure WITH touch)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45

S215	3375	S214 AND (touch WITH menu)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S216	170031	(pressure WITH (magnitude or threshold))	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S217	1011	S216 AND S215	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S218	60	S217 AND S204	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S219	185	(slide WITH gesture WITH menu)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S220	9	S219 AND (slide WITH pressure)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S221	36	S219 AND (slide SAME pressure)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S222	10	"15072354"	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S223	4073	(("SMITH") near3 ("Michael")).INV.	US-PGPUB; USPAT; USOCR	ADJ	ON	2020/02/01 10:45
S224	12	S223 AND (intermediate state)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S225	48	S223 AND (gesture WITH menu)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S226	13783	G06F3/04847.cpc.	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45

S227	15352	G06F3/04817.cpc.	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S228	35168	g06f3/0482.cpc.	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S229	26419	g06f3/04883.cpc.	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S230	67346	(S226 or S227 or S228 or S229)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S231	1254	S230 AND (intermediate WITH (pressure or signal or state))	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S232	20	S230 AND (intermediate WITH (pressure or signal or state) WITH menu)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S233	208	("20010005692" | "20010043291" | "20020002629" | "20020005111" | "20020008691" | "20020033919" | "20020045854" | "20020085952" | "20020116952" | "20020116959" | "20020118180" | "20020130832" | "20020180763" | "20030117408" | "20030123328" | "20030147041" | "20030151589" | "20030217972" | "20030232192" | "20030235452" | "20040084372" | "20040108995" | "20040109788" | "20040121855" | "20040191509" | "20040207542" | "20040212598" | "20040239624" | "20040263488" | "20050045540" | "20050099403" | "20050231461" | "20050242034" | "20050264521" | "20050280746" | "20060001654" | "20060001800" | "20060033701" | "20060077186" | "20060107719" | "20060138983" | "20060146032" | "20060167400" | "20060179088" | "20060195064" | "20060197736" | "20060197737" | "20060209039" | "20060238495" | "20060260711" |	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45

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		"20090073138" | "20090086420" |				
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		"20090271731" | "20090289912" |				
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S234	234	("20130124993" | "20130125322" | "20130127765" | "20130132838" | "20130141388" | "20130181928" | "20130181931" | "20130188336" | "20130215064" | "20130307809" | "20130307827" | "20130321317" | "20130332876" | "20130335357" | "20140028601" | "20140057102" | "20140066139" | "20140096092" | "20140099235" | "20140104219" | "20140104220" | "20140132548" | "20140132549" | "20140134433" | "20140134434" | "20140139473" | "20140168128" | "20140191962" | "20140208248" | "20140210786" | "20140340358" | "20140368455" | "20150068526" | "20150197670" | "20150234518" | "20150253609" | "3633322"	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45

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		"5305423" | "5309172" | "5311302" |				
		"5343650" | "5386219" | "5448263" |				
		"5486286" | "5487827" | "5566096" |				
		"5680160" | "5742894" | "5743859" |				
		"5744027" | "5838244" | "5856822" |				
		"5947334" | "5999892" | "6108064" |				
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		"6441807" | "6509847" | "6526315" |				
		"6533757" | "6567102" | "6626013" |				
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		"6738514" | "6747636" | "6776546" |				
		"6791640" | "6801211" | "6879318" |				
		"6880998" | "6888537" | "6917282" |				
		"6919927" | "6933991" | "6961015" |				
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		"7098776" | "7122149" | "7138984" |				
		"7205983" | "7254973" | "7289113" |				
		"7303680" | "7312784" | "7312791" |				
		"7315336" | "7318892" | "7405779" |				
		"7423557" | "7437221" | "7535463" |				
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		"7705824" | "7738068" | "7755612" |				
		"7903096" | "7932893" | "7952566" |				
		"7973777" | "7973778" | "7982721" |				
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		"8334850" | "8345018" | "8349228" |				
		"8373675" | "8384674" | "8411039" |				
		"8416210" | "8424590" | "8427434" |				
		"8451238" | "8471824" | "8477111" |				
		"8479110" | "8487900" | "8493384" |				
		"8497884" | "8508494" | "8542193" |				
		"8542209" | "8553012" | "8564559" |				
		"8587542" | "8624851" | "8624867" |				

		"8638311" | "8648839" | "8654104" | "8674947" | "8692815" | "8698777" | "8717303" | "8723826" | "8727557" | "8743076" | "8745514" | "8754862" | "8760408" | "8780089" | "8816993" | "8854317" | "8866785" | "8872798" | "8878809" | "8878810" | "8884913" | "8896575" | "8913031" | "8917262" | "8947381" | "8970540" | "8976128" | "8982081" | "8988364" | "9003591" | "9013414" | "9018030" | "9030427" | "9035897" | "9041679" | "9045670" | "9046999" | "9063597" | "9069204" | "9069416" | "9069460" | "9092129" | "9098193" | "9116609" | "9125630" | "9130651" | "9134880" | "9152258" | "9152288" | "RE41716").PN.				
S235	442	S233 or S234	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S236	17	S235 AND (intermediate WITH (pressure or signal or state))	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S237	297	S235 AND (second WITH (pressure or signal or state))	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S238	58	S235 AND (second WITH (pressure or signal or state) WITH third)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S239	1	S235 AND (second WITH (pressure or signal or state) WITH third) WITH menu	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S240	3223	g06f2203/04105.cpc.	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S241	781	S240 AND (second WITH (pressure or signal or state) WITH third)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45

S242	781	S240 AND (second WITH (pressure or signal or state) WITH third)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S243	12	S240 AND (second WITH (pressure or signal or state) WITH third) WITH menu	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S244	147	S240 AND (intermediate WITH (pressure or signal or state))	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S245	10	"15072354"	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S246	14	(US-20130162667-$ or US-20110145764-$ or US-20100313166-$ or US-20080219493-$ or US-20040150644-$ or US-20120306788-$ or US-20110175805-$ or US-20100026640-$ or US-20080178126-$ or US-20110196935-$ or US-20090207175-$ or US-20120225413-$ or US-20080204427-$ or US-20080024459-$).did.	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S247	1	"3659229".pn.	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S248	10	"15072354"	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S249	1	"10133397".pn.	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S250	4073	(("SMITH") near3 ("Michael")).INV.	US-PGPUB; USPAT; USOCR	ADJ	ON	2020/02/01 10:45
S251	1	"16377142"	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S252	10	(antonio near2 xavier).xa,xp. AND (virtual layer).clm.	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45

S253	360	(virtual layer).clm.	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S254	1	"3659229".pn.	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S255	0	"2010175805".pn.	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S256	1	"20110175805".pn.	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S257	2720	(pressure or magnitude) WITH (selection WITH (size))	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S258	90	(pressure or magnitude or intensity) WITH (selection WITH (size)) WITH (touch or finger)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S259	2	"14144140"	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S260	8	("20010024195" | "20080189629" | "20100153879" | "20110239110" | "20130147718" | "20130191785" | "20150149964" | "9244601").PN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2020/02/01 10:45
S261	4073	(("SMITH") near3 ("Michael")).INV.	US-PGPUB; USPAT; USOCR	ADJ	ON	2020/02/01 10:45
S262	36	S261 AND (scal$3).clm.	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S263	13783	G06F3/04847.cpc.	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S264	15352	G06F3/04817.cpc.	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45

S265	35168	g06f3/0482.cpc.	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S266	26419	g06f3/04883.cpc.	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S267	67346	(S263 or S264 or S265 or S266)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S268	2491	S267 AND (scal$3).clm.	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S269	88	S267 AND (scal$3 near object).clm.	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S270	2	(pressure or magnitude) WITH (touch or gesture) WITH (invers$2 near proportional)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S271	573	(pressure or magnitude) WITH (invers$2 near proportional)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S272	6	S271 SAME (touch or gesture)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S273	2783	(pressure or magnitude or touch) WITH (threshold) WITH (invers$3 or revers$3)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S274	2677	(pressure or magnitude) WITH (threshold) WITH (invers$3 or revers$3)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S275	14	(pressure or magnitude) WITH (threshold) WITH (invers$3 or revers$3) WITH (touch)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S276	0	"13567004".an.	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45

S277	29	"13567004"	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S278	13560	(inversely near (related or proportional)) WITH (pressure or magnitude)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S279	217	(inversely near (related or proportional)) WITH (pressure or magnitude) WITH (zoom$3 or scal$3)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S280	0	"6323846".pn. AND (invers$2)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S281	0	"09236513".an. AND (invers$2)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S282	1	"6323846".pn.	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S283	0	"6323846".pn. AND (invers$2)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S284	1	"6323846".pn. AND (inversely)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S285	1	"6323846".pn. AND (invers$3)	US-PGPUB; USPAT	ADJ	ON	2020/02/01 10:45
S286	1	"9417754".pn.	US-PGPUB; USPAT; USOCR	ADJ	ON	2020/02/01 10:45
S287	1	"16377142" AND watch	US-PGPUB; USPAT; USOCR	ADJ	ON	2020/02/01 10:45
S309	3	"20060026535".pn. or "20110248941".pn. or "20100153879".pn.	US-PGPUB; USPAT	ADJ	ON	2020/02/03 09:30

S310	1	"20060210958".pn.	US-PGPUB; USPAT	ADJ	ON	2020/04/13 10:46
S311	157	(home$1screen or home screen) AND (touch$1down or touch down) AND (lift$1off or lift off)	US-PGPUB; USPAT	ADJ	ON	2020/04/13 11:25
S312	6315	((home$1screen or home screen) WITH interface)	US-PGPUB; USPAT	ADJ	ON	2020/04/13 11:27
S313	334	(touch$1down or touch down) WITH (lift$1off or lift off) WITH (move or movement or direction or swipe or flick)	US-PGPUB; USPAT	ADJ	ON	2020/04/13 11:27
S314	53	S312 AND S313	US-PGPUB; USPAT	ADJ	ON	2020/04/13 11:28
S315	1	"20080204476".pn. AND (press or duration)	US-PGPUB; USPAT	ADJ	ON	2020/05/01 11:00

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L2	76	(("SMITH") near3 ("Michael")).INV. AND (duration).clm.	USPAT	ADJ	ON	2020/05/01 15:43
S93	3480	G06F3/04847.cpc.	USPAT	ADJ	ON	2018/09/07 17:58
S94	4153	G06F3/04817.cpc.	USPAT	ADJ	ON	2018/09/07 17:58
S95	9279	g06f3/0482.cpc.	USPAT	ADJ	ON	2018/09/07 17:58
S96	7394	g06f3/04883.cpc.	USPAT	ADJ	ON	2018/09/07 17:58
S99	0	(when near slide gesture).dm.	USPAT	ADJ	ON	2019/01/03 07:53

S100	21	(slide gesture WITH second).clm.	USPAT	ADJ	ON	2019/01/03 07:53
S103	1	((slide WITH gesture) WITH (pressure) WITH menu).clm.	USPAT	ADJ	ON	2019/01/04 18:45
S104	3821	G06F3/04847.cpc.	USPAT	ADJ	ON	2019/01/04 18:50
S105	4491	G06F3/04817.cpc.	USPAT	ADJ	ON	2019/01/04 18:50
S106	10010	g06f3/0482.cpc.	USPAT	ADJ	ON	2019/01/04 18:50
S107	7926	g06f3/04883.cpc.	USPAT	ADJ	ON	2019/01/04 18:50
S108	19968	S104 or S105 or S106 or S107	USPAT	ADJ	ON	2019/01/04 18:50
S109	3565	S108 AND (slide or gesture).clm.	USPAT	ADJ	ON	2019/01/04 18:51
S110	203	S109 AND (pressure).clm.	USPAT	ADJ	ON	2019/01/04 18:51
S145	4932	G06F3/04847.cpc.	USPAT	ADJ	ON	2019/12/03 19:32
S146	5592	G06F3/04817.cpc.	USPAT	ADJ	ON	2019/12/03 19:32
S147	12545	g06f3/0482.cpc.	USPAT	ADJ	ON	2019/12/03 19:32
S148	9558	g06f3/04883.cpc.	USPAT	ADJ	ON	2019/12/03 19:32
S149	24442	S145 or S146 or S147 or S148	USPAT	ADJ	ON	2019/12/03 19:32
S150	39	S149 AND (inversely).clm.	USPAT	ADJ	ON	2019/12/03 19:32
S151	0	"6323846".pn. AND (invers$2)	USPAT	ADJ	ON	2019/12/03 19:34

S288	5129	G06F3/04847.cpc.	USPAT	ADJ	ON	2020/02/01 10:45
S289	5802	G06F3/04817.cpc.	USPAT	ADJ	ON	2020/02/01 10:45
S290	12997	g06f3/0482.cpc.	USPAT	ADJ	ON	2020/02/01 10:45
S291	9855	g06f3/04883.cpc.	USPAT	ADJ	ON	2020/02/01 10:45
S292	0	(when near slide gesture).dm.	USPAT	ADJ	ON	2020/02/01 10:45
S293	27	(slide gesture WITH second).clm.	USPAT	ADJ	ON	2020/02/01 10:45
S294	4	((slide WITH gesture) WITH (pressure) WITH menu).clm.	USPAT	ADJ	ON	2020/02/01 10:45
S295	5129	G06F3/04847.cpc.	USPAT	ADJ	ON	2020/02/01 10:45
S296	5802	G06F3/04817.cpc.	USPAT	ADJ	ON	2020/02/01 10:45
S297	12997	g06f3/0482.cpc.	USPAT	ADJ	ON	2020/02/01 10:45
S298	9855	g06f3/04883.cpc.	USPAT	ADJ	ON	2020/02/01 10:45
S299	25236	S295 or S296 or S297 or S298	USPAT	ADJ	ON	2020/02/01 10:45
S300	4516	S299 AND (slide or gesture).clm.	USPAT	ADJ	ON	2020/02/01 10:45
S301	269	S300 AND (pressure).clm.	USPAT	ADJ	ON	2020/02/01 10:45
S302	5129	G06F3/04847.cpc.	USPAT	ADJ	ON	2020/02/01 10:45
S303	5802	G06F3/04817.cpc.	USPAT	ADJ	ON	2020/02/01 10:45

S304	12997	g06f3/0482.cpc.	USPAT	ADJ	ON	2020/02/01 10:45
S305	9855	g06f3/04883.cpc.	USPAT	ADJ	ON	2020/02/01 10:45
S306	25236	S302 or S303 or S304 or S305	USPAT	ADJ	ON	2020/02/01 10:45
S307	39	S306 AND (inversely).clm.	USPAT	ADJ	ON	2020/02/01 10:45
S308	0	"6323846".pn. AND (invers$2)	USPAT	ADJ	ON	2020/02/01 10:45
S316	5520	G06F3/04847.cpc.	USPAT	ADJ	ON	2020/05/01 10:44
S317	6132	G06F3/04817.cpc.	USPAT	ADJ	ON	2020/05/01 10:44
S318	13801	g06f3/0482.cpc.	USPAT	ADJ	ON	2020/05/01 10:44
S319	10339	g06f3/04883.cpc.	USPAT	ADJ	ON	2020/05/01 10:44
S320	26581	S316 or S317 or S318 or S319	USPAT	ADJ	ON	2020/05/01 10:44
S321	4456	S320 AND ((touch or contact or press or gesture) WITH (duration or threshold))	USPAT	ADJ	ON	2020/05/01 10:44
S322	1370	S320 AND ((touch or contact or press or gesture) WITH (duration or threshold)).clm.	USPAT	ADJ	ON	2020/05/01 10:44
S323	1670	S321 AND (hyper$1link or hyperlink or web$1page or web page)	USPAT	ADJ	ON	2020/05/01 10:47
S324	44	S322 AND (hyper$1link or hyperlink or web$1page or web page).dm.	USPAT	ADJ	ON	2020/05/01 10:48

5/1/2020 3:52:42 PM
C:\Users\axavier\Desktop\axavier data files\EAST workspaces\16687649-CON of 16377142-CON of 16153763-CON of 15072354-CON of 13567004.wsp

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	
Filing Date	
First Named Inventor	Michael S Smith
Art Unit	
Examiner Name	
Attorney Docket Number	SMITH070AY

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	8055833	B2	2011-11-08	Danilak et al.	
	2	8057419	B2	2011-11-15	Ellingboe et al.	
	3	8060774	B2	2011-11-15	Smith et al.	
	4	8068021	B1	2011-11-29	Donohue	
	5	8072430	B2	2011-12-06	Kim et al.	
	6	8072837	B1	2011-12-06	Solomon et al.	
	7	8077535	B2	2011-12-13	Schakel et al.	
	8	8081474	B1	2011-12-20	Zohni et al.	

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	9	8081535	B2	2011-12-20	Bhakta et al.	
	10	8081536	B1	2011-12-20	Solomon et al.	
	11	8081537	B1	2011-12-20	Bhakta et al.	
	12	8081677	B2	2011-12-20	Badalone	
	13	8082523	B2	2011-12-20	Forstall et al.	Entire Document
	14	8089795	B2	2012-01-03	Rajan et al.	
	15	8090897	B2	2012-01-03	Rajan et al.	
	16	8093702	B2	2012-01-10	Lua et al.	
	17	8094134	B2	2012-01-10	Suzuki et al.	
	18	8094673	B2	2012-01-10	Proctor et al.	
	19	8102496	B2	2012-01-24	Kim	

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	20	8103215	B2	2012-01-24	Rek	
	21	8103928	B2	2012-01-24	Hargan	
	22	8106491	B2	2012-01-31	Corisis et al.	
	23	8106520	B2	2012-01-31	Keeth et al.	
	24	8111534	B2	2012-02-07	Walker	
	25	8111566	B1	2012-02-07	Wang et al.	
	26	8112266	B2	2012-02-07	Rajan et al.	
	27	8115291	B2	2012-02-14	Baek et al.	
	28	8120044	B2	2012-02-21	Cho et al.	
	29	8122207	B2	2012-02-21	Rajan et al.	
	30	8127185	B2	2012-02-28	Jeddeloh	

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	31	8127204	B2	2012-02-28	Hargan	
	32	8130527	B2	2012-03-06	Keeth	
	33	8130560	B1	2012-03-06	Rajan et al.	
	34	8134378	B2	2012-03-13	Keeth	
	35	8135900	B2	2012-03-13	Kunimatsu et al.	
	36	8143710	B2	2012-03-27	Cho	
	37	8144453	B2	2012-03-27	Brown et al.	
	38	8148763	B2	2012-04-03	Kim et al.	
	39	8148807	B2	2012-04-03	Lee et al.	
	40	8154901	B1	2012-04-10	Lee et al.	
	41	8154935	B2	2012-04-10	Rajan et al.	

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	42	8158967	B2	2012-04-17	Tang et al.	
	43	8169233	B2	2012-05-01	Ferolito et al.	
	44	8169841	B2	2012-05-01	Johnson et al.	
	45	8173507	B2	2012-05-08	Lim et al.	
	46	8174105	B2	2012-05-08	Kwang et al.	
	47	8174115	B2	2012-05-08	Chung	
	48	8180954	B2	2012-05-15	Kilzer et al.	
	49	8181048	B2	2012-05-15	Rajan et al.	
	50	8184228	B2	2012-05-22	Han et al.	
	51	8185778	B2	2012-05-22	Kilzer et al.	
	52	8187901	B2	2012-05-29	Sheen	

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	53	8188982	B2	2012-05-29	You et al.	
	54	8189328	B2	2012-05-29	Kanapathippillai et al.	
	55	8193646	B2	2012-06-05	Wood et al.	
	56	8199116	B2	2012-06-12	Jeon et al.	
	57	8207945	B2	2012-06-26	Jong et al.	
	58	8209479	B2	2012-06-26	Rajan et al.	
	59	8209628	B1	2012-06-26	Davidson	
	60	8218705	B2	2012-07-10	Moghaddam et al.	
	61	8223799	B2	2012-07-17	Karaoguz	
	62	8228309	B2	2012-07-24	Tamaki et al.	
	63	8244971	B2	2012-08-14	Rajan et al.	

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	Attorney Docket Number	SMITH070AY

	64	8248255	B2	2012-08-21	Tzidon et al.	
	65	8253699	B2	2012-08-28	Son	
	66	8261041	B2	2012-09-04	Kunimatsu	
	67	8264903	B1	2012-09-11	Lee et al.	
	68	8265709	B2	2012-09-11	Forstall	
	69	8265822	B2	2012-09-11	Nakashima et al.	
	70	8269731	B2	2012-09-18	Mölne	
	71	8269733	B2	2012-09-18	HU	
	72	8270148	B2	2012-09-18	Griffith et al.	
	73	8279361	B2	2012-10-02	Chen et al.	
	74	8279690	B1	2012-10-02	Wang et al.	

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	First Named Inventor	Michael S Smith
	Art Unit	
	Examiner Name	
	Attorney Docket Number	SMITH070AY

	75	8280714	B2	2012-10-02	Rajan et al.	
	76	8286102	B1	2012-10-09	Wilensky	
	77	8287291	B1	2012-10-16	Bhakta et al.	
	78	8291341	B2	2012-10-16	Tseng et al.	
	79	8291344	B2	2012-10-16	Chaudhri	Entire Document
	80	8296496	B2	2012-10-23	Mogul et al.	
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Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

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A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Patrick Caldwell/	Date (YYYY-MM-DD)	2019-11-18
Name/Print	Patrick Caldwell	Registration Number	44580

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	Filing Date	
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	Attorney Docket Number	SMITH070AY

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

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☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Patrick Caldwell/	Date (YYYY-MM-DD)	2019-11-18
Name/Print	Patrick Caldwell	Registration Number	44580

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

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Name/Print	Patrick Caldwell	Registration Number	44580

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Signature	/Patrick Caldwell/	Date (YYYY-MM-DD)	2019-11-18
Name/Print	Patrick Caldwell	Registration Number	44580

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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

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Bibliographic Data

Application No: 16/687,649

Foreign Priority claimed: ○ Yes ◉ No

35 USC 119 (a-d) conditions met: ☐ Yes ☑ No ☐ Met After Allowance

Verified and Acknowledged: /Antonio Xavier/ (Examiner's Signature) | (Initials)

Title: DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
11/18/2019	345	2623	SMITH070AY
RULE			

APPLICANTS

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INVENTORS

Michael S Smith Palo Alto, CA, UNITED STATES

CONTINUING DATA

This application is a CON of 16377142 04/05/2019 PAT 10656753

16377142 is a CON of 16153763 10/06/2018 PAT 10275086

16153763 is a CON of 15072354 03/16/2016 PAT 10133397

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13567004 has PRO of 61581918 12/30/2011

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13567004 has PRO of 61515835 08/05/2011

FOREIGN APPLICATIONS

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Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

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Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

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See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Patrick Caldwell/	Date (YYYY-MM-DD)	2019-11-18
Name/Print	Patrick Caldwell	Registration Number	44580

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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Filing Date:	18-Nov-2019
Title of Invention:	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK
First Named Inventor/Applicant Name:	Michael S Smith
Filer:	Patrick Edgar Caldwell
Attorney Docket Number:	SMITH070AY

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CLAIMS IN EXCESS OF 20	2202	53	50	2650
Miscellaneous-Filing:				
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Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
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			Total in USD ($)	**2650**

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EFS ID:	39279924
Application Number:	16687649
International Application Number:	
Confirmation Number:	6079
Title of Invention:	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK
First Named Inventor/Applicant Name:	Michael S Smith
Customer Number:	92045
Filer:	Patrick Edgar Caldwell
Filer Authorized By:	
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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Preliminary Amendment	SMITH070AY_PrelimAmend_vF_27-Apr-2020.pdf	152097 c481bbc7f2ec66cca89ba98f38a314c8a9bd51d6	no	41
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	31107 5792bb9e3956e9481e2d2ff8e46f063e8d003289	no	2
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Michael S. Smith Application No.: 16/687,649 Filed: 11-18-2019 For: DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK	Confirmation No.: 6079 Examiner: XAVIER, ANTONIO J Art Unit: 2623 Atty. Docket No.: SMITH070AY Date: 4/27/2020

PRELIMINARY AMENDMENT C

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Examiner:

Before substantive examination, please enter the following:

IN THE CLAIMS

Please amend the claims as follows:

1.-21. (Cancelled)

22. (New) An electronic device, comprising:

a display;

a touch-sensitive interaction surface;

an actuator;

one or more processors;

memory; and

one or more programs, wherein the one or more programs are stored in the memory and configured to be executed by the one or more processors, the one or more programs including instructions to:

display, on the display and via a user interface of a network browser application, a first web page including a hyperlink that identifies a second web page;

detect a first contact starting at a first contact point at a first contact time on the touch-sensitive interaction surface;

detect an end of the first contact at a second contact time;

determine a duration of the first contact as a difference between the first contact time and the second contact time;

determine whether there is a contact movement of the first contact between the first contact point and a second contact point;

determine whether the first contact point of the first contact corresponds with a location of the hyperlink of the first web page;

when: the first web page is displayed via the user interface of the network browser application, the duration of the first contact is determined to be less than a first user-configurable predefined duration, and the end of the first contact is detected: avoid display, on the first web page, a result of any operation based on the first contact;

when: the first web page is displayed via the user interface of the network browser application, the duration of the first contact is determined to be greater than the first user-configurable predefined duration and less than a second user-configurable predefined duration, the first contact point of the first contact is determined to correspond with the location of the hyperlink of the first web page, it is not determined that there is the contact movement of the first contact between the first contact point and the second contact point, and the end of the first contact is detected: replace the display of the first web page with the second web page via the user interface of the network browser application; and

when: the first web page is displayed via the user interface of the network browser application, the duration of the first contact is determined to be greater than the second user-configurable predefined duration, the first contact point of the first contact is determined to correspond with the location of the hyperlink of the first web page, it is not determined that there is the contact movement of the first contact between the first contact point and the second contact point, and the end of the first contact is not detected: output, utilizing the actuator, a first feedback that is perceptible by touch and display a

menu including at least one option for, in response to detection of a selection thereof, performing an operation on a web address associated with the hyperlink of the first web page, and further display at least a portion of the second web page, such that at least the at least portion of the second web page is displayed in at least one first virtual display layer which appears above at least one second virtual display layer that includes at least a portion of the user interface of the network browser application that remains at least partially visible.

23. (New) The electronic device of Claim 22, wherein the electronic device is configured such that:

the user interface of the network browser is configured for performing an operation in response to it being determined that there is the contact movement of the first contact between the first contact point and the second contact point; and

the at least portion of the second web page is displayed in a view that is not configured for performing the operation in response to it being determined that there is the contact movement of the first contact between the first contact point and the second contact point.

24. (New) The electronic device of Claim 22, wherein the electronic device is configured such that the first feedback that is perceptible by touch is output prior to the display of the menu.

25. (New) The electronic device of Claim 22, wherein the electronic device is configured to, when: the menu is displayed, it is determined that there is the contact movement of the first contact between the first contact point and the second contact point in a first direction for a first distance, and the end of the touch is not detected: display movement, in the first direction, of the at least portion of the second web page and the menu continuously as a continuous function of the contact movement of the first contact detected in the first direction.

26. (New) The electronic device of Claim 25, wherein the electronic device is configured such that the display of the movement in the first direction is reverted when the end of the first contact is detected.

27. (New) The electronic device of Claim 25, wherein the electronic device is configured such that the display of the movement in the first direction is not reverted when the end of the first contact is detected.

28. (New) The electronic device of Claim 22, wherein the electronic device is configured to, when: the menu is displayed, it is determined that there is the contact movement of the first contact between the first contact point and the second contact point in a first direction for a first distance, and the end of the touch is not detected: display a decrease in a size of the at least portion of the second web page continuously as a continuous function of the contact movement of the first contact detected in the first direction.

29. (New) The electronic device of Claim 28, wherein the electronic device is configured such that the decrease in the size of the at least portion of the second web page is displayed while not displaying a change in a size of the menu.

30. (New) The electronic device of Claim 28, wherein the electronic device is configured such that the decrease in the size remains when the end of the first contact is detected.

31. (New) The electronic device of Claim 22, wherein the electronic device is configured to, when: the menu is displayed, it is determined that there is the contact movement of the first contact between the first contact point and the second contact point in a first direction for a first distance, and the end of the touch is not detected: display movement, in the first direction, of the at least portion of the second web page and the menu continuously as a continuous function of the contact movement of the first contact detected in the first direction, and display a decrease in a size of the at least portion of the second web page continuously as a continuous function of the contact movement of the first contact detected in the first direction.

32. (New) The electronic device of Claim 31, wherein the electronic device is configured such that the display of the movement in the first direction and the display of the decrease in the size are reverted when the end of the first contact is detected.

33. (New) The electronic device of Claim 31, wherein the electronic device is configured such that the display of the movement in the first direction and the display of the decrease in the size are not reverted when the end of the first contact is detected.

34. (New) The electronic device of Claim 25, wherein the electronic device is configured to, when: the menu is displayed, it is determined that there is the contact movement of the first contact between the first contact point and the second contact point in a second direction for less than the first distance after the contact movement of the first contact is determined between the first contact point and the second contact point in the first direction, and the end of the first contact is not detected: display movement, in the second direction, of the at least portion of the second web page and the menu continuously as a continuous function of the contact movement of the first contact detected in the second direction.

35. (New) The electronic device of Claim 28, wherein the electronic device is configured to, when: the menu is displayed, it is determined that there is the contact movement of the first contact between the first contact point and the second contact point in a second direction for less than the first distance after it is determined that there is the contact movement of the first contact between the first contact point and the second contact point in the first direction, and the end of the first contact is not detected: display an increase in the size of the at least portion of the second web page continuously as a continuous function of the contact movement of the first contact detected in the second direction.

36. (New) The electronic device of Claim 35, wherein the electronic device is configured such that the increase in the size of the at least portion of the second web page is displayed while not displaying a change in the size of the menu.

37. (New) The electronic device of Claim 35, wherein the electronic device is configured such that the display of the movement in the second direction and the display of the increase in the size are continued when the end of the first contact is detected.

38. (New) The electronic device of Claim 22, wherein the electronic device is configured to:

when: the menu is displayed, it is determined that there is the contact movement of the first contact between the first contact point and the second contact point for less than a first predetermined length, and the end of the first contact is not detected: display a decrease in a size of the at least portion of the second web page continuously as a continuous function of the contact movement of the first contact detected while not displaying a change in a size of the menu; and

when: the menu is displayed, the contact movement of the first contact is determined between the first contact point and the second contact point for greater than the first predetermined length, and the end of the first contact is not detected: display a decrease in a size of the menu while fading out the menu, until the display of the menu is ceased.

39. (New) The electronic device of Claim 38, wherein the electronic device is configured such that the display of the movement and the display of the decrease in the size are reverted when the end of the first contact is detected.

40. (New) The electronic device of Claim 38, wherein the electronic device is configured such that the display of the fade out is reverted when the end of the first contact is detected, for re-displaying the menu.

41. (New) The electronic device of Claim 38, wherein the electronic device is configured such that the display of the movement and the display of the decrease in the size are not reverted when the end of the first contact is detected.

42. (New) The electronic device of Claim 22, wherein the electronic device is configured such that:

the user interface of the network browser is configured for displaying: scrolling of the second web page via the user interface of the network browser application in response to detection of longitudinal contact movement, opening of one or more hyperlinks of the second web page in response to detection of a selection thereof, and opening of one or more manually entered web addresses in response to detection of a manual entry thereof; and

the at least portion of the second web page is displayed in a view that is different from the user interface of the network browser application in that the view is configured for not displaying: the scrolling of the second web page via the user interface of the network browser application in response to detection of the longitudinal contact movement, the opening of the one or more hyperlinks of the second web page in response to detection of the selection thereof, and the opening of the one or more manually entered hyperlinks in response to detection of the manual entry thereof.

43. (New) The electronic device of Claim 22, wherein the electronic device is configured such that:

the user interface of the network browser is configured for scrolling in response to it being determined that there is the contact movement of the first contact between the first contact point and the second contact point; and

the at least portion of the second web page is displayed in a view that is not configured for scrolling in response to it being determined that there is the contact movement of the first contact between the first contact point and the second contact point.

44. (New) The electronic device of Claim 22, wherein the electronic device is configured such that the at least one option includes: a first option for, in response to detection of a selection thereof, opening the second web page in a new tab of the network browser application for

displaying the at least portion of the second web page; a second option for, in response to detection of a selection thereof, opening the second web page in another tab of the network browser application for displaying the at least portion of the second web page; a third option for, in response to detection of a selection thereof, copying the web address; a fourth option for, in response to detection of a selection thereof, sharing an image of the second web page without sharing other parts of the second web page including text; and a fifth option for, in response to detection of a selection thereof, opening the image in the new tab of the network browser application for displaying the image without displaying the other parts of the second web page including the text.

45. (New) The electronic device of Claim 44, wherein the electronic device is configured such that the another tab includes a background tab.

46. (New) The electronic device of Claim 44, wherein the electronic device is configured such that the image includes a single image.

47. (New) The electronic device of Claim 44, wherein the electronic device is configured such that the opening the second web page includes displaying the image in addition to the text of the web page.

48. (New) The electronic device of Claim 22, wherein the electronic device is configured such that the at least one option includes: a first plurality of operations for operating only on a single image of the second web page, and a second plurality of operations for operating only on the web address.

49. (New) The electronic device of Claim 22, wherein the electronic device is configured such that the at least one option includes: a first plurality of operations for operating on a single image of the second web page, and a second plurality of operations for operating on the web address.

50. (New) The electronic device of Claim 22, wherein the electronic device is configured such that the at least portion of the second web page is displayed in the at least one first virtual display layer where, in response to detection of a selection of the at least portion of the second web page, the second web page is enlarged.

51. (New) The electronic device of Claim 22, wherein the electronic device is configured such that the at least portion of the second web page is displayed in the at least one first virtual display layer where, in response to detection of a selection of the at least portion of the second web page, the at least one first virtual display layer is enlarged.

52. (New) The electronic device of Claim 22, wherein the electronic device is configured such that the at least portion of the second web page is displayed in the at least one first virtual display layer where, in response to detection of a selection of the at least portion of the second web page, the at least portion of the second web page is displayed via the user interface of the network browser application.

53. (New) The electronic device of Claim 22, wherein the electronic device is configured for utilizing one or more types of one or more gesture recognizers, where the one or more types of one or more gesture recognizers include a first type of gesture recognizer that is a non-continuous gesture recognizer that is operable to recognize a gesture without performing any intermediate operations.

54. (New) The electronic device of Claim 22, wherein the electronic device is configured for utilizing one or more types of one or more gesture recognizers, where the one or more types of one or more gesture recognizers include a first type of gesture recognizer that is a continuous gesture recognizer that is operable to recognize a gesture and continuously perform one or more intermediate operations.

55. (New) The electronic device of Claim 22, wherein the electronic device is configured for utilizing one or more types of one or more gesture recognizers, where the one or more types of one or more gesture recognizers include a first type of gesture recognizer that is a continuous

gesture recognizer that is operable to recognize a gesture and continuously perform one or more intermediate operations, where the one or more intermediate operations are operations associated with the gesture that are executed before the gesture is done.

56. (New) The electronic device of Claim 22, wherein the electronic device is configured for utilizing one or more types of one or more gesture recognizers and one or more types of one or more gesture differentiators.

57. (New) The electronic device of Claim 22, wherein the electronic device is configured for utilizing one or more types of one or more gesture recognizers and one or more types of one or more gesture differentiators, where at least one gesture differentiator utilizes at least one gesture recognizer.

58. (New) The electronic device of Claim 22, wherein the electronic device is configured for utilizing one or more types of one or more gesture differentiators including a first type of gesture differentiator that is a non-continuous gesture differentiator that uses a non-continuous gesture recognizer.

59. (New) The electronic device of Claim 22, wherein the electronic device is configured for utilizing one or more types of one or more gesture differentiators including a first type of gesture differentiator that is a non-continuous gesture differentiator that uses a non-continuous gesture recognizer, and a second type of gesture differentiator that is a continuous gesture differentiator that uses a continuous gesture recognizer.

60. (New) The electronic device of Claim 22, wherein the electronic device is configured for utilizing one or more types of one or more gesture recognizers including a first non-continuous gesture recognizer to recognize a first touch gesture and a second non-continuous gesture differentiator to recognize a second touch gesture.

61. (New) The electronic device of Claim 22, wherein the electronic device is configured to:

when: the menu is displayed, it is not determined that there is the contact movement of the first contact between the first contact point and the second contact point, and the end of the first contact is detected: avoid display, on the first web page, a result of any further operation based on the first contact;

when: the menu is displayed, it is determined that there is the contact movement of the first contact between the first contact point and the second contact point in a first direction for a first distance, and the end of the touch is not detected: display movement, in the first direction, of the at least portion of the second web page and the menu continuously as a continuous function of the contact movement of the first contact detected in the first direction, and display a decrease in a size of the at least portion of the second web page continuously as a continuous function of the contact movement of the first contact detected in the first direction while not displaying a change in a size of the menu, such that the display of the movement in the first direction and the display of the decrease in the size are not reverted when the end of the first contact is detected;

when: the menu is displayed, it is determined that there is the contact movement of the first contact between the first contact point and the second contact point in a second direction for less than the first distance after it is determined that there is the contact movement of the first contact between the first contact point and the second contact point in the first direction, and the end of the first contact is not detected: display movement, in the second direction, of the at least portion of the second web page and the menu continuously as a continuous function of the contact movement of the first contact detected in the second direction, and display an increase in the size of the at least portion of the second web page continuously as a continuous function of the contact movement of the first contact detected in the second direction while not displaying a change in the size of the menu, such that the display of the movement in the second direction and the display of the increase in the size are continued when the end of the first contact is detected;

when: the menu is displayed, it is determined that there is the contact movement of the first contact between the first contact point and the second contact point in the second direction for a second distance that is less than a first predetermined length, and the end of the first contact is not detected: display movement, in the second direction, of the at least portion of the second web page and the menu continuously as a continuous function of the contact movement of the first contact detected in the second direction, and display a decrease in a size of the at least portion of the second web page continuously as a continuous function of the contact movement of the first contact detected in the second direction while not displaying a change in a size of the menu, such that the display of the movement in the second direction and the display of the decrease in the size are reverted when the end of the first contact is detected;

when: the menu is displayed, it is determined that there is the contact movement of the first contact between the first contact point and the second contact point in the first direction for less than the second distance after it is determined that there is the contact movement of the first contact between the first contact point and the second contact point in the second direction, and the end of the first contact is not detected: display movement, in the first direction, of the at least portion of the second web page and the menu continuously as a continuous function of the contact movement of the first contact detected in the first direction, and display an increase in the size of the at least portion of the second web page continuously as a continuous function of the contact movement of the first contact detected in the first direction while not displaying a change in the size of the menu, such that the display of the movement in the first direction and the display of the increase in the size are continued when the end of the first contact is detected;

when: the menu is displayed, it is determined that there is the contact movement of the first contact between the first contact point and the second contact point in the second direction for a third distance that is greater than the first predetermined length, and the end of the first contact is not detected: display a decrease in a size of the menu while fading out the menu, until the display of the menu is ceased, such that the display

of the decrease in the size and the fade out are reverted when the end of the first contact is detected, for re-displaying the menu;

when: it is determined that there is the contact movement of the first contact between the first contact point and the second contact point in the first direction for less than the third distance after it is determined that there is the contact movement of the first contact between the first contact point and the second contact point in the second direction, and the end of the first contact is not detected: display an increase in the size of the menu while fading in the menu, until the menu is re-displayed; and

when: the menu is displayed, it is determined that there is the contact movement of the first contact between the first contact point and the second contact point in the second direction for a fourth distance that is greater than a second predetermined length that is greater than the first predetermined length, and the end of the first contact is detected: cease display of the menu, cease display of the at least portion of the second web page, and display the at least portion of the first web page of the at least one second virtual display layer without being altered.

62. (New) The electronic device of Claim 61, wherein the electronic device is configured such that at least one of:

said touch-sensitive interaction surface and the display are components of a touch screen;

said touch-sensitive interaction surface and the display are on a front face of the electronic device;

said touch-sensitive interaction surface and the display are on a back face of the electronic device;

said actuator includes at least one of: a vibrator, a motor, or an actuator;

said first feedback includes a vibration;

said first feedback includes at least one of: a vibration, a force feedback, a tactile output, a weight feedback, a mechanical output, or a mass feedback;

said first feedback includes at least one of: a vibration, a force feedback, a tactile output, a weight feedback, a mechanical output, or a mass feedback;

said first feedback that is perceptible by touch results from the electronic device being vibrated only once;
said first feedback that is perceptible by touch results from the electronic device being vibrated at least once;
said first feedback that is perceptible by touch results from the electronic device being vibrated for a predetermined period of time;
said first contact includes at least one of a touch contact or a press contact;
said end of the first contact includes a lift off of the first contact;
said second contact point is at different locations depending on whether the contact movement is in the first direction or the second direction;
said duration of the first contact is determined as an exact difference between the first contact time and the second contact time;
said duration of the first contact is determined as an approximate difference between the first contact time and the second contact time;
said duration of the first contact is determined as the difference between the first contact time and the second contact time and is a function of at least one additional factor;
said duration of the first contact is determined as the difference between the first contact time and the second contact time and is a function of at least one additional variable;
said determination whether there is the contact movement of the first contact between the first contact point and the second contact point, includes determination whether there is the contact movement of the first contact between the first contact point and the second contact point such that the first contact reaches the second contact point;
said determination whether there is the contact movement of the first contact between the first contact point and the second contact point, includes determination whether there is the contact movement of the first contact between the first contact point and the second contact point such that the first contact does not reach the second contact point;
said determination whether there is the contact movement of the first contact between the first contact point and the second contact point, includes determination whether there is the contact movement of the first contact between the first contact point and the second contact point such that the first contact reaches a third contact point that resides between the first contact point and the second contact point;

said determination whether there is the contact movement of the first contact between the first contact point and the second contact point, includes determining whether there is a threshold contact movement amount of the first contact between the first contact point and the second contact point;

said determination whether there is the contact movement of the first contact between the first contact point and the second contact point, includes determining whether there is any contact movement of the first contact between the first contact point and the second contact point;

each instance of the detection occurs prior to each instance of the determination;

one or more instances of the detection occur after at least one instance of the determination;

said hyperlink identifies the second web page by the web address pointing thereto;

said duration of the first contact is determined, before it is determined whether there is the contact movement and whether the first contact point of the first contact corresponds with the location of the hyperlink of the first web page;

it is determined whether there is the contact movement, before the duration of the first contact is determined and it is determined whether the first contact point of the first contact corresponds with the location of the hyperlink of the first web page;

it is determined whether the first contact point of the first contact corresponds with the location of the hyperlink of the first web page, before the duration of the first contact is determined and it is determined whether there is the contact movement;

said contact movement includes a threshold amount of contact movement;

said contact movement includes a user-configurable threshold amount of contact movement;

said menu includes a contextual menu;

said contact movement includes a predefined threshold amount of contact movement;

said contact movement includes any amount of contact movement;

said touch-sensitive interaction surface is pressure-sensitive;

said touch-sensitive interaction surface is not pressure-sensitive;

said user interface includes a graphical user interface;

said network browser application includes an Internet browser;

said hyperlink includes the web address and visual text;
each instance of said display is carried out by the display;
each instance of said when includes only a portion of a duration;
each instance of said when includes an entirety of a duration;
each instance of said when includes while;
said first contact is detected utilizing one or more of a plurality of contact-sensing technologies including a capacitive-based contact sensing technology, a resistive-based contact sensing technology, an optical-based contact sensing technology, or a surface acoustic wave-based contact sensing technology;
said first contact is detected utilizing a plurality of contact-sensing technologies including at least two of: a capacitive-based contact sensing technology, a resistive-based contact sensing technology, an optical-based contact sensing technology, or a surface acoustic wave-based contact sensing technology;
said first contact generates a touch signal that, during a first component of an associated gesture, is not touch magnitude-dependent, and, during a second component of the associated gesture, is touch magnitude-dependent;
said first contact generates a touch signal that, during a first component of an associated gesture, is not touch magnitude-dependent and thus results in a touch signal, and, during a second component of the associated gesture, is touch magnitude-dependent and thus results in a touch signal;
said user interface of the network browser application includes a window of the network browser application;
said user interface of the network browser application includes a pane of the network browser application;
said user interface of the network browser application includes a tab of the network browser application;
said user interface of the network browser application includes a portion of a graphical user interface of the network browser application;
said user interface of the network browser application includes only a portion of a graphical user interface of the network browser application;

said user interface of the network browser application includes a entirety of a graphical user interface of the network browser application;
said first web page is displayed via the user interface of the network browser application, by being displayed in a window of the network browser application;
said first web page is displayed via the user interface of the network browser application, by being displayed in a pane of the network browser application;
said first web page is displayed via the user interface of the network browser application, by being displayed in a tab of the network browser application;
said first user-configurable predefined duration is initially defined by an operating system and is thereafter configurable by a user utilizing the operating system;
said first user-configurable predefined duration is predefined by an operating system and is thereafter configurable by a user utilizing the operating system;
said first user-configurable predefined duration is user-configurable by being configurable by a user utilizing the operating system;
said first user-configurable predefined duration is predefined by being defined before the display of the first web page;
said first user-configurable predefined duration is predefined by being defined by an operating system before the display of the first web page;
said first user-configurable predefined duration is predefined by being defined by a user before the display of the first web page;
said first user-configurable predefined duration includes a first user-configurable predefined duration threshold;
said second user-configurable predefined duration is initially defined by an operating system and is thereafter configurable by a user utilizing the operating system;
said second user-configurable predefined duration is predefined by an operating system and is thereafter configurable by a user utilizing the operating system;
said second user-configurable predefined duration is user-configurable by being configurable by a user utilizing the operating system;
said second user-configurable predefined duration is predefined by being defined before the display of the first web page;

said second user-configurable predefined duration is predefined by being defined by an operating system before the display of the first web page;
said second user-configurable predefined duration is predefined by being defined by a user before the display of the first web page;
said second user-configurable predefined duration includes a user-configurable predefined duration threshold;
it is not determined that there is the contact movement of the first contact between the first contact point and the second contact point, when a contact movement threshold is not met;
it is not determined that there is the contact movement of the first contact between the first contact point and the second contact point, when no contact movement is detected;
said display of the first web page includes display of an entirety of the first web page;
said display of the first web page does not include display of an entirety of the first web page;
said display of the first web page includes display of a portion of the first web page;
said display of the first web page includes display of only a portion of the first web page;
said display of the first web page is replaced with the second web page via the user interface of the network browser application, by ceasing display of the first web page and displaying an entirety of the second web page;
said display of the first web page is replaced with the second web page via the user interface of the network browser application, by ceasing display of the first web page and not displaying an entirety of the second web page;
said display of the first web page is replaced with the second web page via the user interface of the network browser application, by ceasing display of the first web page and displaying a portion of the second web page;
said display of the first web page is replaced with the second web page via the user interface of the network browser application, by ceasing display of the first web page and displaying only a portion of the second web page;
said display of the first web page does not include display of an entirety of the first web page, such that the at least portion of the first web page includes a subset of a subset of the first web page;

said display of the first web page includes display of only a portion of the first web page, such that the at least portion of the first web page includes a subset of a subset of the first web page;
said display of the first web page is replaced with the second web page via the user interface of the network browser application, by not displaying an entirety of the second web page, such that the at least portion of the second web page includes a subset of a subset of the second web page;
said display of the first web page is replaced with the second web page via the user interface of the network browser application, by displaying only a portion of the second web page, such that the at least portion of the second web page includes a subset of a subset of the second web page;
said display of the first web page is replaced with the second web page via the user interface of the network browser application, by ceasing display of the first web page and displaying the second web page;
said display of the first web page is replaced with the second web page via the user interface of the network browser application, by ceasing display of the first web page and displaying, instead, the second web page;
said display of the first web page is replaced with the second web page via the user interface of the network browser application, by ceasing display of the first web page and displaying, in a same graphical user interface, the second web page;
said display of the first web page is replaced with the second web page via the user interface of the network browser application, without changing display of control icons of the network browser application;
said at least one first virtual display layer appears above the at least one second virtual display layer, by having a z-value that less than that of the at least one second virtual display layer;
said at least one first virtual display layer appears above the at least one second virtual display layer and is smaller in area, so that the at least portion of the user interface of the network browser application remains at least partially visible;
said at least portion of the user interface of the network browser application remains at least partially visible, as a result of a reduced size or area of the first virtual display layer;

said at least portion of the user interface of the network browser application remains at least partially visible, as a result of a reduced size or area of the second web page;
said at least portion of the user interface of the network browser application that remains at least partially visible, includes at least a portion of the first web page;
said at least portion of the user interface of the network browser application that remains at least partially visible, includes one or more controls of the network browser application;
said at least portion of the user interface of the network browser application remains at least partially visible while being transformed;
said at least portion of the user interface of the network browser application remains at least partially visible while being faded or blurred;
said at least portion of the user interface of the network browser application remains at least partially visible while not being faded or blurred;
said at least portion of the second web page includes a link;
said at least portion of the second web page includes an image;
said at least portion of the second web page includes a symbol;
said at least portion of the second web page includes only a link;
said at least portion of the second web page includes only an image;
said at least portion of the second web page includes only a symbol;
said hyperlink includes a selectable object;
said contact movement is for at least one of scrolling, changing interfaces, or moving an object;
said menu and the at least portion of the second web page are part of different user interface elements;
said menu and the at least portion of the second web page are part of the same user interface element; or
said menu and the at least portion of the second web page are not part of the same user interface element.

63. (New) A method, comprising:

at an electronic device including a display, a touch-sensitive interaction surface, an actuator, one or more processors, and memory:

displaying, on the display and via a user interface of a network browser application, a first web page including a hyperlink that identifies a second web page;

detecting a first contact starting at a first contact point at a first contact time on the touch-sensitive interaction surface;

detecting an end of the first contact at a second contact time;

determining a duration of the first contact as a difference between the first contact time and the second contact time;

determining whether there is a contact movement of the first contact between the first contact point and a second contact point;

determining whether the first contact point of the first contact corresponds with a location of the hyperlink of the first web page;

based on detected usage where: the first web page is displayed via the user interface of the network browser application, the duration of the first contact is determined to be less than a first user-configurable predefined duration, and the end of the first contact is detected: avoiding display, on the first web page, a result of any operation based on the first contact;

based on detected usage where: the first web page is displayed via the user interface of the network browser application, the duration of the first contact is determined to be greater than the first user-configurable predefined duration and less than a second user-configurable predefined duration, the first contact point of the first contact is determined to correspond with the location of the hyperlink of the first web page, it is

not determined that there is the contact movement of the first contact between the first contact point and the second contact point, and the end of the first contact is detected: replacing the display of the first web page with the second web page via the user interface of the network browser application; and

based on detected usage where: the first web page is displayed via the user interface of the network browser application, the duration of the first contact is determined to be greater than the second user-configurable predefined duration, the first contact point of the first contact is determined to correspond with the location of the hyperlink of the first web page, it is not determined that there is the contact movement of the first contact between the first contact point and the second contact point, and the end of the first contact is not detected: outputting, utilizing the actuator, a first feedback that is perceptible by touch and displaying a context menu including at least one option for, in response to detection of a selection thereof, performing an operation on a web address associated with the hyperlink of the first web page, and further displaying at least a portion of the second web page, such that at least the at least portion of the second web page is displayed in at least one first virtual display layer which appears above at least one second virtual display layer that includes at least a portion of the user interface of the network browser application that remains at least partially visible.

64. (New) The method of Claim 63, wherein:

the user interface of the network browser is configured for performing an operation in response to it being determined that there is the contact movement of the first contact between the first contact point and the second contact point; and

the at least portion of the second web page is displayed in a view that is not configured for performing the operation in response to it being determined that there is the contact movement of the first contact between the first contact point and the second contact point.

65. (New) The method of Claim 63, wherein the first feedback that is perceptible by touch is output prior to the display of the context menu.

66. (New) The method of Claim 63, and further comprising: based on detected usage where: the context menu is displayed, it is determined that there is the contact movement of the first contact between the first contact point and the second contact point in a first direction for a first distance, and the end of the touch is not detected: displaying movement, in the first direction, of the at least portion of the second web page and the context menu as a function of the contact movement of the first contact detected in the first direction.

67. (New) The method of Claim 63, and further comprising: based on detected usage where: the context menu is displayed, it is determined that there is the contact movement of the first contact between the first contact point and the second contact point in a first direction for a first distance, and the end of the touch is not detected: displaying a decrease in a size of the at least portion of the second web page as a function of the contact movement of the first contact detected in the first direction.

68. (New) The method of Claim 67, wherein the decrease in the size of the at least portion of the second web page is displayed while not displaying a change in a size of the context menu.

69. (New) The method of Claim 63, and further comprising: based on detected usage where: the context menu is displayed, it is determined that there is the contact movement of the first contact between the first contact point and the second contact point in a first direction for a first distance, and the end of the touch is not detected: displaying movement, in the first direction, of the at least portion of the second web page and the context menu as a function of the contact movement of the first contact detected in the first direction, and displaying a decrease in a size of the at least portion of the second web page as a function of the contact movement of the first contact detected in the first direction.

70. (New) The method of Claim 66, and further comprising: based on detected usage where: the context menu is displayed, it is determined that there is the contact movement of the first

contact between the first contact point and the second contact point in a second direction for less than the first distance after the contact movement of the first contact is determined between the first contact point and the second contact point in the first direction, and the end of the first contact is not detected: displaying movement, in the second direction, of the at least portion of the second web page and the context menu as a function of the contact movement of the first contact detected in the second direction.

71. (New) The method of Claim 67, and further comprising: based on detected usage where: the context menu is displayed, it is determined that there is the contact movement of the first contact between the first contact point and the second contact point in a second direction for less than the first distance after it is determined that there is the contact movement of the first contact between the first contact point and the second contact point in the first direction, and the end of the first contact is not detected: displaying an increase in the size of the at least portion of the second web page as a function of the contact movement of the first contact detected in the second direction.

72. (New) The method of Claim 71, wherein the increase in the size of the at least portion of the second web page is displayed while not displaying a change in the size of the context menu.

73. (New) The method of Claim 71, wherein the display of the movement in the second direction and the display of the increase in the size are continued based on detected usage where the end of the first contact is detected.

74. (New) The method of Claim 63, wherein the electronic device is configured to:

based on detected usage where: the context menu is displayed, it is determined that there is the contact movement of the first contact between the first contact point and the second contact point for less than a first predetermined length, and the end of the first contact is not detected: display a decrease in a size of the at least portion of the second web page as a function of the contact movement of the first contact detected while not displaying a change in a size of the context menu; and

based on detected usage where: the context menu is displayed, the contact movement of the first contact is determined between the first contact point and the second contact point for greater than the first predetermined length, and the end of the first contact is not detected: display a decrease in a size of the context menu while fading out the context menu, until the display of the context menu is ceased.

75. (New) The method of Claim 63, wherein:

the user interface of the network browser is configured for displaying: scrolling of the second web page via the user interface of the network browser application in response to detection of longitudinal contact movement, opening of one or more hyperlinks of the second web page in response to detection of a selection thereof, and opening of one or more manually entered web addresses in response to detection of a manual entry thereof; and

the at least portion of the second web page is displayed in a view that is different from the user interface of the network browser application in that the view is configured for not displaying: the scrolling of the second web page via the user interface of the network browser application in response to detection of the longitudinal contact movement, the opening of the one or more hyperlinks of the second web page in response to detection of the selection thereof, and the opening of the one or more manually entered hyperlinks in response to detection of the manual entry thereof.

76. (New) The method of Claim 63, wherein:

the user interface of the network browser is configured for scrolling in response to it being determined that there is the contact movement of the first contact between the first contact point and the second contact point; and

the at least portion of the second web page is displayed in a view that is not configured for scrolling in response to it being determined that there is the contact movement of the first contact between the first contact point and the second contact point.

77. (New) The method of Claim 63, wherein the at least one option includes: a first option for, in response to detection of a selection thereof, opening the second web page in a new tab of the network browser application for displaying the at least portion of the second web page; a second option for, in response to detection of a selection thereof, opening the second web page in another tab of the network browser application for displaying the at least portion of the second web page; a third option for, in response to detection of a selection thereof, copying the web address; a fourth option for, in response to detection of a selection thereof, sharing an image of the second web page without sharing other parts of the second web page including text; and a fifth option for, in response to detection of a selection thereof, opening the image in the new tab of the network browser application for displaying the image without displaying the other parts of the second web page including the text.

78. (New) The method of Claim 77, wherein the another tab includes a background tab.

79. (New) The method of Claim 77, wherein the image includes a single image.

80. (New) The method of Claim 77, wherein the opening the second web page includes displaying the image in addition to the text of the web page.

81. (New) The method of Claim 63, wherein the at least one option includes: a first plurality of operations for operating only on a single image of the second web page, and a second plurality of operations for operating only on the web address.

82. (New) The method of Claim 63, wherein the at least one option includes: a first plurality of operations for operating on a single image of the second web page, and a second plurality of operations for operating on the web address.

83. (New) The method of Claim 63, wherein the at least portion of the second web page is displayed in the at least one first virtual display layer where, in response to detection of a selection of the at least portion of the second web page, the second web page is enlarged.

84. (New) The method of Claim 63, wherein the at least portion of the second web page is displayed in the at least one first virtual display layer where, in response to detection of a selection of the at least portion of the second web page, the at least one first virtual display layer is enlarged.

85. (New) The method of Claim 63, wherein the at least portion of the second web page is displayed in the at least one first virtual display layer where, in response to detection of a selection of the at least portion of the second web page, the at least portion of the second web page is displayed via the user interface of the network browser application.

86. (New) The method of Claim 63, wherein the at least portion of the second web page is displayed in the at least one first virtual display layer where, in response to detection of a selection of the at least portion of the second web page, the at least portion of the second web page is displayed via the user interface of the network browser application.

87. (New) The method of Claim 63, and further comprising: utilizing one or more types of one or more gesture recognizers in connection with the detected usage where: the first web page is displayed via the user interface of the network browser application, the duration of the first contact is determined to be greater than the second user-configurable predefined duration, the first contact point of the first contact is determined to correspond with the location of the hyperlink of the first web page, it is not determined that there is the contact movement of the first contact between the first contact point and the second contact point, and the end of the first contact is not detected, where the one or more types of one or more gesture recognizers include a first type of gesture recognizer that is a non-continuous gesture recognizer that is operable to recognize a gesture without performing any intermediate operations.

88. (New) The method of Claim 63, and further comprising: utilizing one or more types of one or more gesture recognizers in connection with the detected usage where: the first web page is displayed via the user interface of the network browser application, the duration of the first contact is determined to be greater than the second user-configurable predefined duration, the first contact point of the first contact is determined to correspond with the location of the hyperlink of the first web page, it is not determined that there is the contact movement of the first contact between the first contact point and the second contact point, and the end of the first contact is not detected, where the one or more types of one or more gesture recognizers include a first type of gesture recognizer that is a continuous gesture recognizer that is operable to recognize a gesture and continuously perform one or more intermediate operations, where the one or more intermediate operations are operations associated with the gesture that are executed before the gesture is done.

89. (New) The method of Claim 63, and further comprising: utilizing one or more types of one or more gesture recognizers and one or more types of one or more gesture differentiators in connection with the detected usage where: the first web page is displayed via the user interface of the network browser application, the duration of the first contact is determined to be greater than the second user-configurable predefined duration, the first contact point of the first contact is determined to correspond with the location of the hyperlink of the first web page, it is not determined that there is the contact movement of the first contact between the first contact point and the second contact point, and the end of the first contact is not detected, where at least one gesture differentiator utilizes at least one gesture recognizer.

90. (New) The method of Claim 63, and further comprising: utilizing one or more types of one or more gesture differentiators including a first type of gesture differentiator that is a non-continuous gesture differentiator that uses a non-continuous gesture recognizer, in connection with the detected usage where: the first web page is displayed via the user interface of the network browser application, the duration of the first contact is determined to be greater than the second user-configurable predefined duration, the first contact point of the first contact is determined to correspond with the location of the hyperlink of the first web page, it is not

determined that there is the contact movement of the first contact between the first contact point and the second contact point, and the end of the first contact is not detected.

91. (New) The method of Claim 63, and further comprising: utilizing one or more types of one or more gesture differentiators including a first type of gesture differentiator that is a non-continuous gesture differentiator that uses a non-continuous gesture recognizer, and a second type of gesture differentiator that is a continuous gesture differentiator that uses a continuous gesture recognizer, in connection with the detected usage where: the first web page is displayed via the user interface of the network browser application, the duration of the first contact is determined to be greater than the second user-configurable predefined duration, the first contact point of the first contact is determined to correspond with the location of the hyperlink of the first web page, it is not determined that there is the contact movement of the first contact between the first contact point and the second contact point, and the end of the first contact is not detected.

92. (New) The method of Claim 63, and further comprising: utilizing one or more types of one or more gesture recognizers including a first non-continuous gesture recognizer to recognize a first touch gesture and a second non-continuous gesture differentiator to recognize a second touch gesture, in connection with the detected usage where: the first web page is displayed via the user interface of the network browser application, the duration of the first contact is determined to be greater than the second user-configurable predefined duration, the first contact point of the first contact is determined to correspond with the location of the hyperlink of the first web page, it is not determined that there is the contact movement of the first contact between the first contact point and the second contact point, and the end of the first contact is not detected.

93. (New) The method of Claim 63, and further comprising:

based on detected usage where: the context menu is displayed, it is not determined that there is the contact movement of the first contact between the first contact point and

the second contact point, and the end of the first contact is detected: avoiding display, on the first web page, a result of any further operation based on the first contact;

based on detected usage where: the context menu is displayed, it is determined that there is the contact movement of the first contact between the first contact point and the second contact point in a first direction for a first distance, and the end of the touch is not detected: displaying movement, in the first direction, of the at least portion of the second web page and the context menu as a function of the contact movement of the first contact detected in the first direction, and displaying a decrease in a size of the at least portion of the second web page as a function of the contact movement of the first contact detected in the first direction while not displaying a change in a size of the context menu;

based on detected usage where: the context menu is displayed, it is determined that there is the contact movement of the first contact between the first contact point and the second contact point in a second direction for less than the first distance after it is determined that there is the contact movement of the first contact between the first contact point and the second contact point in the first direction, and the end of the first contact is not detected: displaying movement, in the second direction, of the at least portion of the second web page and the context menu as a function of the contact movement of the first contact detected in the second direction, and displaying an increase in the size of the at least portion of the second web page as a function of the contact movement of the first contact detected in the second direction while not displaying a change in the size of the context menu;

based on detected usage where: the context menu is displayed, it is determined that there is the contact movement of the first contact between the first contact point and the second contact point in the second direction for a second distance that is less than a first predetermined length, and the end of the first contact is not detected: displaying movement, in the second direction, of the at least portion of the second web page and the context menu as a function of the contact movement of the first contact detected in the second direction, and displaying a decrease in a size of the at least portion of the second

web page as a function of the contact movement of the first contact detected in the second direction while not displaying a change in a size of the context menu;

based on detected usage where: the context menu is displayed, it is determined that there is the contact movement of the first contact between the first contact point and the second contact point in the first direction for less than the second distance after it is determined that there is the contact movement of the first contact between the first contact point and the second contact point in the second direction, and the end of the first contact is not detected: displaying movement, in the first direction, of the at least portion of the second web page and the context menu as a function of the contact movement of the first contact detected in the first direction, and displaying an increase in the size of the at least portion of the second web page as a function of the contact movement of the first contact detected in the first direction while not displaying a change in the size of the context menu;

based on detected usage where: the context menu is displayed, it is determined that there is the contact movement of the first contact between the first contact point and the second contact point in the second direction for a third distance that is greater than the first predetermined length, and the end of the first contact is not detected: displaying a decrease in a size of the context menu while fading out the context menu, until the display of the context menu is ceased;

based on detected usage where: it is determined that there is the contact movement of the first contact between the first contact point and the second contact point in the first direction for less than the third distance after it is determined that there is the contact movement of the first contact between the first contact point and the second contact point in the second direction, and the end of the first contact is not detected: displaying an increase in the size of the context menu while fading in the context menu, until the context menu is re-displayed; and

based on detected usage where: the context menu is displayed, it is determined that there is the contact movement of the first contact between the first contact point and the second contact point in the second direction for a fourth distance that is greater than a second predetermined length that is greater than the first predetermined length, and the end of the first contact is detected: ceasing display of the context menu, ceasing display of the at least portion of the second web page, and displaying the at least portion of the first web page of the at least one second virtual display layer without being altered.

94. (New) The method of Claim 93, wherein at least ten of:

said touch-sensitive interaction surface and the display are components of a touch screen;

said touch-sensitive interaction surface and the display are on a front face of the electronic device;

said touch-sensitive interaction surface and the display are on a back face of the electronic device;

said actuator includes at least one of: a vibrator, a motor, or an actuator;

said first feedback includes a vibration;

said first feedback includes at least one of: a vibration, a force feedback, a tactile output, a weight feedback, a mechanical output, or a mass feedback;

said first feedback includes at least one of: a vibration, a force feedback, a tactile output, a weight feedback, a mechanical output, or a mass feedback;

said first feedback that is perceptible by touch results from the electronic device being vibrated only once;

said first feedback that is perceptible by touch results from the electronic device being vibrated at least once;

said first feedback that is perceptible by touch results from the electronic device being vibrated for a predetermined period of time;

said first contact includes at least one of a touch contact or a press contact;

said end of the first contact includes a lift off of the first contact;

said second contact point is at different locations depending on whether the contact movement is in the first direction or the second direction;

said duration of the first contact is determined as an exact difference between the first contact time and the second contact time;
said duration of the first contact is determined as an approximate difference between the first contact time and the second contact time;
said duration of the first contact is determined as the difference between the first contact time and the second contact time and is a function of at least one additional factor;
said duration of the first contact is determined as the difference between the first contact time and the second contact time and is a function of at least one additional variable;
said determination whether there is the contact movement of the first contact between the first contact point and the second contact point, includes determination whether there is the contact movement of the first contact between the first contact point and the second contact point such that the first contact reaches the second contact point;
said determination whether there is the contact movement of the first contact between the first contact point and the second contact point, includes determination whether there is the contact movement of the first contact between the first contact point and the second contact point such that the first contact does not reach the second contact point;
said determination whether there is the contact movement of the first contact between the first contact point and the second contact point, includes determination whether there is the contact movement of the first contact between the first contact point and the second contact point such that the first contact reaches a third contact point that resides between the first contact point and the second contact point;
said determination whether there is the contact movement of the first contact between the first contact point and the second contact point, includes determining whether there is a threshold contact movement amount of the first contact between the first contact point and the second contact point;
said determination whether there is the contact movement of the first contact between the first contact point and the second contact point, includes determining whether there is any contact movement of the first contact between the first contact point and the second contact point;
each instance of the detection occurs prior to each instance of the determination;

one or more instances of the detection occur after at least one instance of the determination;
said hyperlink identifies the second web page by the web address pointing thereto;
said duration of the first contact is determined, before it is determined whether there is the contact movement and whether the first contact point of the first contact corresponds with the location of the hyperlink of the first web page;
it is determined whether there is the contact movement, before the duration of the first contact is determined and it is determined whether the first contact point of the first contact corresponds with the location of the hyperlink of the first web page;
it is determined whether the first contact point of the first contact corresponds with the location of the hyperlink of the first web page, before the duration of the first contact is determined and it is determined whether there is the contact movement;
said contact movement includes a threshold amount of contact movement;
said contact movement includes a user-configurable threshold amount of contact movement;
said contact movement includes a predefined threshold amount of contact movement;
said contact movement includes any amount of contact movement;
said touch-sensitive interaction surface is pressure-sensitive;
said touch-sensitive interaction surface is not pressure-sensitive;
said user interface includes a graphical user interface;
said network browser application includes an Internet browser;
said hyperlink includes the web address and visual text;
each instance of said display is carried out by the display;
each instance of said based on detected usage where includes only a portion of a duration;
each instance of said based on detected usage where includes an entirety of a duration;
each instance of said based on detected usage where includes while;
said first contact is detected utilizing one or more of a plurality of contact-sensing technologies including a capacitive-based contact sensing technology, a resistive-based contact sensing technology, an optical-based contact sensing technology, or a surface acoustic wave-based contact sensing technology;

said first contact is detected utilizing a plurality of contact-sensing technologies including at least two of: a capacitive-based contact sensing technology, a resistive-based contact sensing technology, an optical-based contact sensing technology, or a surface acoustic wave-based contact sensing technology;
said first contact generates a touch signal that, during a first component of an associated gesture, is not touch magnitude-dependent, and, during a second component of the associated gesture, is touch magnitude-dependent;
said first contact generates a touch signal that, during a first component of an associated gesture, is not touch magnitude-dependent and thus results in a touch signal, and, during a second component of the associated gesture, is touch magnitude-dependent and thus results in a touch signal;
said user interface of the network browser application includes a window of the network browser application;
said user interface of the network browser application includes a pane of the network browser application;
said user interface of the network browser application includes a tab of the network browser application;
said user interface of the network browser application includes a portion of a graphical user interface of the network browser application;
said user interface of the network browser application includes only a portion of a graphical user interface of the network browser application;
said user interface of the network browser application includes a entirety of a graphical user interface of the network browser application;
said first web page is displayed via the user interface of the network browser application, by being displayed in a window of the network browser application;
said first web page is displayed via the user interface of the network browser application, by being displayed in a pane of the network browser application;
said first web page is displayed via the user interface of the network browser application, by being displayed in a tab of the network browser application;
said first user-configurable predefined duration is initially defined by an operating system and is thereafter configurable by a user utilizing the operating system;

said first user-configurable predefined duration is predefined by an operating system and is thereafter configurable by a user utilizing the operating system;
said first user-configurable predefined duration is user-configurable by being configurable by a user utilizing the operating system;
said first user-configurable predefined duration is predefined by being defined before the display of the first web page;
said first user-configurable predefined duration is predefined by being defined by an operating system before the display of the first web page;
said first user-configurable predefined duration is predefined by being defined by a user before the display of the first web page;
said first user-configurable predefined duration includes a first user-configurable predefined duration threshold;
said second user-configurable predefined duration is initially defined by an operating system and is thereafter configurable by a user utilizing the operating system;
said second user-configurable predefined duration is predefined by an operating system and is thereafter configurable by a user utilizing the operating system;
said second user-configurable predefined duration is user-configurable by being configurable by a user utilizing the operating system;
said second user-configurable predefined duration is predefined by being defined before the display of the first web page;
said second user-configurable predefined duration is predefined by being defined by an operating system before the display of the first web page;
said second user-configurable predefined duration is predefined by being defined by a user before the display of the first web page;
said second user-configurable predefined duration includes a user-configurable predefined duration threshold;
it is not determined that there is the contact movement of the first contact between the first contact point and the second contact point, based on detected usage where a contact movement threshold is not met;

it is not determined that there is the contact movement of the first contact between the first contact point and the second contact point, based on detected usage where no contact movement is detected;

said display of the first web page includes display of an entirety of the first web page;

said display of the first web page does not include display of an entirety of the first web page;

said display of the first web page includes display of a portion of the first web page;

said display of the first web page includes display of only a portion of the first web page;

said display of the first web page is replaced with the second web page via the user interface of the network browser application, by ceasing display of the first web page and displaying an entirety of the second web page;

said display of the first web page is replaced with the second web page via the user interface of the network browser application, by ceasing display of the first web page and not displaying an entirety of the second web page;

said display of the first web page is replaced with the second web page via the user interface of the network browser application, by ceasing display of the first web page and displaying a portion of the second web page;

said display of the first web page is replaced with the second web page via the user interface of the network browser application, by ceasing display of the first web page and displaying only a portion of the second web page;

said display of the first web page does not include display of an entirety of the first web page, such that the at least portion of the first web page includes a subset of a subset of the first web page;

said display of the first web page includes display of only a portion of the first web page, such that the at least portion of the first web page includes a subset of a subset of the first web page;

said display of the first web page is replaced with the second web page via the user interface of the network browser application, by not displaying an entirety of the second web page, such that the at least portion of the second web page includes a subset of a subset of the second web page;

said display of the first web page is replaced with the second web page via the user interface of the network browser application, by displaying only a portion of the second web page, such that the at least portion of the second web page includes a subset of a subset of the second web page;

said display of the first web page is replaced with the second web page via the user interface of the network browser application, by ceasing display of the first web page and displaying the second web page;

said display of the first web page is replaced with the second web page via the user interface of the network browser application, by ceasing display of the first web page and displaying, instead, the second web page;

said display of the first web page is replaced with the second web page via the user interface of the network browser application, by ceasing display of the first web page and displaying, in a same graphical user interface, the second web page;

said display of the first web page is replaced with the second web page via the user interface of the network browser application, without changing display of control icons of the network browser application;

said at least one first virtual display layer appears above the at least one second virtual display layer, by having a z-value that less than that of the at least one second virtual display layer;

said at least one first virtual display layer appears above the at least one second virtual display layer and is smaller in area, so that the at least portion of the user interface of the network browser application remains at least partially visible;

said at least portion of the user interface of the network browser application remains at least partially visible, as a result of a reduced size or area of the first virtual display layer;

said at least portion of the user interface of the network browser application remains at least partially visible, as a result of a reduced size or area of the second web page;

said at least portion of the user interface of the network browser application that remains at least partially visible, includes at least a portion of the first web page;

said at least portion of the user interface of the network browser application that remains at least partially visible, includes one or more controls of the network browser application;

said at least portion of the user interface of the network browser application remains at least partially visible while being transformed;
said at least portion of the user interface of the network browser application remains at least partially visible while being faded or blurred;
said at least portion of the user interface of the network browser application remains at least partially visible while not being faded or blurred;
said at least portion of the second web page includes a link;
said at least portion of the second web page includes an image;
said at least portion of the second web page includes a symbol;
said at least portion of the second web page includes only a link;
said at least portion of the second web page includes only an image;
said at least portion of the second web page includes only a symbol;
said hyperlink includes a selectable object;
said contact movement is for at least one of scrolling, changing interfaces, or moving an object;
said context menu and the at least portion of the second web page are part of different user interface elements;
said context menu and the at least portion of the second web page are part of the same user interface element; or
said context menu and the at least portion of the second web page are not part of the same user interface element.

REMARKS

The claims have been clarified.

It is believed that all of the pending issues have been addressed. It should be noted that the absence of a reply to a specific rejection, issue, or comment does not signify agreement with or concession of that rejection, issue, or comment. In addition, because the arguments made above may not be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed. Still yet, nothing in this reply should be construed as intention to concede any issue with regard to any claim, except as specifically stated in this reply. Finally, it should be noted that no claim is intended to be construed under 35 U.S.C. 112, paragraph 6.

Should the Examiner deem that any further amendment is desirable to place this Application in condition for allowance, Applicant invites the Examiner to telephone the undersigned attorney at the number listed below.

Respectfully submitted,



Dated: 27 Apr 2020

The Caldwell Firm, LLC
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Dallas, Texas 75229-0655
Telephone: (214) 734-2313
pcaldwell@thecaldwellfirm.com

Patrick E. Caldwell, Esq.
Reg. No. 44,580

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/687,649	Filing Date 11/18/2019	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

	(Column 1)	(Column 2)			
FOR	NUMBER FILED	NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $230 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	04/27/2020	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 73	Minus	** 20	= 53		x $50 =	2650
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0		x $230 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	2650

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/KIM R WATSON/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/687,649	11/18/2019	Michael S Smith	SMITH070AY	6079

92045 7590 04/13/2020

The Caldwell Firm, LLC
PO Box 59655
Dept. SVIPGP
Dallas, TX 75229

EXAMINER	
AWAD, AMR A	

ART UNIT	PAPER NUMBER
2623	

NOTIFICATION DATE	DELIVERY MODE
04/13/2020	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

eofficeaction@appcoll.com
pcaldwell@thecaldwellfirm.com

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Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
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Doc Code: TRACK1.GRANT

CORRECTED ***Decision Granting Request for Prioritized Examination (Track I or After RCE)***	Application No.: 16/687,649

1. THE REQUEST FILED November 18, 2019 IS **GRANTED.**

The above-identified application has met the requirements for prioritized examination

A. ☒ for an original nonprovisional application (Track I).
B. ☐ for an application undergoing continued examination (RCE).

2. **The above-identified application will undergo prioritized examination.** The application will be accorded special status throughout its entire course of prosecution until one of the following occurs:

A. filing a **petition for extension of time** to extend the time period for filing a reply;
B. filing an **amendment to amend the application to contain more than four independent claims, more than thirty total claims**, or a multiple dependent claim;
C. filing a **request for continued examination**;
D. filing a notice of appeal;
E. filing a request for suspension of action;
F. mailing of a notice of allowance;
G. mailing of a final Office action;
H. completion of examination as defined in 37 CFR 41.102; or
I. abandonment of the application.

Telephone inquiries with regard to this decision should be directed to **Michelle R. Eason** at (571) 272-4231. In his/her absence, calls may be directed to Brian W. Brown at (571) 272-5338.

/Michelle R. Eason/
(*Signature*)

Paralegal Specialist, Office of Petitions
(Title)

U.S. Patent and Trademark Office
PTO-2298 (Rev. 02-2012)

United States Patent and Trademark Office

Office of the Chief Financial Officer

Document Code:WFEE

User :C41722

Sale Accounting Date:04/10/2020

Sale Item Reference Number	Effective Date
16687649	11/18/2019

Document Number	Fee Code	Fee Code Description	Amount Paid	Payment Method
I202040E31510554	2830	PROCESSING FEE, EXCEPT PROV. APPLS.	$70.00	Salea

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/687,649	11/18/2019	Michael S Smith	SMITH070AY	6079

92045 7590 04/03/2020

The Caldwell Firm, LLC
PO Box 59655
Dept. SVIPGP
Dallas, TX 75229

EXAMINER
AWAD, AMR A

ART UNIT	PAPER NUMBER
2623	

NOTIFICATION DATE	DELIVERY MODE
04/03/2020	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

eofficeaction@appcoll.com
pcaldwell@thecaldwellfirm.com

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United States Patent and Trademark Office
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Alexandria, VA 22313-1450
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Doc Code: TRACK1.DENY

Decision Dismissing Request for Prioritized Examination (Track I)	Application No.: 16/687,649

1. THE REQUEST FILED November 18, 2019 IS **DISMISSED** BECAUSE:

A. ☐ The application is not a utility application under 35 U.S.C. 111(a) filed by EFS-Web or a plant application under 35 U.S.C. 111(a) filed by paper:
   i. ☐ The application is a utility application that was not filed by EFS-Web.
   ii. ☐ The application is neither a utility application nor a plant application, but rather is a _____, which is excluded from the Track I program.

B. ☐ The request was not filed with the application or on the same date the application was filed.

C. ☒ One or more of the following fees were not filed with the application or on the same date the application was filed:
   i. ☐ Basic filing fee, as set forth in 37 CFR 1.16(a), or for a plant application, 37 CFR 1.16(c).
   ii. ☐ Search fee, as set forth in 37 CFR 1.16(k), or for a plant application, 37 CFR 1.16(m).
   iii. ☐ Examination fee, as set forth in 37 CFR 1.16(o), or for a plant application, 37 CFR 1.16(q).
   iv. ☐ Publication fee, as set forth in 37 CFR 1.18(d).
   v. ☒ Track I processing fee, as set forth in 37 CFR 1.17(i).
   vi. ☐ Track I prioritized examination fee, as set forth in 37 CFR 1.17(c).

D. ☐ The executed inventor's oath or declaration, **or** an application data sheet meeting the conditions specified in 37 CFR 1.53(f)(3)(i) was not filed with the application or on the same date the application was filed.

E. ☐ The application contains or has been amended to contain:
   i. ☐ More than four independent claims.
   ii. ☐ More than thirty total claims.
   iii. ☐ One or more multiple dependent claims.

F. ☐ The Track I program has exceeded its limit of 10,000 requests for the current fiscal year.

G. ☐ Other: _____

2. CONCLUSION

☐ **ALL of the above defect(s) consist only of one or more of items E (i-iii). Applicant is hereby accorded a non-extendable ONE MONTH time period from the mailing date of this Decision to (1) correct the subject defect(s) and (2) file a petition under 37 CFR 1.181 requesting reconsideration of prioritized examination. If no such petition is timely filed, the application will not undergo prioritized examination.**

-OR-

☒ **The application will not undergo prioritized examination, because the request was not accompanied by all of the required items.**

Telephone inquiries with regard to this decision should be directed to Michelle R. Eason at 571-272-4231.

In his/her absence, calls may be directed to Brian W. Brown at (571) 272-5338.

/Michelle R. Eason/	Paralegal Specialist, Office of Petitions
(*Signature*)	(Title)

U.S. Patent and Trademark Office
PTO-2299 (Rev. 01-2014)

Electronic Acknowledgement Receipt

EFS ID:	38453105
Application Number:	16687649
International Application Number:	
Confirmation Number:	6079
Title of Invention:	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK
First Named Inventor/Applicant Name:	Michael S Smith
Customer Number:	92045
Filer:	Patrick Edgar Caldwell
Filer Authorized By:	
Attorney Docket Number:	SMITH070AY
Receipt Date:	30-JAN-2020
Filing Date:	18-NOV-2019
Time Stamp:	23:26:42
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Preliminary Amendment	SMITH070AY_PrelimAmend_vF_30-Jan-2020.pdf	74486 df8d1b6372658f8b224e5e0615779c8ab883e200	no	8

Warnings:

Information:	
Total Files Size (in bytes):	74486

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE CLAIMS

Please amend the claims as follows:

1.-20. (Cancelled)

21. (New) An electronic device, comprising:

a display;

a touch-sensitive interaction surface;

an actuator;

one or more processors;

memory; and

one or more programs, wherein the one or more programs are stored in the memory and configured to be executed by the one or more processors, the one or more programs including instructions to:

display, on the display and via a user interface of a network browser application, a first web page including a hyperlink that identifies a second web page;

detect a first contact starting at a first contact point at a first contact time on the touch-sensitive interaction surface;

detect an end of the first contact at a second contact time;

determine a duration of the first contact as a difference between the first contact time and the second contact time;

determine whether there is a contact movement of the first contact between the first contact point and a second contact point;

determine whether the first contact point of the first contact corresponds with a location of the hyperlink of the first web page;

when: the duration of the first contact is determined to be less than a first user-configurable predefined duration, regardless as to a location of the first contact point of the first contact, and the end of the first contact is detected: avoid display, on the first web page, a result of any operation based on the first contact;

when: the first web page is displayed via the user interface of the network browser application, the first contact point of the first contact is determined to correspond with the location of the hyperlink of the first web page, the duration of the first contact is determined to be greater than the first user-configurable predefined duration and less than the second user-configurable predefined duration, and the end of the first contact is detected: replace the display of the first web page with the second web page in the user interface of the network browser application; and

when: the duration of the first contact is determined to be greater than the second user-configurable predefined duration, the first contact point of the first contact is determined to correspond with the location of the hyperlink of the first web page, the movement of the first contact is not determined between the first contact point and the second contact point, and the end of the first contact is not detected: output, utilizing the actuator, a first feedback that is perceptible by touch and display a menu including at least one option for, in response to detection of a selection thereof, performing an operation on a web address associated with the at least one selectable hyperlink of the first web page, and further subsequently display at least a portion of the second web page,

such that at least the at least portion of the second web page is displayed in at least one first virtual display layer which appears above at least one second virtual display layer that includes at least a portion of the user interface of the network browser application that remains at least partially visible, where the at least portion of the user interface of the network browser application of the at least one second virtual display layer is altered, by at least one of blurring, fogging, or fading, to appear at a first depth that is greater than a second depth of the at least one first virtual display layer.

IN THE ABSTRACT

Please amend the abstract as follows:

In one embodiment, a method and apparatus are provided to: display, on a display and via a user interface of a network browser application, a first web page including a hyperlink that identifies a second web page; detect a first contact starting at a first contact point at a first contact time on the touch-sensitive interaction surface; detect an end of the first contact at a second contact time; determine a duration of the first contact as a difference between the first contact time and the second contact time; determine whether there is a contact movement of the first contact between the first contact point and a second contact point; determine whether the first contact point of the first contact corresponds with a location of the hyperlink of the first web page; for performing a variety of operations. ~~In one embodiment, an apparatus and associated method are provided, comprising: a display; one or more processors; memory; and one or more programs, wherein the one or more programs are stored in the memory and configured to be executed by the one or more processors, the one or more programs including instructions means for: displaying a plurality of user interface elements on the display including a first user interface element and a second user interface element; detecting a first contact moving across the display; and, while the first contact is detected moving across the display: moving the first user interface element in a first direction on the display at a first speed; and moving the second user interface element on the display at a second speed greater than the first speed.~~

REMARKS

The claims have been clarified.

It is believed that all of the pending issues have been addressed. It should be noted that the absence of a reply to a specific rejection, issue, or comment does not signify agreement with or concession of that rejection, issue, or comment. In addition, because the arguments made above may not be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed. Still yet, nothing in this reply should be construed as intention to concede any issue with regard to any claim, except as specifically stated in this reply. Finally, it should be noted that no claim is intended to be construed under 35 U.S.C. 112, paragraph 6.

Respectfully submitted,



Dated: 30 Jan 2020

The Caldwell Firm, LLC
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Telephone: (214) 734-2313
pcaldwell@thecaldwellfirm.com

Patrick E. Caldwell, Esq.
Reg. No. 44,580

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Michael S. Smith Application No.: 16/687,649 Filed: 11-18-2019 For: DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK	Confirmation No.: 6079 Examiner: AWAD, AMR A Art Unit: 2621 Atty. Docket No.: SMITH070AY Date: 1/30/2020

PRELIMINARY AMENDMENT

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Examiner:

Before substantive examination, please enter the following:

IN THE SUMMARY

Please amend the summary as follows:

[0004] In one embodiment, a method and apparatus are provided to: display, on a display and via a user interface of a network browser application, a first web page including a hyperlink that identifies a second web page; detect a first contact starting at a first contact point at a first contact time on the touch-sensitive interaction surface; detect an end of the first contact at a second contact time; determine a duration of the first contact as a difference between the first contact time and the second contact time; determine whether there is a contact movement of the first contact between the first contact point and a second contact point; determine whether the first contact point of the first contact corresponds with a location of the hyperlink of the first web page; when: the duration of the first contact is determined to be less than a first user-configurable predefined duration, regardless as to a location of the first contact point of the first contact, and the end of the first contact is detected: avoid display, on the first web page, a result of any operation based on the first contact; when: the first web page is displayed via the user interface of the network browser application, the first contact point of the first contact is determined to correspond with the location of the hyperlink of the first web page, the duration of the first contact is determined to be greater than the first user-configurable predefined duration and less than the second user-configurable predefined duration, and the end of the first contact is detected: replace the display of the first web page with the second web page in the user interface of the network browser application; and when: the duration of the first contact is determined to be greater than the second user-configurable predefined duration, the first contact point of the first contact is determined to correspond with the location of the hyperlink of the first web page, the movement of the first contact is not determined between the first contact point and the second contact point, and the end of the first contact is not detected: output, utilizing the actuator, a first feedback that is perceptible by touch and display a menu including at least one option for, in response to detection of a selection thereof, performing an operation on a web address associated with the at least one selectable hyperlink of the first web page, and further subsequently display at least a portion of the second web page, such that at least the at least portion of the second web page is displayed in at least one first virtual display layer which appears above at least one

second virtual display layer that includes at least a portion of the user interface of the network browser application that remains at least partially visible, where the at least portion of the user interface of the network browser application of the at least one second virtual display layer is altered, by at least one of blurring, fogging, or fading, to appear at a first depth that is greater than a second depth of the at least one first virtual display layer.

~~[0004] In one embodiment, an apparatus and associated method are provided, comprising: a display; one or more processors; memory; and one or more programs, wherein the one or more programs are stored in the memory and configured to be executed by the one or more processors, the one or more programs including instructions means for: displaying a plurality of user interface elements on the display including a first user interface element and a second user interface element; detecting a first contact moving across the display; and, while the first contact is detected moving across the display: moving the first user interface element in a first direction on the display at a first speed; and moving the second user interface element on the display at a second speed greater than the first speed.~~

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/687,649	Filing Date 11/18/2019	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $230 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	01/30/2020	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 1	Minus	** 20	= 0		x $50 =	0
	Independent (37 CFR 1.16(h))	* 1	Minus	*** 3	= 0		x $230 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/BRENDA V HARRISON/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
16/687,649	11/18/2019	2621	1055	SMITH070AY	20	2

CONFIRMATION NO. 6079

92045
The Caldwell Firm, LLC
PO Box 59655
Dept. SVIPGP
Dallas, TX 75229

FILING RECEIPT

OC000000114231830

Date Mailed: 01/28/2020

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Michael S Smith, Palo Alto, CA;

Applicant(s)

P4TENTS1 LLC, Wilmington, GERMANY;

Power of Attorney: The patent practitioners associated with Customer Number 92045

Domestic Priority data as claimed by applicant

This application is a CON of 16/377,142 04/05/2019
which is a CON of 16/153,763 10/06/2018 PAT 10275086
which is a CON of 15/072,354 03/16/2016 PAT 10133397
which is a CON of 13/567,004 08/03/2012 PAT 9417754
which claims benefit of 61/581,918 12/30/2011
and claims benefit of 61/569,213 12/09/2011
and claims benefit of 61/566,577 12/02/2011
and claims benefit of 61/515,835 08/05/2011

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 01/27/2020

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/687,649**

Projected Publication Date: Request for Non-Publication Acknowledged

Non-Publication Request: Yes

Early Publication Request: No
**** SMALL ENTITY ****
Title

DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK

Preliminary Class

345

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

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Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

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Title 37, Code of Federal Regulations, 5.11 & 5.15

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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 16/687,649

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	75		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	330		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	380		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	20 minus 20 =	*	x 50 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2 minus 3 =	*	x 230 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			200			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	985		TOTAL	

APPLICATION AS AMENDED - PART II

AMENDMENT A

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
Application Size Fee (37 CFR 1.16(s))									
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

AMENDMENT B

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)		RATE($)	ADDITIONAL FEE($)
Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
Application Size Fee (37 CFR 1.16(s))									
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	16687649
	Filing Date	
	First Named Inventor	Michael S Smith
	Art Unit	
	Examiner Name	
	Attorney Docket Number	SMITH070AY

U.S.PATENTS						Remove
Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	10101898	B2	2018-10-16	AMELINE	
	2	10222891	B1	2019-03-05	Smith	
	3	10425284	B2	2019-09-24	Dellinger et al.	
	4	3358493	A	1967-12-19	Erich	
	5	3956986	A	1976-05-18	Wirz et al.	
	6	6030499	A	2000-02-29	Soderholm	
	7	6105600	A	2000-08-22	Wang	
	8	6526133	B1	2003-02-25	Izaki et al.	

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	9	7551899	B1	2009-06-23	Nicolas et al.	
	10	7555311	B2	2009-06-30	Kangas et al.	
	11	7721227	B2	2010-05-18	Ronkainen	
	12	7821506	B2	2010-10-26	Sato et al.	
	13	7930002	B2	2011-04-19	Gong	
	14	8103215	B2	2012-01-24	Rek	
	15	8248255	B2	2012-08-21	Tzidon et al.	
	16	8265709	B2	2012-09-11	Forstall	
	17	8265822	B2	2012-09-11	Nakashima et al.	
	18	8300016	B2	2012-10-30	Lu et al.	
	19	8331579	B2	2012-12-11	Kato	

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	Examiner Name	
	Attorney Docket Number	SMITH070AY

	20	8355700	B2	2013-01-15	Lee	
	21	8400107	B2	2013-03-19	Taguchi et al.	
	22	8405528	B2	2013-03-26	Aghaei et al.	
	23	8441377	B2	2013-05-14	Liu	
	24	8468469	B1	2013-06-18	Mendis et al.	
	25	8534318	B2	2013-09-17	Kanemaru et al.	
	26	8566923	B2	2013-10-22	Fredette et al.	
	27	8591028	B2	2013-11-26	Dobashi	
	28	8606968	B2	2013-12-10	Blewett et al.	
	29	8712477	B2	2014-04-29	Yu et al.	
	30	8757198	B2	2014-06-24	Santamaria et al.	

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	Attorney Docket Number	SMITH070AY

	31	8832577	B2	2014-09-09	Sirpal et al.	
	32	8838076	B2	2014-09-16	Lee	
	33	8954887	B1	2015-02-10	Tseng et al.	
	34	8988353	B2	2015-03-24	Shin et al.	
	35	9003515	B2	2015-04-07	Ganem	
	36	9047005	B2	2015-06-02	Hill et al.	
	37	9058061	B2	2015-06-16	Aono et al.	
	38	9058102	B2	2015-06-16	Miyamoto	
	39	9103691	B2	2015-08-11	Wäller et al.	
	40	9152240	B2	2015-10-06	Yeh	
	41	9195389	B2	2015-11-24	Park et al.	

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	42	9305531	B2	2016-04-05	Miwa	
	43	9405466	B2	2016-08-02	Suraqui	
	44	9430122	B2	2016-08-30	Cassar	
	45	9538346	B2	2017-01-03	Kim et al.	
	46	9619141	B2	2017-04-11	Konami	
	47	9684521	B2	2017-06-20	Shaffer et al.	
	48	9690474	B2	2017-06-27	Chen et al.	
	49	9881608	B2	2018-01-30	Lebeau et al.	
	50	9972297	B2	2018-05-15	Xu et al.	

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear

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	Examiner Name	
	Attorney Docket Number	SMITH070AY

	1	20040244554	A1	2004-12-09	Rodriguez	
	2	20060078295	A1	2006-04-13	Yamashita	
	3	20070066310	A1	2007-03-22	Haar et al.	
	4	20070270179	A1	2007-11-22	Lee et al.	
	5	20070271513	A1	2007-11-22	Andren	
	6	20080169960	A1	2008-07-17	Rosenbury	
	7	20090179780	A1	2009-07-16	Tambe	
	8	20090315741	A1	2009-12-24	Kim	
	9	20090327979	A1	2009-12-31	Haverinen et al.	
	10	20100031186	A1	2010-02-04	Tseng et al.	
	11	20100241984	A1	2010-09-23	Nurmi et al.	

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	12	20100245282	A1	2010-09-30	Lai	
	13	20100302281	A1	2010-12-02	Kim	
	14	20110029868	A1	2011-02-03	Moran et al.	
	15	20110227830	A1	2011-09-22	Chun	
	16	20110310537	A1	2011-12-22	Imamura et al.	
	17	20110314423	A1	2011-12-22	Ohmiya et al.	
	18	20120081290	A1	2012-04-05	Heo	
	19	20120102401	A1	2012-04-26	Ijas et al.	
	20	20120117507	A1	2012-05-10	Tseng et al.	
	21	20120159387	A1	2012-06-21	OH et al.	
	22	20120162213	A1	2012-06-28	Shim et al.	

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	First Named Inventor	Michael S Smith
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	Attorney Docket Number	SMITH070AY

	23	20120192108	A1	2012-07-26	Kolb	
	24	20120212420	A1	2012-08-23	Shin	
	25	20120252426	A1	2012-10-04	Nagaoka et al.	
	26	20120268361	A1	2012-10-25	Shotel et al.	
	27	20120289290	A1	2012-11-15	Chae et al.	
	28	20120290946	A1	2012-11-15	Schrock et al.	
	29	20120299980	A1	2012-11-29	Fujikawa	
	30	20120306775	A1	2012-12-06	MIYACHI et al.	
	31	20120312806	A1	2012-12-13	Burt et al.	
	32	20130016586	A1	2013-01-17	Craig	
	33	20130044062	A1	2013-02-21	Bose et al.	

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	Application Number	16687649
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	First Named Inventor	Michael S Smith
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	Examiner Name	
	Attorney Docket Number	SMITH070AY

	34	20130050122	A1	2013-02-28	KANG et al.	
	35	20130050141	A1	2013-02-28	PARK et al.	
	36	20130120298	A1	2013-05-16	Zhou	
	37	20130125803	A1	2013-05-23	Tseng	
	38	20130154968	A1	2013-06-20	Tomimori	
	39	20130154981	A1	2013-06-20	Park et al.	
	40	20130160514	A1	2013-06-27	Mitze	
	41	20130169981	A1	2013-07-04	Takahashi	
	42	20130268853	A1	2013-10-10	Gommier et al.	
	43	20140006948	A1	2014-01-02	Yang et al.	
	44	20140143659	A1	2014-05-22	Xue et al.	

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	Attorney Docket Number	SMITH070AY

	45	20140210727	A1	2014-07-31	Wassingbo	
	46	20140247216	A1	2014-09-04	Fang	
	47	20140303436	A1	2014-10-09	Pless et al.	
	48	20160041715	A1	2016-02-11	Sirpal et al.	

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1		

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EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	First Named Inventor	Michael S Smith
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	Examiner Name	
	Attorney Docket Number	SMITH070AY

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16687649
	Filing Date	
	First Named Inventor	Michael S Smith
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	Examiner Name	
	Attorney Docket Number	SMITH070AY

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Patrick Caldwell/	Date (YYYY-MM-DD)	2019-11-19
Name/Print	Patrick Caldwell	Registration Number	44580

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The information provided by you in this form will be subject to the following routine uses:

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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

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7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

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Electronic Acknowledgement Receipt

EFS ID:	37799766
Application Number:	16687649
International Application Number:	
Confirmation Number:	6079
Title of Invention:	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK
First Named Inventor/Applicant Name:	Michael S Smith
Customer Number:	92045
Filer:	Patrick Edgar Caldwell
Filer Authorized By:	
Attorney Docket Number:	SMITH070AY
Receipt Date:	19-NOV-2019
Filing Date:	
Time Stamp:	18:35:43
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	SMITH070AY_IDS_20191119_vF.pdf	1055190 7610354b543b8677a9e03c8f779df1faf9409b00	no	13

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Information:	
Total Files Size (in bytes):	1055190

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Electronic Acknowledgement Receipt

EFS ID:	37787617
Application Number:	16687649
International Application Number:	
Confirmation Number:	6079
Title of Invention:	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK
First Named Inventor/Applicant Name:	Michael S Smith
Customer Number:	92045
Filer:	Patrick Edgar Caldwell
Filer Authorized By:	
Attorney Docket Number:	SMITH070AY
Receipt Date:	19-NOV-2019
Filing Date:	
Time Stamp:	00:49:35
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Non Patent Literature	221-Ross-A-Calibration-Model.pdf	1224289 481cbbba244504fce3630a794e01c14aa2150a60	no	12

Warnings:

Information:					
2	Non Patent Literature	222-Rudolph-A-Virtualization-Infrastructure.pdf	1038837 4d9d119401eaaff8b689df1255d702990c819ea9	no	6
Warnings:					
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3	Non Patent Literature	223-RYU-High-Frequency-Simultaneous.pdf	470132 8e148bcd19f3efb01b17c4be450906d1b7d289ad	no	6
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4	Non Patent Literature	224-Sahami-Rich-Tactile-Output.pdf	968604 0ab42ac0e07eb97a011795f170206b91a0c4a57e	no	12
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5	Non Patent Literature	225-Sangorrin-Dual-OS-Architecture.pdf	2516304 3dec5b1a268eae46844ad1bdb46d74362192bed2	no	24
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6	Non Patent Literature	226-Satyanarayanan-Bringing-Cloud-to-Earth.pdf	631732 7eaf4e4520c1e21d0947ffb8f3f650f8be3351bd	no	11
Warnings:					
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7	Non Patent Literature	227-Satyanarayanan-Pervasive-Personal-Computing.pdf	1204310 51ae30629a81eb68f4140b2d98d28eb9014a72df	no	10
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8	Non Patent Literature	228-Satyanarayanan-Towards-seamless-mobility.pdf	1881837 405ef9529a4df84013425ba9239f08822bb5788f	no	33
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9	Non Patent Literature	229-SCHRADER-CMOS-Transmitter.pdf	450292 11ac383c9741c532684dcc1131960089d43857c8	no	4
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10	Non Patent Literature	230-Schrader-Multi-Root-I-O-Virtualization.pdf	1508975 9f10fd904caeec02cf4e694395758a4a7d83931d	no	9
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11	Non Patent Literature	231-SCHRADER-Pulse-Width-Modulation.pdf	947200 aba84a96036d683e6f0c95d83e57542284e1362f	no	10
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12	Non Patent Literature	232-SCHRADER-Wireline-Equalization-2007.pdf	7189532 bb2d306b4742ff54969d17874cfbb6e6e3891cc2	no	166
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13	Non Patent Literature	233-SCHRADER-Wireline-Equalization-IEEE-2006.pdf	1007388 dcf09c08391bd87fd9e3da1e6679689a3b174bec	no	8
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14	Non Patent Literature	234-SEMTECH-Adv-Communications-Sensing.pdf	4595024 3c27a52d8e1e2fc4f70fd007ea5004aaa1579fea	no	61
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15	Non Patent Literature	235-Seo-Research-System-Virtualization.pdf	634808 724249d2405fcd8d91c419d16aa6f0283e3bdec3	no	11
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17	Non Patent Literature	237-SHAO-Bit-reversal-SDRAM.pdf	744774 fb2107b619715e787ec292661fd883cc110b08cc	no	8
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Information:					
18	Non Patent Literature	238-SIDIROPOULOS-High-Perf-Inter-Chip-SIgnalling.pdf	6464922 2ab9978133634de4f92571654a4116a6bb79e8bb	no	139
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19	Non Patent Literature	239-Silvia-Adaptive-HTTP-Streaming.pdf	396485 9d9555b85a2d48ad743eb5ab1e8db2de205f57b4	no	6
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20	Non Patent Literature	240-Smaldone-Leveraging-Smart-Phones.pdf	1429688 5ddaab14433340b7d534a42603520c0f7848576c	no	14
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21	Non Patent Literature	241-Smith-Achieving-High-Performance.pdf	421745 010d9ce971376ed71de176f0688ff0f9ef5864e7	no	6
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22	Non Patent Literature	242-Sousa-Aura-Architectural-Framework.pdf	1155674 c99ed4ca6939362de42672662e710eacb6aadd44	no	15
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23	Non Patent Literature	243-Sousa-Aura-software-Architecture.pdf	2698410 554e8366baa8c467c2f029bf32b70a3c6b12f524	no	48
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24	Non Patent Literature	244-Stackhouse-A-65-nm-2-Billion-Transistor.pdf	1444028 58623031ca8d918a6671d8bf3149ef5d48eb37b9	no	14
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25	Non Patent Literature	245-Stockhammer-Dynamic-Adaptive-Streaming.pdf	331055 55584c06407034ec136031a7dac32a134e099370	no	3
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26	Non Patent Literature	246-STOJANOVIC-Adaptive-Equalization.pdf	457744 653d61d438a56939661db93d542740df1c89186c	no	4
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27	Non Patent Literature	247-STOJANOVIC-Channel-limited-high-speed-links.pdf	7852106 9c637f04c80a61db52c97288452a2a22d25b8522	no	180
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28	Non Patent Literature	248-STOJANOVIC-Modeling-Analysis.pdf	9253348 73ca3a443b629791d4f7cbd2f066475b33efd4cb	no	49
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29	Non Patent Literature	249-SUCHITHA-Simulation-methodology.pdf	7424031 17b652b99ae0858d294ac1b04f778e074eb631bb	no	36
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30	Non Patent Literature	250-Sud-Dynamic-Migration.pdf	1268181 9b9627cd8220a4a5e47a885f0e02c482a4fc0f36	no	10
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31	Non Patent Literature	251-SUDAN-Micro-Pages.pdf	1397359 0af1d0b7051ca222b2249af8ca4a34b7c5803c5f	no	12
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32	Non Patent Literature	252-SUN-Low-Power-Continuous.pdf	2010249 8877c067bac4538b753adc2430ef24f08199448e	no	71
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33	Non Patent Literature	253-Texas-Instruments-DC-4-GBPS-DUAL-Multiplexer.pdf	930228 017aa7b9193d38db9eebdc2d2893c5f1d76ca60d	no	22
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34	Non Patent Literature	254-TIRUVURU-Transmission-Line.pdf	334742 1c1dd8ae6671aba02e7099bd58bfb14d198d86c5	no	4
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35	Non Patent Literature	255-TOMS-Assessment-3D-Interconnect.pdf	8765085 a8187019d8b8d8c2f4e4b3f5ee8c11dd47fcefe7	no	23
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36	Non Patent Literature	256-TURUDIC-Pre-Emphasis-Equalization.pdf	2859449 73abe4d2f8c7d335b3e466a5b49a7a92f12a290b	no	28
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37	Non Patent Literature	257-Understanding-Linux-Virtual-Memory.pdf	921386 50465f1ac8ce15784773c3178c8e245f76b9e795	no	20
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38	Non Patent Literature	258-USERS-GUIDE-Motorola-Backflip.pdf	3407355 b87c382f8c86de1676f2dc508ed757ad8c080445	no	67
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39	Non Patent Literature	259-USPAN_11226061_file-wrapper.pdf	11313606 bec29c461e323a1c4ff5f3030637ad08b780c017	no	276
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40	Non Patent Literature	260-USPAN_11449435_file-wrapper.pdf	7104693 4a949028a6673fbc10c1132b01bf44808c07a21a	no	222
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41	Non Patent Literature	261-USPAN_12233386_NFOA_27-May-2011.pdf	924650 16946991d59d7e5d2829b3891dcd28f03f69c793	no	25
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42	Non Patent Literature	262-USPAN_61457233_prov-app.pdf	1907460 19dab4ce4f619db76e51ec084c06fd49ddae793c	no	64
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43	Non Patent Literature	263-Van-Schaik-High-Performance-Microkernels.pdf	1133138 52d27fc5f28ada887760faec5ae124872e2e595b	no	11
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44	Non Patent Literature	264-Varanasi-Implementing-Hardware-Supported_1-of-2.pdf	2530426 1fd4c4a6469c04fc8d53ce4c322dab594b6bac70	no	53
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45	Non Patent Literature	265-Varanasi-Implementing-Hardware-Supported_2-of-2.pdf	1334298 80dba74ff84dda6d63d9ea180fab27954e23605b	no	35
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46	Non Patent Literature	266-Vmware-Understanding-Full-virtualization.pdf	1732030 3e75a7b5a7f8a33b1288cb63f49c4f79e62522cb	no	16
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47	Non Patent Literature	267-VRAZEL-Overcoming-Signal-Integrity.pdf	1551843 3d34f4767466116109c135459d70afa1fc61a34f	no	25
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48	Non Patent Literature	268-WANG-6b9b-Encoding-Scheme.pdf	397499 a8fda1904e864c12c42ef20304409bc13293bb95	no	4
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49	Non Patent Literature	269-WANG-Exploiting-Smart-Phone.pdf	1035970 bd1492bfa3473afea6b6e4f2582c61bf22413eee	no	10
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50	Non Patent Literature	270-WELTE-Anatomy-contemporary-GSM.pdf	636829 1cc085f9df9b48e375d2b116a647c36044681153	no	11
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51	Non Patent Literature	271-WIJERING-What-is-Video-Streaming.pdf	505411 847021184896c1f13f360e4bdccb9e6a0fa68c8d	no	6
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52	Non Patent Literature	272-WILTON-Implementing-Logic-FPGA.pdf	421563 c4bda5cf4b1b8bdf93f7d1c09c745a2e033d4b21	no	6
Warnings:					
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53	Non Patent Literature	273-Wintek_Specifications-for-LCD-Module.pdf	1369740 6249d5d1e5e82b7f68919bb0cca3f0cbd9ae8453	no	22
Warnings:					
The page size in the PDF is too large. The pages should be 8.5 x 11 or A4. If this PDF is submitted, the pages will be resized upon entry into the Image File Wrapper and may affect subsequent processing					
Information:					
54	Non Patent Literature	274-WITT-Test-Simulation-Results.pdf	2423262 81ca2ff2f88bd5422c0c7328cb92dd5f2abdd783	no	17
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55	Non Patent Literature	275-WOLBACH-Transient-customization.pdf	573713 9a45b9e4cad9615b77c3e755de6f7c6c701d3759	no	5
Warnings:					
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56	Non Patent Literature	276-Wolf-Lets-Get-Virtual.pdf	2934212 3aa28c47a511c4966acceeab06d4303ad5f78f3c	no	42
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57	Non Patent Literature	277-Xiao-Mobile-Imaging.pdf	722498 c8fd5ea589b79c4d8761db3f5ce0b3e4ebb680cd	no	9
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58	Non Patent Literature	278-Xu-Dynamic-Binary-Translation.pdf	420137 883c2fb04f4296499e0b5ad8c263b3d44407dcc7	no	6
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59	Non Patent Literature	279-YE-Prototyping-Hybrid.pdf	8315349 65a9f4fc8dde0541b3e7dd6eb1735fc599906b49	no	15
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60	Non Patent Literature	280-YUEN-A-5Gbps-Transmitter.pdf	498368 f6ee85b2cc691837dacf35dbf41d49758d6f937b	no	4
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		Total Files Size (in bytes):	139447086		

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Electronic Acknowledgement Receipt	
EFS ID:	37787482
Application Number:	16687649
International Application Number:	
Confirmation Number:	6079
Title of Invention:	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK
First Named Inventor/Applicant Name:	Michael S Smith
Customer Number:	92045
Filer:	Patrick Edgar Caldwell
Filer Authorized By:	
Attorney Docket Number:	SMITH070AY
Receipt Date:	19-NOV-2019
Filing Date:	
Time Stamp:	00:14:04
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Non Patent Literature	161-KLOSTER-Efficient-Memory-Sharing-in-the-Xen.pdf	3885346 dedcf60f038e00d1e4938903fad7254f3c2c164a	no	86

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2	Non Patent Literature	162-KLOSTER-Feasibility-of-Memory-Sharing.pdf	6177888 8e4fbc79947114b4fbdb015513828d0ead064dca	no	132
Warnings:					
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3	Non Patent Literature	163-Kotzmann-Design-Java-HotSpot.pdf	2770283 7bfaf8b0342eb80d42776a4a45d3c958e804b13f	no	32
Warnings:					
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4	Non Patent Literature	164-Kozuch-Internet-Suspend-Resume.pdf	626408 d09ebcbc476aea75744794e0fb25db5d2f93f1d3	no	7
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5	Non Patent Literature	165-Kozuch-Migration-without-Virtualization.pdf	441026 76b010a98558a1b0935ff89819426590eb70cd99	no	5
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6	Non Patent Literature	166-Kratz-Extending-Virtual-Trackball.pdf	549747 67203585d462803474b336f10236caa9d4f90962	no	4
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7	Non Patent Literature	167-Kratz-Gesture-Recognition.pdf	475336 6275e0ee57159207c746b0b1ed84689102970660	no	5
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Information:					
8	Non Patent Literature	168-KRAUSE-Implementing-PCI-I-0-Virtualization.pdf	256288 7b8de5cc214a04d079052a730a86d088f0f197b6	no	8
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18	Non Patent Literature	178-Lowell-Devirtualizable-Virtual-Machines.pdf	2007540 7d3e48bd4a1d1377bae07166074d662ea4712901	no	13
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19	Non Patent Literature	179-Lynch-Nokia-6100-LCD.pdf	13748944 936e2204a1c84980b325f78834fc300e99cb0f07	no	55
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20	Non Patent Literature	180-MacKenzie-tactile-touchpad.pdf	583264 fe9be51c925a4ef7ea86344b3ef90a8da6b8013d	no	5
Warnings:					
Information:					
21	Non Patent Literature	181-MARKATOS-On-Using-Network-RAM.pdf	955066 64c5cc96303387231fd35051f072ab2f67628738	no	15
Warnings:					
Information:					
22	Non Patent Literature	182-Marmor-Visual-Insignificance.pdf	1457509 e1a8af76e16ad94862e4ba6143524293b3c1e2a3	no	7
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Information:					

23	Non Patent Literature	183-MAXIM-Designing-Simple-Small.pdf	919115 06b879bc0301b74ef5ad645b29c30f2e169879fd	no	14
Warnings:					
Information:					
24	Non Patent Literature	184-Maxim-Passive-Equalizer.pdf	1040619 04463052097f8481b65b943601c621ea807f5d5a	no	15
Warnings:					
Information:					
25	Non Patent Literature	185-McCallum-ARC-Pad-Absolute-Relative.pdf	494895 062b7a002703732769f456c55d75ed11f9104726	no	4
Warnings:					
Information:					
26	Non Patent Literature	186-McCammon-Android-Solutions.pdf	736269 2a31d301c1bac1e00ff0ee64174ecb5b18d9aa69	no	11
Warnings:					
Information:					
27	Non Patent Literature	187-McCammon-Streamlining-Android-Migration.pdf	1023135 3c32f10ba8bb484a6589df538bdd115470b1c7cd	no	12
Warnings:					
Information:					
28	Non Patent Literature	188-MCCAMMON-Using-Virtualization-Create.pdf	462798 b1b9aa7ecd849618a3d85758018b870138ff14d9	no	3
Warnings:					
Information:					
29	Non Patent Literature	189-McGill-Process-Migration.pdf	47566 65d52049ede3a50a417fafa085198cc42a7e1d6b	no	1
Warnings:					
Information:					

30	Non Patent Literature	190-Memory-Mgmt_UofWA_Winter-2007_vR.pdf	11021508 ae7cd0ef747d6cfbd41691fa301a0cec65d47948	no	30
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31	Non Patent Literature	191-Micron-Announces-SyncflashTM.pdf	68059 253cc7fc82213342137da27949caeac5961aa165	no	1
Warnings:					
Information:					
32	Non Patent Literature	192-MICRON-NANO-Flash-Memory.pdf	7894531 4a96fad5ad5451e5e33a28f3000ad5ed7e6adda8	no	158
Warnings:					
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33	Non Patent Literature	193-MIJAT-Virtualization-Coming.pdf	1368680 eef26837b33a7b032973f88c7f2fe114d22ef5e0	no	13
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34	Non Patent Literature	194-Molnos-Composable-Processor.pdf	650158 e95266f9d04c26846fed22da5beff7fa97107c25	no	10
Warnings:					
Information:					
35	Non Patent Literature	195-Morre-Addressing-Challenges.pdf	1126323 b5ce817c4feb742bca19ddcc18c6d54d17ddacb0	no	10
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36	Non Patent Literature	196-Muthitacharoen-Low-bandwidth-Network.pdf	1218374 957511093d2c47201ee96a741388f74c4720b9dd	no	14
Warnings:					
Information:					

37	Non Patent Literature	197-NATIONAL-Semiconductor-EQ50F100.pdf	573278 13c55a3409bfb81839d8ef603f111d96a01f0445	no	2
Warnings:					
Information:					
38	Non Patent Literature	198-NXP-semiconductors_interfacing-4-and-5-wire_vR.pdf	12080180 60edd9bc9d71a7ebe81faef3338fcfe7f58bcb89	no	27
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Information:					
39	Non Patent Literature	199-On-ANA-Method-ARM.pdf	328927 61f07f4311cac6fd78f66799f73247517e4a007d	no	21
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Information:					
40	Non Patent Literature	200-Onoue-Virtual-Machine-Migration.pdf	581435 0600a56f61efda5a41f7dbeb622e8361b08de21e	no	8
Warnings:					
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41	Non Patent Literature	201-OPDENACKER-Linux-USB-drivers.pdf	9000445 208eebfd74397bbe3bca1ccd416ebb4ddf70bdfe	no	95
Warnings:					
Information:					
42	Non Patent Literature	202-OSMAN-Design-Implementation-Zap.pdf	1589352 a70b22662f689ede67896febe9c12ed01df90977	no	16
Warnings:					
Information:					
43	Non Patent Literature	203-OUSTERHOUT-Case-for-RAMClouds.pdf	1256819 f7212fd19f703ff07cadd219df83ce0db9f8d5ea	no	14
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Information:					

44	Non Patent Literature	204-Pai-Customizable-Multimedia.pdf	2174248 9a3396ca1cf05cd71390b25af4f8ffd30e879531	no	18
Warnings:					
Information:					
45	Non Patent Literature	205-Palm_Pre_Revisited_vR.pdf	2727671 e6c8156d83b87a751ad53a2f820797f05bfeed6c	no	12
Warnings:					
Information:					
46	Non Patent Literature	206-Park-Real-time-OS-Virtualization.pdf	778717 02c134a4f8eb303f273e56a7b3d552ffae482a78	no	10
Warnings:					
Information:					
47	Non Patent Literature	207-PARK-Signal-Integrity.pdf	1594584 a26d4de30092039937ee5de555eca6d021088ea4	no	91
Warnings:					
Information:					
48	Non Patent Literature	208-Pasricha-Reducing-Backlight-Power.pdf	692130 953ede446739dfbd260df66ed57e2a7653b8ebcc	no	7
Warnings:					
Information:					
49	Non Patent Literature	209-Patterson-Human-Factors.pdf	1735361 7de578dcfaa69197385ee8e0b68eb5070d02e6f7	no	14
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Information:					
50	Non Patent Literature	210-PCI-SIG-Single-Root-I-0-Virtualization.pdf	14009188 1692d3379ec169dd5cb5be25fb0e6e98696a5463	no	136
Warnings:					
Information:					

51	Non Patent Literature	211-PELZL-Virtualization-Technologies-Cars.pdf	1438638 fe852c181d42626f88c62d9ae86800ea218e6cc2	no	10
Warnings:					
Information:					
52	Non Patent Literature	212-PERING-Intel-Personal-Wellness.pdf	2741316 3f108b89bc618f4a2923d2c3112c266fc4f89b72	no	22
Warnings:					
Information:					
53	Non Patent Literature	213-PERING-The-PSI-Board.pdf	561203 7ede4ce6e01af3b8289ce370f8c3bc014dcc4384	no	6
Warnings:					
Information:					
54	Non Patent Literature	214-PHADKE-MLP-Aware-Heterogeneous.pdf	654697 d25e66210a0cdf5e9191676a083bcc40b03e2e5d	no	6
Warnings:					
Information:					
55	Non Patent Literature	215-POTTER-Virtualization-Mechanisms.pdf	12512448 d7a7640bf22c6b6611ae873ce0bad6a39fdfd554	no	241
Warnings:					
Information:					
56	Non Patent Literature	216-Probst-Register-Liveness-Analysis.pdf	1083955 a269611d7d1df2bc01061730e401732f0e9c5866	no	10
Warnings:					
Information:					
57	Non Patent Literature	217-Qualcomm_Sues_vR.pdf	2162225 4da4005c19511a6f0d043b480b8e8e9eb8d0569e	no	4
Warnings:					
Information:					

58	Non Patent Literature	218-RAMESH-Design-De-Emphasis.pdf	1114475 ff1bd4ce6c5ce7bde863aeb779c799985b33b243	no	28
Warnings:					
Information:					
59	Non Patent Literature	219-RedHat-Virtualizationt-Guide.pdf	8283318 57ef4fe6b5de3fcab9164a4eb0a70325cf5252fc	no	104
Warnings:					
Information:					
60	Non Patent Literature	220-Riecke-Selected-Technical-Perceptual.pdf	1423038 4313e8406f653d80a9bdedfc37d9dc7721742985	no	17
Warnings:					
Information:					
		Total Files Size (in bytes):	170948603		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Electronic Acknowledgement Receipt

EFS ID:	37787627
Application Number:	16687649
International Application Number:	
Confirmation Number:	6079
Title of Invention:	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK
First Named Inventor/Applicant Name:	Michael S Smith
Customer Number:	92045
Filer:	Patrick Edgar Caldwell
Filer Authorized By:	
Attorney Docket Number:	SMITH070AY
Receipt Date:	19-NOV-2019
Filing Date:	
Time Stamp:	00:53:59
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Non Patent Literature	079a-HARTIG-L4-Microkernel.pdf	24121463 286c91484c053f6fdf8161d453a14cd3701daab1	no	50

Warnings:

Information:					
2	Non Patent Literature	079b-HARTIG-L4-Microkernel.pdf	17005348 b9e28bd5cb2555bb3240e1c8d96c57045c17f38d	no	49
Warnings:					
Information:					
3	Non Patent Literature	281-Zctoak-Special-Topic-Mobile-Cloud.pdf	11777272 6ba47730d0bf7d16a06a813a8a3fc627b3431221	no	70
Warnings:					
Information:					
4	Non Patent Literature	282-Zhou-Receiver-Makes-Right.pdf	567041 3b32b2eb35eb5c45209dd95702d6decb7f077e51	no	8
Warnings:					
Information:					
5	Non Patent Literature	283-Zwicker-Antialiasing-Automultiscopic.pdf	149283 9bb97e8ceb619e326178a1cd2d907aef40003774	no	1
Warnings:					
Information:					
			Total Files Size (in bytes):	53620407	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

<u>New Applications Under 35 U.S.C. 111</u>
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
<u>National Stage of an International Application under 35 U.S.C. 371</u>
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
<u>New International Application Filed with the USPTO as a Receiving Office</u>
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Doc Code: TRACK1.REQ
Document Description: TrackOne Request

PTO/AIA/424 (04-14)

CERTIFICATION AND REQUEST FOR PRIORITIZED EXAMINATION UNDER 37 CFR 1.102(e) (Page 1 of 1)

First Named Inventor:	Michael S. Smith	Nonprovisional Application Number (if known):	
Title of Invention:	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK		

APPLICANT HEREBY CERTIFIES THE FOLLOWING AND REQUESTS PRIORITIZED EXAMINATION FOR THE ABOVE-IDENTIFIED APPLICATION.

1. The processing fee set forth in 37 CFR 1.17(i)(1) and the prioritized examination fee set forth in 37 CFR 1.17(c) have been filed with the request. The publication fee requirement is met because that fee, set forth in 37 CFR 1.18(d), is currently $0. The basic filing fee, search fee, and examination fee are filed with the request or have been already been paid. I understand that any required excess claims fees or application size fee must be paid for the application.

2. I understand that the application may not contain, or be amended to contain, more than four independent claims, more than thirty total claims, or any multiple dependent claims, and that any request for an extension of time will cause an outstanding Track I request to be dismissed.

3. The applicable box is checked below:

I. ☑ Original Application (Track One) - Prioritized Examination under § 1.102(e)(1)

i. (a) The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a). This certification and request is being filed with the utility application via EFS-Web.

---OR---

(b) The application is an original nonprovisional plant application filed under 35 U.S.C. 111(a). This certification and request is being filed with the plant application in paper.

ii. An executed inventor's oath or declaration under 37 CFR 1.63 or 37 CFR 1.64 for each inventor, **or** the application data sheet meeting the conditions specified in 37 CFR 1.53(f)(3)(i) is filed with the application.

II. ☐ Request for Continued Examination - Prioritized Examination under § 1.102(e)(2)

i. A request for continued examination has been filed with, or prior to, this form.
ii. If the application is a utility application, this certification and request is being filed via EFS-Web.
iii. The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a), or is a national stage entry under 35 U.S.C. 371.
iv. This certification and request is being filed prior to the mailing of a first Office action responsive to the request for continued examination.
v. No prior request for continued examination has been granted prioritized examination status under 37 CFR 1.102(e)(2).

Signature /Patrick Caldwell/	Date 18 Nov 2019
Name (Print/Typed) Patrick Caldwell	Practitioner Registration Number 44580

***Note**: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required.**

☑ *Total of 1 forms are submitted.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/AIA/01 (06-12)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	GESTURE-EQUIPPED TOUCH SCREEN SYSTEM, METHOD, AND COMPUTER PROGRAM PRODUCT

As the below named inventor, I hereby declare that:

This declaration is directed to:

- [x] The attached application, or
- [ ] United States application or PCT international application number _____

filed on _____.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Michael Smith Date (Optional) :_____

Signature: /Michael Smith/

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
127953.00207		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2009/065741	24/11/2009	26/11/2008
Applicant		
RESEARCH IN MOTION LIMITED		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of:

[X] the international application in the language in which it was filed

[ ] a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. [ ] This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

c. [ ] With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. [ ] **Certain claims were found unsearchable** (See Box No. II)

3. [ ] **Unity of invention is lacking** (see Box No III)

4. With regard to the **title**,

[X] the text is approved as submitted by the applicant

[ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

[X] the text is approved as submitted by the applicant

[ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings**,

a. the figure of the **drawings** to be published with the abstract is Figure No. 7

[ ] as suggested by the applicant

[ ] as selected by this Authority, because the applicant failed to suggest a figure

[X] as selected by this Authority, because this figure better characterizes the invention

b. [ ] none of the figures is to be published with the abstract

Form PCT/ISA/210 (first sheet) (April 2007)

A. CLASSIFICATION OF SUBJECT MATTER
INV. G06F3/041 G06F3/044

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2007/103449 A1 (LAITINEN PAULI [FI] ET AL) 10 May 2007 (2007-05-10) paragraph [0033] paragraph [0031] paragraph [0018] paragraph [0023] paragraph [0028]	1-21
X	US 2006/022952 A1 (RYYNANEN MATTI [FI] RYYNAENEN MATTI [FI]) 2 February 2006 (2006-02-02) paragraph [0024] paragraph [0037] - paragraph [0039]	1-21
X	WO 2008/125130 A1 (NOKIA CORP [FI]; LAITINEN PAULI [FI]; KAUHANEN PETTERI [FI]) 23 October 2008 (2008-10-23) page 7, line 33 - page 11, line 8	1-21

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
17 February 2010	24/02/2010

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Davenport, Kevin

Form PCT/ISA/210 (second sheet) (April 2005)

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2007103449 A1	10-05-2007	CN 101341605 A	07-01-2009
		EP 1946391 A1	23-07-2008
		WO 2007054781 A1	18-05-2007
		JP 2009515351 T	09-04-2009
US 2006022952 A1	02-02-2006	NONE	
WO 2008125130 A1	23-10-2008	CN 101641665 A	03-02-2010
		EP 2135154 A1	23-12-2009

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2009/065741	24.11.2009	26.11.2008

International Patent Classification (IPC) or both national classification and IPC
INV. G06F3/041 G06F3/044

Applicant
RESEARCH IN MOTION LIMITED

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:	Date of completion of this opinion	Authorized Officer
European Patent Office P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Fax: +31 70 340 - 3016	see form PCT/ISA/210	Davenport, Kevin Telephone No. +31 70 340-2191

Form PCT/ISA/237 (Cover Sheet) (April 2005)

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material:

      ☐ a sequence listing

      ☐ table(s) related to the sequence listing

   b. format of material:

      ☐ on paper

      ☐ in electronic form

   c. time of filing/furnishing:

      ☐ contained in the international application as filed.

      ☐ filed together with the international application in electronic form.

      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	3-4, 8-10, 13-16, 19-21
	No:	Claims	1-2, 5-7, 11-12, 17-18
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-21
Industrial applicability (IA)	Yes:	Claims	1-21
	No:	Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1 Reference is made to the following documents:
D1 : US 2007/103449 A1 (LAITINEN PAULI [FI] ET AL) 10 May 2007 (2007-05-10)
D2 : US 2006/022952 A1 (RYYNANEN MATTI [FI] RYYNAENEN MATTI [FI]) 2 February 2006 (2006-02-02)
D3 : WO 2008/125130 A1 (NOKIA CORP [FI]; LAITINEN PAULI [FI]; KAUHANEN PETTERI [FI]) 23 October 2008 (2008-10-23)

2 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 is not new in the sense of Article 33(2) PCT.

Document D1 discloses a portable electronic device (§[0033]) comprising at least one force sensor configured to generate a force signal based at least in part on a force applied to a touch-sensitive display (§[0028],§[0023]); a processor configured to receive the force signal and to provide a feedback signal when the force exceeds a force threshold (§[0031]). The subject-matter of claim 1 is therefore not new (Article 33(2) PCT).

3 A similar argumentation, mutatis mutandis, also applies to corresponding independent claims 11,17, and to separate independent aparatus claim 18, which may be shown to be not new in the sense of Article 33(2) PCT.

4 Dependent claims 2-10, 12-16, 19-21 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step (Article 33 (2) and (3) PCT).

Possible steps after receipt of the international search report (ISR) and written opinion of the International Searching Authority (WO-ISA)

General information	For all international applications filed on or after 01/01/2004 the competent ISA will establish an ISR. It is accompanied by the WO-ISA. Unlike the former written opinion of the IPEA (Rule 66.2 PCT), the WO-ISA is not meant to be responded to, but to be taken into consideration for further procedural steps. This document explains about the possibilities.
Amending claims under Art. 19 PCT	Within 2 months after the date of mailing of the ISR and the WO-ISA the applicant may file amended claims under Art. 19 PCT directly with the International Bureau of WIPO. The PCT reform of 2004 did not change this procedure. For further information please see Rule 46 PCT as well as form PCT/ISA/220 and the corresponding Notes to form PCT/ISA/220.
Filing a demand for international preliminary examination	In principle, the WO-ISA will be considered as the written opinion of the IPEA. This should, in many cases, make it unnecessary to file a demand for international preliminary examination. If the applicant nevertheless wishes to file a demand this must be done before expiry of 3 months after the date of mailing of the ISR/WO-ISA or 22 months after priority date, whichever expires later (Rule 54bis PCT). Amendments under Art. 34 PCT can be filed with the IPEA as before, normally at the same time as filing the demand (Rule 66.1 (b) PCT). If a demand for international preliminary examination is filed and no comments/amendments have been received the WO-ISA will be transformed by the IPEA into an IPRP (International Preliminary Report on Patentability) which would merely reflect the content of the WO-ISA. The demand can still be withdrawn (Art. 37 PCT).
Filing informal comments	After receipt of the ISR/WO-ISA the applicant may file informal comments on the WO-ISA directly with the International Bureau of WIPO. These will be communicated to the designated Offices together with the IPRP (International Preliminary Report on Patentability) at 30 months from the priority date. Please also refer to the next box.
End of the international phase	At the end of the international phase the International Bureau of WIPO will transform the WO-ISA or, if a demand was filed, the written opinion of the IPEA into the IPRP, which will then be transmitted together with possible informal comments to the designated Offices. The IPRP replaces the former IPER (international preliminary examination report).
Relevant PCT Rules and more information	Rule 43 PCT, Rule 43bis PCT, Rule 44 PCT, Rule 44bis PCT, PCT Newsletter 12/2003, OJ 11/2003, OJ 12/2003

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

To:
Halbert, Michael J.
SILICON VALLEY PATENT GROUP LLP
4010 Moorpark Avenue Suite 210
San Jose CA 95117
ETATS-UNIS D'AMERIQUE

RECEIVED
OCT 10 2012
BY:

Date of mailing *(day/month/year)* 4 October 2012 (04-10-2012)	
Applicant's or agent's file reference Q111601WOmh	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. PCT/US2012/035992	International filing date *(day/month/year)* 1 May 2012 (01-05-2012)

Applicant

QUALCOMM INCORPORATED

1. [X] The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:
The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the International Search Report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: (41-22) 338.82.70

For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 - 9.011.

2. [ ] The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. [ ] **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

[ ] the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

[ ] no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4 **Reminders**

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before completion of the technical preparations for international publication (Rules 90*bis*.1 and 90*bis*.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide*, National Chapters.

Name and mailing address of the International Searching Authority	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040 Fax: (+31-70) 340-3016	GOLZE, Doreen Tel: +49 (0)30 25901-704

Form PCT/ISA/220 (July 2010)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
Q111601WOmh		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2012/035992	01/05/2012	19/05/2011
Applicant		
QUALCOMM INCORPORATED		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the international Bureau.

This international search report consists of a total of 6 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language,** the international search was carried out on the basis of:

[X] the international application in the language in which it was filed

[ ] a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. [ ] This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

c. [ ] With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. [ ] **Certain claims were found unsearchable** (See Box No. II)

3. [X] **Unity of invention is lacking** (see Box No III)

4. With regard to the **title,**

[X] the text is approved as submitted by the applicant

[ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**

[X] the text is approved as submitted by the applicant

[ ] the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings,**

a. the figure of the **drawings** to be published with the abstract is Figure No. 1

[X] as suggested by the applicant

[ ] as selected by this Authority, because the applicant failed to suggest a figure

[ ] as selected by this Authority, because this figure better characterizes the invention

b. [ ] none of the figures is to be published with the abstract

Form PCT/ISA/210 (first sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/035992

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☒ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2012/035992

A. CLASSIFICATION OF SUBJECT MATTER
INV. G06F3/048
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2010/149129 A1 (HOMMA FUMINORI [JP] ET AL) 17 June 2010 (2010-06-17) paragraph [0071] - paragraph [0073] paragraph [0088] - paragraph [0099]; figures	1-20
X	US 2011/107212 A1 (JEONG WOOKYUNG [KR]) 5 May 2011 (2011-05-05) paragraph [0055] - paragraph [0060] paragraph [0075] - paragraph [0083]; claims; figures	1-20
X	US 6 448 959 B1 (KAWAGUCHI NAOHISA [JP] ET AL) 10 September 2002 (2002-09-10) column 7, line 43 - column 9, line 35 column 11, line 47 - line 57; claims; figures	1-20

-/--

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 September 2012	04/10/2012

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Durand, Jacques

3

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2012/035992

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2011/050653 A1 (MIYAZAWA YUSUKE [JP] ET AL) 3 March 2011 (2011-03-03) paragraph [0008] - paragraph [0012] paragraph [0059] - paragraph [0063] paragraph [0066]; figures	21-34
A	WO 2010/073731 A1 (KYOCERA CORP [JP]; AONO TOMOTAKE [JP]) 1 July 2010 (2010-07-01) paragraph [0057] - paragraph [0058]; figures & US 2011/181539 A1 (AONO TOMOTAKE [JP]) 28 July 2011 (2011-07-28) paragraph [0076] - paragraph [0077]; figures	21-34
X	US 2008/024459 A1 (POUPYREV IVAN [JP] ET AL) 31 January 2008 (2008-01-31)	21-34
Y	paragraph [0024] paragraph [0066] - paragraph [0068] paragraph [0075] - paragraph [0077] paragraph [0087] paragraph [0117] - paragraph [0125] paragraph [0131]; figures	35-48
Y	KR 2011 0004203 A (SAMSUNG ELECTRONICS CO LTD [KR]) 13 January 2011 (2011-01-13) paragraph [0023] - paragraph [0024] paragraph [0039] - paragraph [0044]; figure 3	35-48
A	US 2011/037609 A1 (KIM JONGCHEOL [KR] ET AL) 17 February 2011 (2011-02-17) paragraph [0009] - paragraph [0015]; figures	35-48

3

Form PCT/ISA/210 (continuation of second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2012/035992

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2010149129 A1	17-06-2010	CN 101943987 A	12-01-2011
		JP 4743268 B2	10-08-2011
		JP 2010140417 A	24-06-2010
		US 2010149129 A1	17-06-2010
US 2011107212 A1	05-05-2011	KR 20110049431 A	12-05-2011
		US 2011107212 A1	05-05-2011
US 6448959 B1	10-09-2002	JP 3345433 B2	18-11-2002
		JP 5165593 A	02-07-1993
		US 6448959 B1	10-09-2002
US 2011050653 A1	03-03-2011	CN 102004602 A	06-04-2011
		JP 2011053832 A	17-03-2011
		US 2011050653 A1	03-03-2011
WO 2010073731 A1	01-07-2010	JP 4746086 B2	10-08-2011
		JP 2010152736 A	08-07-2010
		KR 20110086870 A	01-08-2011
		US 2011181539 A1	28-07-2011
		WO 2010073731 A1	01-07-2010
US 2008024459 A1	31-01-2008	CN 101118469 A	06-02-2008
		JP 2008033739 A	14-02-2008
		US 2008024459 A1	31-01-2008
KR 20110004203 A	13-01-2011	NONE	
US 2011037609 A1	17-02-2011	US 2011037609 A1	17-02-2011
		US 2011037851 A1	17-02-2011
		WO 2011019154 A2	17-02-2011
		WO 2011019155 A2	17-02-2011

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-20

A method comprising:
displaying a plurality of selectable objects that are at least partially overlapping on a touch screen display coupled to a computing device;
determining a force level of a contact with the touch screen display using at least one force sensor coupled to the touch screen display;
using the force level of the contact to select an object from the plurality of selectable objects; and controlling the computing device based on the object selected.

---

2. claims: 21-34

A method comprising:
detecting a contact with a selectable object on a touch screen display, the selectable object is associated with a command to control a computing device;
determining that the command to control the computing device requires secondary confirmation;
determining a force level of the contact with the touch screen display using at least one force sensor coupled to the touch screen display; and
initiating the command in response to the contact with the selectable object and the force level.

---

3. claims: 35-48

A method comprising:
displaying an augmented reality representation of a real-world device on a touch screen display operatively coupled to a computing device, wherein the augmented reality representation comprises a selectable object that is associated with a real-world selectable object on the real-world device, the real-world selectable object having a force requirement to select;
detecting a contact with the selectable object on the touch screen display;
determining a force level of the contact with the touch screen display using at least one force sensor coupled to the touch screen display;
comparing the force level to a force threshold that is associated with the force requirement; and
controlling the computing device in response to the contact when the force level is greater than the force threshold.

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43*bis*.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2012/035992	01.05.2012	19.05.2011

International Patent Classification (IPC) or both national classification and IPC
INV. G06F3/048

Applicant
QUALCOMM INCORPORATED

1. This opinion contains indications relating to the following items:

- ☑ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☑ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA:	Date of completion of this opinion	Authorized Officer
European Patent Office Gitschiner Str. 103 D-10958 Berlin Tel. +49 30 25901 - 0 Fax: +49 30 25901 - 840	see form PCT/ISA/210	Durand, Jacques Telephone No. +49 30 25901-421

Form PCT/ISA/237 (Cover Sheet) (July 2009)

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☑ the international application in the language in which it was filed

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:

   a. (means)

      ☐ on paper

      ☐ in electronic form

   b. (time)

      ☐ in the international application as filed

      ☐ together with the international application in electronic form

      ☐ subsequently to this Authority for the purposes of search

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

Box No. IV Lack of unity of invention

1. ☑ In resoonse to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has, within the applicable time limit:

   ☒ paid additional fees

   ☐ paid additional fees under protest and, where applicable, the protest fee

   ☐ paid additional fees under protest but the applicable protest fee was not paid

   ☐ not paid additional fees

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is

   ☐ complied with

   ☒ not complied with for the following reasons:

   see separate sheet

4. Consequently, this report has been established in respect of the following parts of the international application:

   ☐ all parts.

   ☒ the parts relating to claims Nos. 1-48

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	8, 16, 35-48
	No:	Claims	1-7, 9-15, 17-34
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-48
Industrial applicability (IA)	Yes:	Claims	1-48
	No:	Claims	

2. Citations and explanations

see separate sheet

Re Item IV

Lack of unity of invention

1 This Authority considers that the application does not meet the requirements of unity of invention and that there are 3 inventions covered by the claims indicated as follows:

(1) Claims 1 to 20: A method comprising:

displaying a plurality of selectable objects that are at least partially overlapping on a touch screen display coupled to a computing device;

determining a force level of a contact with the touch screen display using at least one force sensor coupled to the touch screen display;

using the force level of the contact to select an object from the plurality of selectable objects; and controlling the computing device based on the object selected.

(2) Claims 21 to 34: A method comprising:

detecting a contact with a selectable object on a touch screen display, the selectable object is associated with a command to control a computing device;

determining that the command to control the computing device requires secondary confirmation;

determining a force level of the contact with the touch screen display using at least one force sensor coupled to the touch screen display; and

initiating the command in response to the contact with the selectable object and the force level.

(3) Claims 35 to 48: A method comprising:

displaying an augmented reality representation of a real-world device on a touch screen display operatively coupled to a computing device, wherein the augmented reality representation comprises a selectable object that is associated with a real-world selectable object on the real-world device, the real-world selectable object having a force requirement to select;

detecting a contact with the selectable object on the touch screen display;

determining a force level of the contact with the touch screen display using at least one force sensor coupled to the touch screen display;

comparing the force level to a force threshold that is associated with the force requirement; and

controlling the computing device in response to the contact when the force level is greater than the force threshold.

2 The reasons for which the inventions are not so linked as to form a single general inventive concept, as required by Rule 13.1 PCT, are as follows:

2.1 The closest prior art might be seen as D1 (US 2010/149129 A1). This document discloses (see in particular figures 8 to 10 and accompanying text) a method comprising:

displaying a plurality of selectable objects that are at least partially overlapping on a touch screen display coupled to a computing device;

determining a force level of a contact with the touch screen display using at least one force sensor coupled to the touch screen display; and

moving overlapping objects from their overlapping position when pressure is exerted on a touchscreen for allowing direct selection of the objects with a tap gesture.

2.2 It follows that the following technical features of claim 1 make a contribution over the prior art and can be considered as a special technical features (STF) within the meaning of Rule 13.2 PCT:

using the force level of the contact to select an object from the plurality of selectable objects; and controlling the computing device based on the object selected.

The same applies for the corresponding independent claims 9, 17 and 19.

The problem solved by these special technical features can therefore be construed as:

allowing direct selection of the required objects.

2.3 Likewise, the STF of the second invention is:

detecting a contact with a selectable object on a touch screen display, the selectable object is associated with a command to control a computing device;

determining that the command to control the computing device requires secondary confirmation; and

initiating the command in response to the contact with the selectable object and the force level.

The problem solved by these special technical features can therefore be construed as:

allowing the by-pass of secondary confirmation.

2.4 The STF of the third invention is:

displaying an augmented reality representation of a real-world device on a touch screen display operatively coupled to a computing device, wherein the augmented reality representation comprises a selectable object that is associated with a real-world selectable object on the real-world device, the real-world selectable object having a force requirement to select;

detecting a contact with the selectable object on the touch screen display;

comparing the force level to a force threshold that is associated with the force requirement; and

controlling the computing device in response to the contact when the force level is greater than the force threshold.

The problem solved by these special technical features can therefore be construed as:

to mimic the interaction with the displayed real-world selectable object.

2.5 Thus, the (groups of) claims mentioned above do not present a single common STF, nor are these STF's corresponding ones, since they do not solve a single common objective problem which is new and inventive. Therefore, the technical relationship required by Rule 13.2 PCT is not present between these groups of claims.

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1 Reference is made to the following documents:

D1 US 2010/149129 A1 (HOMMA FUMINORI [JP] ET AL) 17 June 2010 (2010-06-17)

D2 US 2011/107212 A1 (JEONG WOOKYUNG [KR]) 5 May 2011 (2011-05-05)

D3 US 6 448 959 B1 (KAWAGUCHI NAOHISA [JP] ET AL) 10 September 2002 (2002-09-10)

D4 US 2011/050653 A1 (MIYAZAWA YUSUKE [JP] ET AL) 3 March 2011 (2011-03-03)

D5 WO 2010/073731 A1 (KYOCERA CORP [JP]; AONO TOMOTAKE [JP]) 1 July 2010 (2010-07-01); & US 2011/181539 A1 (AONO TOMOTAKE [JP]) 28 July 2011 (2011-07-28)

D6 US 2008/024459 A1 (POUPYREV IVAN [JP] ET AL) 31 January 2008 (2008-01-31)

D7 KR 2011 0004203 A (SAMSUNG ELECTRONICS CO LTD [KR]) 13 January 2011 (2011-01-13)

D8 US 2011/037609 A1 (KIM JONGCHEOL [KR] ET AL) 17 February 2011 (2011-02-17)

2 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1, 9, 17 and 19 is not new in the sense of Article 33(2) PCT.

Document D2 discloses (see in particular figures 5, 6 and accompanying text) a method comprising:

displaying a plurality of selectable objects that are at least partially overlapping on a touch screen display coupled to a computing device;

determining a force level of a contact with the touch screen display using at least one force sensor coupled to the touch screen display (see in particular paragraph 50);

using the force level of the contact to select an object from the plurality of selectable objects; and controlling the computing device based on the object selected (see in particular paragraph 77).

Hence D2 discloses in combination all features of claim 1. Consequently, the subject-matter of this claim is not new.

The same applies for the subject-matter of the corresponding independent claims 9, 17 and 19.

3 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 21, 26, 31 and 33 is not new in the sense of Article 33(2) PCT.

3.1 Document D4 discloses (see in particular figures 4-6 and accompanying text) a method comprising:

detecting a contact with a selectable object on a touch screen display, the selectable object is associated with a command to control a computing device;

determining that the command to control the computing device requires secondary confirmation;

determining a force level of the contact with the touch screen display using at least one force sensor coupled to the touch screen display; and

initiating the command in response to the contact with the selectable object and the force level (see in particular paragraph 59).

3.2 Document D6 also discloses (see in particular figure 6 and accompanying text) a similar method (see in particular paragraphs 119 to 121).

3.3 Hence both documents D4 and D6 disclose respectively in combination all features of claim 21. Consequently, the subject-matter of this claim is not new.

The same applies for the subject-matter of the corresponding independent claims, 26, 31 and 33.

4 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 35, 41, 47 and 48 does not involve an inventive step in the sense of Article 33(3) PCT.

4.1 Document D7 is regarded as being the prior art closest to the subject-matter of claim 35, and discloses (see in particular figure 3 and accompanying text) a method comprising:

displaying an augmented reality representation of a real-world device on a touch screen display operatively coupled to a computing device, wherein the augmented reality representation comprises a selectable object that is associated with a real-world selectable object on the real-world device, the real-world selectable object having a force requirement to select;

detecting a contact with the selectable object on the touch screen display; and

controlling the computing device in response to the contact

4.2 The subject-matter of claim 35 therefore differs from this known method in that a force level of the contact with the touch screen display is determined and compared to a force threshold that is associated with the force requirement; in order to control the computing device in response to the contact only when the force level is greater than the force threshold.

4.3 The problem to be solved by the present invention may therefore be regarded as to mimic the force requirements of real-world objects in an augmented reality (AR) application (see description of the present application, paragraph 52, first sentence).

4.4 However, these features have already been employed for the same purpose in a similar method (see D6, paragraphs 68, 75-77). It would be obvious to the person skilled in the art, namely when the same result is to be achieved, to apply these features with corresponding effect to a method according to D7, thereby arriving at a method according to claim 35.

The fact that both D6 and D7 also provide haptic feedback when the user interacts with the touchscreen is only a supplementary feature which further improves the feeling of the user but is not limiting the teaching of these documents.

4.5 The same reasoning applies, mutatis mutandis, to the subject-matter of the corresponding independent claims 41,47 and 48, which therefore are also considered not inventive.

5 Dependent claims 2-8,10-16, 18, 20, 22-25, 27-30, 32, 34, 36-40 and 42-46 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step (see documents D1 to D8 and the corresponding passages cited in the search report).

6 Because of the reasons stated in sections 2 to 5 above, claims 1 to 48 are not allowable.

Possible steps after receipt of the international search report (ISR) and written opinion of the International Searching Authority (WO-ISA)

General information	For all international applications filed on or after 01/01/2004 the competent ISA will establish an ISR. It is accompanied by the WO-ISA. Unlike the former written opinion of the IPEA (Rule 66.2 PCT), the WO-ISA is not meant to be responded to, but to be taken into consideration for further procedural steps. This document explains about the possibilities.
Amending claims under Art. 19 PCT	Within 2 months after the date of mailing of the ISR and the WO-ISA the applicant may file amended claims under Art. 19 PCT directly with the International Bureau of WIPO. The PCT reform of 2004 did not change this procedure. For further information please see Rule 46 PCT as well as form PCT/ISA/220 and the corresponding Notes to form PCT/ISA/220.
Filing a demand for international preliminary examination	In principle, the WO-ISA will be considered as the written opinion of the IPEA. This should, in many cases, make it unnecessary to file a demand for international preliminary examination. If the applicant nevertheless wishes to file a demand this must be done before expiry of 3 months after the date of mailing of the ISR/WO-ISA or 22 months after priority date, whichever expires later (Rule 54bis PCT). Amendments under Art. 34 PCT can be filed with the IPEA as before, normally at the same time as filing the demand (Rule 66.1 (b) PCT). If a demand for international preliminary examination is filed and no comments/amendments have been received the WO-ISA will be transformed by the IPEA into an IPRP (International Preliminary Report on Patentability) which would merely reflect the content of the WO-ISA. The demand can still be withdrawn (Art. 37 PCT).
Filing informal comments	After receipt of the ISR/WO-ISA the applicant may file informal comments on the WO-ISA directly with the International Bureau of WIPO. These will be communicated to the designated Offices together with the IPRP (International Preliminary Report on Patentability) at 30 months from the priority date. Please also refer to the next box.
End of the international phase	At the end of the international phase the International Bureau of WIPO will transform the WO-ISA or, if a demand was filed, the written opinion of the IPEA into the IPRP, which will then be transmitted together with possible informal comments to the designated Offices. The IPRP replaces the former IPER (international preliminary examination report).
Relevant PCT Rules and more information	Rule 43 PCT, Rule 43bis PCT, Rule 44 PCT, Rule 44bis PCT, PCT Newsletter 12/2003, OJ 11/2003, OJ 12/2003

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:
Halbert, Michael J.
SILICON VALLEY PATENT GROUP LLP
4010 Moorpark Avenue Suite 210
San Jose CA 95117
ETATS-UNIS D'AMERIQUE

RECEIVED
JUL 23 2012
BY:

PCT

INVITATION TO PAY ADDITIONAL FEES
AND, WHERE APPLICABLE, PROTEST FEE

(PCT Article 17(3)(a) and Rule 40.1 and 40.2(e))

Applicant's or agent's file reference Q111601WOmh	Date of mailing *(day/month/year)* 17 July 2012 (17-07-2012) **PAYMENT DUE** within **ONE MONTH** from the above date of mailing
International application No. PCT/US2012/035992	International filing date *(day/month/year)* 1 May 2012 (01-05-2012)
Applicant QUALCOMM INCORPORATED	

1. This International Searching Authority

(i) considers that there are 3 *(number of)* inventions claimed in the international application covered by the claims indicated on an extra sheet;

(ii) therefore considers that **the international application does not comply with the requirements of unity of invention** (Rules 13.1, 13.2 and 13.3) for the reasons indicated on an extra sheet.

(iii) [X] has carried out a partial international search (see Annex) [ ] will establish the international search report on those parts of the international application which relate to the invention first mentioned in claims Nos.:

see extra sheet

(iv) will establish the international search report on the other parts of the international application only if, and to the extent to which, additional fees are paid.

2. Consequently, the applicant is hereby **invited to pay**, within the time limit indicated above, the amount indicated below:

EUR 1.875,00	x	2	=	EUR 3.750,00
Fee per additional invention		number of additional inventions		currency/total amount of additional fees

3. The applicant is informed that, according to Rule 40.2(c), **the payment of any additional fee may be made under protest**, i.e., a reasoned statement to the effect that the international application complies with the requirement of unity of invention or that the amount of the required additional fee is excessive, where applicable, subject to the payment of a protest fee.

Where the applicant pays additional fees under protest, the applicant is hereby invited, within the time limit indicated above, to pay a protest fee (Rule 40.2(e)) in the amount of EUR 830,00 *(currency/amount)*

Where the applicant has not, within the time limit indicated above, paid the required protest fee, the protest will be considered not to have been made and the International Searching Authority will so declare.

4. [ ] Claim(s) Nos. _____ have been found to be unsearchable under Article 17(2)(b) because of defects under Article 17(2)(a) and therefore have not been included with any invention.

Name and mailing address of the International Searching Authority	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040 Fax: (+31-70) 340-3016	GOLZE, Doreen Tel: +49 (0)30 25901-704

Form PCT/ISA/206 (April 2005)
Registered Mail

Annex to Form PCT/ISA/206
COMMUNICATION RELATING TO THE RESULTS OF THE PARTIAL INTERNATIONAL SEARCH

International Application No
PCT/US2012/035992

1. The present communication is an Annex to the invitation to pay additional fees (Form PCT/ISA/206). It shows the results of the international search established on the parts of the international application which relate to the invention first mentioned in claims Nos.:
see 'invitation to pay additional fees'
2. This communication is not the international search report which will be established according to Article 18 and Rule 43.

3. If the applicant does not pay any additional search fees, the information appearing in this communication will be considered as the result of the international search and will be included as such in the international search report.

4. If the applicant pays additional fees, the international search report will contain both the information appearing in this communication and the results of the international search on other parts of the international application for which such fees will have been paid.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2010/149129 A1 (HOMMA FUMINORI [JP] ET AL) 17 June 2010 (2010-06-17) paragraph [0071] - paragraph [0073] paragraph [0088] - paragraph [0099]; figures	1-20
X	US 2011/107212 A1 (JEONG WOOKYUNG [KR]) 5 May 2011 (2011-05-05) paragraph [0055] - paragraph [0060] paragraph [0075] - paragraph [0083]; claims; figures	1-20
X	US 6 448 959 B1 (KAWAGUCHI NAOHISA [JP] ET AL) 10 September 2002 (2002-09-10) column 7, line 43 - column 9, line 35 column 11, line 47 - line 57; claims; figures	1-20

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

1

Form PCT/ISA/206 (Annex, first sheet) (July 1992; reprint January 2004)

Patent Family Annex

information on patent family members

International Application No
PCT/US2012/035992

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2010149129 A1	17-06-2010	CN 101943987 A	12-01-2011
		JP 4743268 B2	10-08-2011
		JP 2010140417 A	24-06-2010
		US 2010149129 A1	17-06-2010
US 2011107212 A1	05-05-2011	KR 20110049431 A	12-05-2011
		US 2011107212 A1	05-05-2011
US 6448959 B1	10-09-2002	JP 3345433 B2	18-11-2002
		JP 5165593 A	02-07-1993
		US 6448959 B1	10-09-2002

Form PCT/ISA/206 (patent family annex) (July 1992; reprint January 2004)

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK
First Named Inventor/Applicant Name:	Michael S. Smith
Filer:	Patrick Edgar Caldwell
Attorney Docket Number:	SMITH070AY

Filed as Small Entity

Filing Fees for Track I Prioritized Examination - Nonprovisional Application under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	75	75
UTILITY SEARCH FEE	2111	1	330	330
UTILITY EXAMINATION FEE	2311	1	380	380
REQUEST FOR PRIORITIZED EXAMINATION	2817	1	2000	2000
Pages:				
UTILITY APPL SIZE FEE PER 50 SHEETS >100	2081	1	200	200
Claims:				
Miscellaneous-Filing:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
NON-ENGLISH TRANSLATION	2053	1	70	70
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**3055**

Electronic Acknowledgement Receipt	
EFS ID:	37787335
Application Number:	16687649
International Application Number:	
Confirmation Number:	6079
Title of Invention:	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK
First Named Inventor/Applicant Name:	Michael S. Smith
Customer Number:	92045
Filer:	Patrick Edgar Caldwell
Filer Authorized By:	
Attorney Docket Number:	SMITH070AY
Receipt Date:	18-NOV-2019
Filing Date:	
Time Stamp:	22:49:30
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$3055
RAM confirmation Number	E2019AHM50297548
Deposit Account	505939
Authorized User	Patrick Caldwell
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees)	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	SMITH070AY_ADS_vF_18-Nov-2019.pdf	1874058 9717ce762094c244d89271e56d950ba312885702	no	9
Warnings:					
Information:					
2		SMITH070AY_Application_vF_18-Nov-2019.pdf	760781 87961f40bf595182c03c2f9bcdf5fad0bf46a47f	yes	139

Multipart Description/PDF files in .zip description

Document Description	Start	End
Abstract	139	139
Claims	133	138
Specification	1	132

Warnings:					
Information:					
3	Drawings-only black and white line drawings	SMITH070AY_Drawings_vF_18-Nov-2019.pdf	2936970 79aacbf2c775cfe027794ed63a48dca2e135542d	no	28
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Information:					
4	Information Disclosure Statement (IDS) Form (SB08)	SMITH070AY_IDS_20191118_1_OF_6_vF.pdf	1062798 7a70c5e98218618b5725d7ac25df3d9f47c26629	no	37
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Information:					
5	Information Disclosure Statement (IDS) Form (SB08)	SMITH070AY_IDS_20191118_2_OF_6_vF.pdf	1061734 e769086024234ba0d11268f2d9b3101b4071e36a	no	36

Warnings:					
Information:					
6	Information Disclosure Statement (IDS) Form (SB08)	SMITH070AY_IDS_20191118_3_OF_6_vF.pdf	1059319 f933c9de8f8db59c60d150f1246b44151036ba65	no	35
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Information:					
7	Information Disclosure Statement (IDS) Form (SB08)	SMITH070AY_IDS_20191118_4_OF_6_vF.pdf	1062632 7c82a68a10a11978632a549173504f427f6d051f	no	36
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Information:					
8	Information Disclosure Statement (IDS) Form (SB08)	SMITH070AY_IDS_20191118_5_OF_6_vF.pdf	1061433 bcd2f9bfa289681d0de05fb9b7583df22e5bb017	no	32
Warnings:					
Information:					
9	Information Disclosure Statement (IDS) Form (SB08)	SMITH070AY_IDS_20191118_6_OF_6_vF.pdf	1055659 170a934863ae4192a90bffd9b6f6e236e8098725	no	7
Warnings:					
Information:					
A U.S. Patent Number Citation or a U.S. Publication Number Citation is required in the Information Disclosure Statement (IDS) form for autoloading of data into USPTO systems. You may remove the form to add the required data in order to correct the Informational Message if you are citing U.S. References. If you chose not to include U.S. References, the image of the form will be processed and be made available within the Image File Wrapper (IFW) system. However, no data will be extracted from this form. Any additional data such as Foreign Patent Documents or Non Patent Literature will be manually reviewed and keyed into USPTO systems.					
10	Power of Attorney	SMITH070AY_POA_vF_18-Nov-2019.pdf	95105 727b4c88dbe0b963751516f41fe590552381952f	no	1
Warnings:					
Information:					
11	TrackOne Request	SMITH070AY_ReqForPrioritizedExam_vF_18-Nov-2019.pdf	96256 ece0101b214a6783276a78b2add00cee21073092	no	2
Warnings:					
Information:					

12	Oath or Declaration filed	SMITH070AY-AI_Declaration_vF_18-Nov-2019.pdf	79100 39735ae620cf34bc514a4f90b4b0f809f66d1911	no	1
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Information:					
13	Non Patent Literature	007-Akhshabi-Experimental-Evaluation.pdf	1020842 c04af0b7cd278be4f3d9a9722d930729068ed8e6	no	12
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Information:					
14	Non Patent Literature	001-02731708.pdf	162392 e36c2f89554b9b573169171e81ef2a503a3bb1d3	no	4
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Information:					
15	Non Patent Literature	002-12625381.pdf	219827 0b9a320fdfa31f7f7442d89e00e0fc1e0e24c573	no	3
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Information:					
16	Non Patent Literature	003-12625381_2.pdf	383502 ba9edcab35bf240d67df295e71ea0408f579ed31	no	5
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17	Non Patent Literature	004-13416731.pdf	1178429 bc6aea50ed6d2dba878029013eae0d91a8626186	no	18
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18	Non Patent Literature	005-13416731_2.pdf	224262 6d86e4cca82e28eed1ceb448316c077a7322a1ac	no	3
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Information:					

19	Non Patent Literature	006-3D-Packing-Newsletter.pdf	3193113 6cee0170be6d9a87b80fdc440b1a158620bfec98	no	16
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20	Non Patent Literature	008-ALTERA-Using-Pre-Emphasis.pdf	817786 557e0d8a814f8964da070c83dc10f6c841b56046	no	11
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Information:					
21	Non Patent Literature	009-AMD-BIOS-and-Kernel.pdf	18836075 590fe1a64702b8f1d619d6f0bd251a4a6c3a6f17	no	403
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Information:					
22	Non Patent Literature	010-AMP-DDR2-DIMM-25-Degree.pdf	39326 12cf5917c45bd19316a4819292ea473ce69ce056	no	1
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Information:					
23	Non Patent Literature	011-AMP-DDR2-DIMM-Socket.pdf	41620 d0c389b45285f3d011d3727101842c3db33da46d	no	1
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24	Non Patent Literature	012-ANALUI-Signal-Integrity.pdf	8001221 86284737990f87886924597c855fd0f9d649d885	no	194
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25	Non Patent Literature	013-ARM-The-ARM-Architecture.pdf	9264897 1104f6eb54ab7d8ffa2323716ebd1eb8a7f7a1ec	no	43
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Information:					

26	Non Patent Literature	014-ARORA-Sensing-by-the-people.pdf	2919790 71fa248131bbe84b1cbb845505057c906cdcd646	no	48
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Information:					
27	Non Patent Literature	015-AVISSAR-Heterogeneous-Memory.pdf	993359 4eeccb4ccbd075381257794b761d535c00201a5f	no	10
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Information:					
28	Non Patent Literature	016-BAHAR-Mobile-Phone-Based.pdf	942753 18ebb598fa0fd7ea7e2e5e0dbaac14233e5c43ef	no	8
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Information:					
29	Non Patent Literature	017-BAKER-Power-Behind-Resistive-Touch.pdf	673065 ed2c76b4772b9b6b585d0fe162490298cb49cbd9	no	9
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Information:					
30	Non Patent Literature	018-BALAKRISHNAN-Background-Single-Link.pdf	362395 20eb75d6df2b9f6681ca083e680742fb8a50e06d	no	6
Warnings:					
Information:					
31	Non Patent Literature	019-BALASUBRAMANIAN-Energy-Consumption.pdf	1628759 625f3424a1bcd33fec39f9c7852b6913b3593f2a	no	14
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32	Non Patent Literature	020-BAR-NIV-Balanced-equalization.pdf	523531 2b31ec315fbd5be710fa14794e09144ebc28ce23	no	4
Warnings:					
Information:					

33	Non Patent Literature	021-BARR-Translation-Caching.pdf	1269989 06a5791a47417eda39d1603154a603c94d657cb1	no	12
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Information:					
34	Non Patent Literature	022-BEN-YEHUDA-The-Turtles-Project.pdf	4374456 6536fd8590bd9d215f7e1912530ab583462750d1	no	92
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35	Non Patent Literature	023-BHARDWAJ-A-Choices-Hypervisor.pdf	259044 3822fdd04f7aad53a360c1f5176692053e087e76	no	5
Warnings:					
Information:					
36	Non Patent Literature	024-BICKFORD-Rootkits-on-Smart-Phones.pdf	838995 54286396230c5f020c56d6b4a1237184dfb8473a	no	6
Warnings:					
Information:					
37	Non Patent Literature	025-BIEN-Reconfigurable-Equalization.pdf	5976375 14d75039a92a6f3eff7a5e77139687fef3eef75b	no	121
Warnings:					
Information:					
38	Non Patent Literature	026-BIHLMAYR-OLED-Display.pdf	3690229 a47f3bd11a89af41e9df38ebfd48ace80af1d032	no	42
Warnings:					
Information:					
39	Non Patent Literature	027-BORNSTEIN-ANDROID-Dalvik-VM-Internals-optimized.pdf	2455312 f85d1b9cb5b97ce83183c3e6a0e8dccefae34dd1	no	58
Warnings:					
Information:					

40	Non Patent Literature	028-BRASH-Extensions-to-the-ARM-v-7-A.pdf	18069498 5fb80f0d206fe762a9762abaa488218a8d47f0b1	no	172
Warnings:					
Information:					
41	Non Patent Literature	029-Brueck_US7818444_CoC.pdf	21654 6bfe2eeffdc952a83bb1448c29dd5e70bcf2b915	no	1
Warnings:					
Information:					
42	Non Patent Literature	030-BUCHALI-Fast-Eye-Monitor.pdf	174017 e953d73379c95e9dfc31ce76e4cf5ecf79995f5e	no	4
Warnings:					
Information:					
43	Non Patent Literature	031-BUCKWALTER-Deterministic-Jitter.pdf	9069132 3421341da5ea4679fe5df3f9d1797fec5eb3f038	no	220
Warnings:					
Information:					
44	Non Patent Literature	032-BUNGALE-ARM-Virtualization.pdf	1864400 f010d9c4b7479180ecbdcac1c9fa5fcc6d1f7929	no	16
Warnings:					
Information:					
45	Non Patent Literature	033-BURDACH-Physical-Memory-Forensics.pdf	17122565 74d96ddef646aeff01ebe410abdfac2b1d4b3bc9	no	53
Warnings:					
Information:					
46	Non Patent Literature	034-CARROLL-An-Analysis-of-Power.pdf	1322860 3f20ec613241de78ec30ea44ef554a06eac1cbb2	no	14
Warnings:					
Information:					

47	Non Patent Literature	035-CASIEZ-RubberEdge.pdf	177292 b413f0227f149ac7e529ac85561c95b53a844275	no	1
Warnings:					
Information:					
48	Non Patent Literature	036-cellphone-hardware-apps.pdf	1021664 279fd0d9614136ce4a4d2b2fff4f8aef93bc0175	no	24
Warnings:					
Information:					
49	Non Patent Literature	037-CHANDRAMOULI-A-BROADBAND.pdf	2449241 7188556d3f87c9097799cbd2793b2eb07ef633db	no	52
Warnings:					
Information:					
50	Non Patent Literature	038-CHANDRASEKARAN-Hardware-assisted.pdf	909853 cda5c149667eda1e03f829092b60a6f6dfb93b91	no	8
Warnings:					
Information:					
51	Non Patent Literature	039-CHAPMAN-MagiXen.pdf	1283190 718ef1079016fad551c123335270a448fb15765a	no	15
Warnings:					
Information:					
52	Non Patent Literature	040-CHAUDHARY-TECHNIQUES-FOR-MIGRATING.pdf	1020113 512bc0b2e8bdf4c4279aa596d77beb984f6071d8	no	19
Warnings:					
Information:					
53	Fee Worksheet (SB06)	fee-info.pdf	40287 8bd5f9c708604cec9f5df7be1e60c03fea65548e	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	137042955		

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	SMITH070AY
	Application Number	
Title of Invention	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 — Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Michael	S	Smith	

Residence Information (Select One) ● US Residency Non US Residency Active US Military Service

City	State/Province	Country of Residence
Palo Alto	CA	US

Mailing Address of Inventor:

Address 1	P4TENTS1, LLC
Address 2	PO BOX 999

City	State/Province	Postal Code	Country
Los Altos	CA	94023-0999	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	92045		
Email Address	pcaldwell@thecaldwellfirm.com	Add Email	Remove Email

Application Information:

Title of the Invention	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK		
Attorney Docket Number	SMITH070AY	**Small Entity Status Claimed**	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)		**Suggested Figure for Publication (if any)**	

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	SMITH070AY
	Application Number	
Title of Invention	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☒ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	● Customer Number	US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	92045		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Continuation of	16377142	2019-04-05

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	SMITH070AY
	Application Number	
Title of Invention	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK	

Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16377142	Continuation of	16153763	2018-10-06	10275086	2019-04-30
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16153763	Continuation of	15072354	2016-03-16	10133397	2018-11-20
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15072354	Continuation of	13567004	2012-08-03	9417754	2016-08-16
Prior Application Status	Expired				Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
13567004	Claims benefit of provisional	61581918	2011-12-30		
Prior Application Status	Expired				Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
13567004	Claims benefit of provisional	61569213	2011-12-09		
Prior Application Status	Expired				Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
13567004	Claims benefit of provisional	61566577	2011-12-02		
Prior Application Status	Expired				Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
13567004	Claims benefit of provisional	61515835	2011-08-05		
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.					Add

Foreign Priority Information:

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	SMITH070AY
	Application Number	
Title of Invention	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK	

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	SMITH070AY
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Title of Invention	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	SMITH070AY
	Application Number	
Title of Invention	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 — Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

● Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.	Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	P4TENTS1 LLC		
Mailing Address Information For Applicant:			
Address 1	1201 Orange St		
Address 2	#600		
City	Wilmington	**State/Province**	DE
Country	US	Postal Code	19899
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

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	Application Number	
Title of Invention	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK	

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Patrick Caldwell/			Date (YYYY-MM-DD)	2019-11-18
First Name	Patrick	Last Name	Caldwell	Registration Number	44580

Additional Signature may be generated within this form by selecting the Add button. Add

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	SMITH070AY
	Application Number	
Title of Invention	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1 The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3 A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent CooperationTreaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

ABSTRACT

In one embodiment, an apparatus and associated method are provided, comprising: a display; one or more processors; memory; and one or more programs, wherein the one or more programs are stored in the memory and configured to be executed by the one or more processors, the one or more programs including instructions for: displaying a plurality of user interface elements on the display including a first user interface element and a second user interface element; detecting a first contact moving across the display; and, while the first contact is detected moving across the display: moving the first user interface element in a first direction on the display at a first speed; and moving the second user interface element on the display at a second speed greater than the first speed.

CLAIMS

1. An electronic device, comprising:

a display;

one or more processors;

memory; and

one or more programs, wherein the one or more programs are stored in the memory and configured to be executed by the one or more processors, the one or more programs including instructions for:

displaying a plurality of user interface elements on the display including a first user interface element and a second user interface element;

detecting a first contact moving across the display; and,

while the first contact is detected moving across the display:

moving the first user interface element in a first direction on the display at a first speed; and

moving the second user interface element on the display at a second speed greater than the first speed.

2. The electronic device of Claim 1, wherein the electronic device is configured such that the plurality of user interface elements are displayed on the display such that the second user interface element is disposed above the first user interface element and the second user interface element at least partially exposes the first user interface element, where the electronic device includes a watch.

3. The electronic device of Claim 2, wherein the electronic device is configured such that the second speed increases relative to the first speed as the first contact moves.

4. The electronic device of Claim 2, wherein the electronic device is configured such that the first contact is detected on the first user interface element, and the first contact is detected moving at the first speed.

5. The electronic device of Claim 2, wherein the electronic device is configured such that the first contact is detected on the first user interface element, and the second user interface element is

displayed to move farther away from the first contact as the first contact is detected moving across the display.

6. The electronic device of Claim 2, wherein the electronic device is configured such that the first contact is detected on the second user interface element, and the first contact is detected moving at the second speed.

7. The electronic device of Claim 2, wherein the electronic device is configured such that the first contact is detected on a portion of a user interface that does not include the first user interface element nor the second user interface element.

8. The electronic device of Claim 7, wherein the electronic device is configured such that the second user interface element is offset from the first user interface element, and the offset is increased as a result of the second user interface element moving at the second speed greater than the first speed.

9. The electronic device of Claim 2, wherein the electronic device is configured such that the plurality of user interface elements includes a third user interface element, and while the first contact is detected moving across the display: the third user interface element is moved in the first direction on the display at a third speed less than the first speed.

10. The electronic device of Claim 2, wherein the first contact includes a first-orientation gesture detected on a particular user interface element including at least one of the first user interface element or the second user interface element, wherein the one or more programs include instructions for:

detecting a second-orientation gesture on the particular user interface element; and

in response to the detection of the second-orientation gesture on the particular user interface element, performing an operation.

11. The electronic device of Claim 10, wherein the electronic device is configured such that the operation includes at least one of a delete operation or a close operation.

12. The electronic device of Claim 2, wherein the first contact is detected on a particular user interface element including at least one of the first user interface element or the second user interface element, wherein the one or more programs include instructions for:

detecting a second contact on the particular user interface element; and

based on detecting the second contact on the particular user interface element and further based on a pressure of the second contact, pulsing the particular user interface element.

13. The electronic device of Claim 2, wherein the electronic device is configured such that the movement of the second user interface element at the second speed greater than the first speed of the movement of the first user interface element, increases a speed with which the first user interface element is exposed for user inspection and selection, for decreasing an amount of time required for a user to inspect and select the first user interface element.

14. The electronic device of Claim 2, wherein the electronic device is configured such that the movement of the second user interface element at the second speed greater than the first speed of the movement of the first user interface element, increases a speed with which the first user interface element is exposed for user inspection and selection, for decreasing an amount of time required for a user to inspect and select the first user interface element, which reduces power consumption by the electronic device.

15. The electronic device of Claim 14, wherein the electronic device is configured such that the movement of the second user interface element at the second speed greater than the first speed of the movement of the first user interface element, solves a technical problem involving an amount of processing and power resources required during operation of the electronic device.

16. The electronic device of Claim 2, wherein the electronic device is configured such that the user interface elements include representations of different applications in a multitasking environment.

17. The electronic device of Claim 2, wherein the electronic device is configured such that the second user interface element is offset from the first user interface element in the first direction.

18. The electronic device of Claim 2, wherein the electronic device is configured such that the first contact is detected as moving across the display in the first direction.

19. The electronic device of Claim 2, wherein at least one of:

the first user interface element includes a first user interface representation;

the first user interface element includes a first object;

the first user interface element includes a first layer;

the first user interface element includes a first window an adjacent object;

the second user interface element includes a second user interface representation;

the second user interface element includes a second object;

the second user interface element includes a second layer;

the second user interface element is moved on the display in the first direction at the second speed greater than the first speed;

the second user interface element is moved on the display in a second direction at the second speed greater than the first speed;

the second user interface element includes a second window an adjacent object;

the second user interface element appears to move faster than the first user interface element;

the second user interface element actually moves faster than the first user interface element;

the second user interface element moves faster than the first user interface element, by appearing to do so;

the first user interface element includes a representation of at least one of a web browser application interface, a messaging application interface, a calendar application interface, or a navigation application interface;

the first user interface element includes content of at least one of a web browser application interface, a messaging application interface, a calendar application interface, or a navigation application interface;

the second user interface element includes a representation of at least one of a web browser application interface, a messaging application interface, a calendar application interface, or a navigation application interface;

the second user interface element includes content of at least one of a web browser application interface, a messaging application interface, a calendar application interface, or a navigation application interface;

at least one of the first user interface element or the second user interface element includes a display element;

at least one of the first user interface element or the second user interface element includes a region of the display allotted to an identifiable visual object;

at least one of the first user interface element or the second user interface element includes a three-dimensional element;

at least one of the first user interface element or the second user interface element includes a three-dimensional display element;

at least one of the first user interface element or the second user interface element includes a virtual display layer;

at least one of the first user interface element or the second user interface element is part of a virtual display layer;

the first user interface element and the second user interface element are manipulatable using separate interaction surfaces;

the first user interface element is manipulatable using a back interaction surface and the second user interface element is manipulatable using a front interaction surface;

the first user interface element and the second user interface element are manipulatable using the same interaction surface;

the first contact is at a location of the first user interface element on the display;

the first contact includes a swipe gesture;

the first contact is a swipe gesture;

the first contact is detected moving across an entirety of the display;

the first contact is detected moving across only a portion of the display;

the movement of at least one of the first user interface element or the second user interface element occurs during an entirety of the movement of the first contact;

the movement of at least one of the first user interface element or the second user interface element occurs during only a portion of the movement of the first contact;

the first user interface element includes a first screen of layered content, and the second user interface element includes a second screen of layered content;

the first user interface element is part of a first screen of layered content, and the second user interface element is part of a second screen of layered content;

the first speed is a depth-based apparent rate;

the second speed is a depth-based apparent rate;

the first speed is in accordance with a speed of the first contact on the display;

the first user interface element is moved at the first speed and the second user interface element is moved at the second speed, for providing a three-dimensional depth cue;

the first user interface element is moved at the first speed and the second user interface element is moved at the second speed, in order give an appearance of depth;

the first user interface element and the second user interface element are included in staggered layers; or

the first user interface element and the second user interface element are included in staggered layers.

20. An electronic device, comprising:

a display;

one or more processors;

memory; and

one or more programs, wherein the one or more programs are stored in the memory and configured to be executed by the one or more processors, the one or more programs including instructions means for:

displaying a plurality of user interface elements on the display including a first user interface element and a second user interface element;

detecting a first contact moving across the display; and,

while the first contact is detected moving across the display:

moving the first user interface element in a first direction on the display at a first speed; and

moving the second user interface element on the display at a second speed greater than the first speed.

DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application is a continuation of and claims priority to U.S. Patent Application No. 16/377,142 filed 04/05/2019 which, in turn, is a continuation of and claims priority to U.S. Patent Application No. 16/153,763 filed 10/06/2018, now U.S. Pat. No. 10,275,086, which, in turn, is a continuation of and claims priority to U.S. Patent Application No. 15/072,354, filed 03/16/2016, now U.S. Pat. No. 10,133,397; which, in turn, is a continuation of and claims priority to U.S. Patent Application No. 13/567,004, filed 08/03/2012, now U.S. Pat. No.: 9,417,754; which, in turn, claims priority to U.S. Provisional Application No. 61/515,835, filed August 5, 2011, U.S. Provisional Application No. 61/566,577, filed December 2, 2011, U.S. Provisional Application No.61/569,213, filed December 9, 2011, and U.S. Provisional Application No. 61/581,918, filed December 30, 2011, the entire contents of all of which are incorporated herein by reference.

[0002] If any definitions (e.g., figure reference signs, specialized terms, examples, data, information, etc.) from any related material (e.g., parent application, other related application, material incorporated by reference, material cited, extrinsic reference, etc.) conflict with this application (e.g., abstract, description, summary, claims, etc.) for any purpose (e.g., prosecution, claim support, claim interpretation, claim construction, etc.), then the definitions in this application shall apply.

BACKGROUND AND FIELD OF INVENTION

[0003] Embodiments of the present invention generally relate to touch screens.

BRIEF SUMMARY

[0004] In one embodiment, an apparatus and associated method are provided, comprising: a display; one or more processors; memory; and one or more programs, wherein the one or more programs are stored in the memory and configured to be executed by the one or more processors, the one or more programs including instructions for: displaying a plurality of user interface elements on the display including a first user interface element and a second user interface element; detecting a first contact moving across the display; and, while the first contact is detected moving across the display: moving the first user interface element in a first direction on the display at a first speed; and moving the second user interface element on the display at a second speed greater than the first speed.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0005] So that the features of various embodiments of the present invention can be understood, a more detailed description, briefly summarized above, may be had by reference to various embodiments, some of which are illustrated in the accompanying drawings. It is to be noted, however, that the accompanying drawings illustrate only embodiments and are therefore not to be considered limiting of the scope of various embodiments of the invention, for the invention may admit to other effective embodiments. The following detailed description makes reference to the accompanying drawings that are now briefly described.

[0006] So that the features of various embodiments of the present invention can be understood, a more detailed description, briefly summarized above, may be had by reference to various embodiments, some of which are illustrated in the accompanying drawings. It is to be noted, however, that the accompanying drawings illustrate only embodiments and are therefore not to be considered limiting of the scope of the invention, for the invention may admit to other effective embodiments. The following detailed description makes reference to the accompanying drawings that are now briefly described.

[0007] Figure 1 illustrates a network architecture, in accordance with one embodiment.

[0008] Figure 2 shows a representative hardware environment that may be associated with the servers and/or clients of Figure 1, in accordance with one embodiment.

[0009] Figure 3 shows a method for altering a user experience based on a received signal, in accordance with one embodiment.

[0010] Figure 4 shows a method for defining a selection made within a user interface based in part on contact pressure, in accordance with one embodiment.

[0011] Figure 5 shows a pressure-sensitive user interface for making a selection, in accordance with one embodiment.

[0012] Figure 6 shows a method for determining the context of a contact pressure-based selection and choosing an appropriate selection function, in accordance with one embodiment.

[0013] Figure 7 shows a device having a backtouch interface, in accordance with one embodiment.

[0014] Figure 8 shows a method for providing feedback to the user of a backtouch interface, in accordance with one embodiment.

[0015] Figure 9 shows a pressure-sensitive user interface for making a selection using a backtouch interface, in accordance with one embodiment.

[0016] Figure 10 shows a user interface for defining settings associated with a backtouch interface, in accordance with one embodiment.

[0017] Figure 11 shows a user interface for defining settings associated with a pressure-sensitive interface, in accordance with one embodiment.

[0018] Figure 12 shows a method for assisting a user in defining touch states, in accordance with one embodiment.

[0019] Figure 13 shows a user interface for assisting a user in defining touch states, in accordance with one embodiment.

[0020] Figure 14 shows a user interface for indicating that a backtouch or pressure-sensitive interface is activated, in accordance with one embodiment.

[0021] Figure 15 shows a user interface for defining a backtouch feedback style, in accordance with one embodiment.

[0022] Figure 16 shows an alternative method for defining a selection made within a user interface based in part on contact pressure, in accordance with one embodiment.

[0023] Figure 17 shows a user interface for performing operations on a selection, in accordance with one embodiment.

[0024] Figure 18 shows a method for utilizing contact pressure-based gestures, in accordance with one embodiment.

[0025] Figure 19 shows an example of a contact pressure-based gesture for scrolling a text field, in accordance with one embodiment.

[0026] Figure 20 shows an example of a multitouch pressure gesture for indicating a direction, in accordance with one embodiment.

[0027] Figure 21 shows an example of a multitouch pressure gesture for indicating a rotation, in accordance with one embodiment.

[0028] Figure 22 shows a 3D layered user interface, in accordance with one embodiment.

[0029] Figure 23 shows exemplary pattern-based gestures, in accordance with one embodiment.

[0030] Figure 24 shows a user interface for defining custom gestures, in accordance with one embodiment.

[0031] Figure 25 shows a user interface for providing quick access to favorite operations, in accordance with one embodiment.

[0032] Figure 26 shows a method for gesture differentiation, in accordance with one embodiment.

[0033] Figure 27 shows a 3D layered user interface having a clipboard layer, in accordance with one embodiment.

[0034] Figure 28 shows a 3D layered user interface having an operation layer, in accordance with one embodiment.

[0035] While the invention is susceptible to various modifications, combinations, and alternative forms, various embodiments thereof are shown by way of example in the drawings and will herein be described in detail. It should be understood, however, that the accompanying drawings and detailed description are not intended to limit the invention to the particular form disclosed, but on the contrary, the intention is to cover all modifications, combinations, equivalents and alternatives falling within the spirit and scope of the present invention as defined by the relevant claims.

DETAILED DESCRIPTION

[0036] Terms that are special to the field of the invention or specific to this description may, in some circumstances, be defined in this description. Further, the first use of such terms (which may include the definition of that term) may be highlighted in italics just for the convenience of the reader. Similarly, some terms may be capitalized, again just for the convenience of the reader. It should be noted that such use of italics and/or capitalization and/or other formatting, highlighting etc, by itself, should not be construed as somehow limiting such terms: beyond any given definition, and/or to any specific embodiments disclosed herein, etc.

[0037] In this description there may be multiple figures that depict similar structures with similar parts or components. Thus, as an example, to avoid confusion an Object in Figure 1 may be labeled and/or referenced as "Object (1)" and a similar, but not identical, Object in Figure 2 is labeled and/or referenced as "Object (2)", etc. Again, it should be noted that use of such labeling and reference manner, by itself, should not be construed as somehow limiting such terms: beyond any given definition, and/or to any specific embodiments disclosed herein, etc.

[0038] In the following detailed description and in the accompanying drawings, specific terminology and images are used in order to provide a thorough understanding. In some instances, the terminology and images may imply specific details that are not required to practice all embodiments. Similarly, the embodiments described and illustrated are representative and should not be construed as precise representations, as there are prospective variations on what is disclosed that may be obvious to someone with skill in the art. Thus this disclosure is not limited to the specific embodiments described and shown but embraces all prospective variations that fall within its scope. For brevity, not all steps may be detailed, where such details will be known to someone with skill in the art having benefit of this disclosure.

[0039] In the following detailed description and in the accompanying drawings, some embodiments and their constituent parts may have been simplified for clarity of explanation. In some cases, a complex system may be broken down into its constituent parts and pieces and each part or piece explained separately. The explanations for each part or piece may possibly use a separate figure along with accompanying text to describe variations and alternative implementations. In some cases, complex elements have been simplified to more clearly define their function. In many cases, a system may be comprised of multiple complex elements with each element being a more complex version of a simple part or piece that has been explained separately. It is not possible to describe every possible combination of complex elements in all possible systems. Thus, the description herein

is not limited to just the specific embodiments of parts or pieces described with each figure or in an accompanying explanation, or even those example systems described, but rather the possible combinations of complex elements based on the parts and pieces described.

[0040] Definitions

[0041] A computer system (e.g., a host system, host, computer, etc.) may include one or more storage systems (or storage subsystems, disk systems, disk subsystems, etc.) that may include storage arrays that include storage devices. A storage device may include a solid-state storage device, hard-disk drive (HD or HDD), or other device (e.g., tape, optical media, etc.).

[0042] A solid-state storage device may refer to a solid-state disk (SSD), but the solid-state storage device is not necessarily an SSD. A solid-state storage device may, for example, comprise memory devices such as flash memory devices (e.g., NAND, NOR, MLC, SLC, etc.), but may also comprise other forms of solid-state memory devices or memory components (e.g., SRAM, DRAM, MRAM, volatile memory, non-volatile memory, etc.), a combination of different types of solid-state components and/or other memory devices, or a combination of solid-state memory with other types of storage devices (e.g., hybrid disk, etc.). An SSD may be in a form-factor that is a drop-in replacement for a hard-disk (3.5", 2.5" form factors, etc.) or may be in any other form-factor or with any interface (e.g., Compact Flash CF, MultiMediaCard MMC, miniSD, Memory Stick, SmartMedia, TransFlash, Secure Digital SD, DIMM or other memory module form factor, PCI Express Card, mini PCI-E card, etc.). An SSD may use a standard storage interface (e.g., IDE, SAS, SATA, etc.) or an IO bus interface (e.g., PCI, PCI-E, USB, LightPeak, etc.), a networking interface (e.g., Ethernet, FCoE, Infiniband, etc.), a CPU bus interface (e.g., Intel QPI, HyperTransport, etc.), or other interface (e.g., PCI-E over Ethernet, etc.). An SSD in a storage array may have a capacity of more than 100 Gbytes and contain tens of NAND flash memory chips. A typical 1 Gbit NAND flash memory chip may contain 1024 flash blocks with each flash block containing 64 flash pages and each flash page containing 2 kbytes.

[0043] Storage arrays may also include a combination of SSD and HDD, or combinations of various storage devices (e.g., magnetic, optical, tape, solid-state, etc.).

[0044] A solid-state storage device may use a disk controller (e.g., storage controller, controller, ASIC, other chips component(s), etc.) to provide the computer system with a standard storage (e.g., disk, storage networking, etc.) interface (e.g., IDE, SATA, SAS, Fibre Channel (FC), etc.), a standard peripheral (e.g., IO bus, IO attach, etc.) interface (e.g., PCI-E, USB, PCI Express, PCI, etc.), other standard interface (e.g., Ethernet, wireless 802.11, etc.), a proprietary (e.g., non-standard,

etc.) interface, a combination of these (e.g., PCI-E over Ethernet, FC over Ethernet (FCoE), etc.), or other storage, networking, interconnect interface(s) etc.

[0045] A storage array controller (often also called disk controller, host-bus adapter, etc.) may be logically located between the computer system and one or more SSDs or HDDs in a disk subsystem. In the context of the present description, the use of the term disk controller has been avoided as a term to describe a controller that controls one or more disks. The term storage array controller has been used herein for a controller that controls one or more disks. In some cases, each disk (HDD or SSD etc.) may have its own disk controller, thus causing potential confusion over terms. Alternative terms for storage array controller may include host-bus adapter, host adapter, host controller. However, the term host-bus adapter (often abbreviated HBA) and similar terms have been avoided herein to avoid confusion with HBA used here for host block address.

[0046] An SSD may include its own SSD controller, but, in some cases, a storage array controller may have more resources than an SSD controller. A storage array controller may use resources, such as memory, CPU, logic, non-volatile memory, etc., as well as unique information (e.g., because a storage array controller is higher than the SSD controller in the storage array hierarchy, i.e., further from the storage devices) in order to manage and control a storage array as well as provide information to an SSD controller.

[0047] A computer system typically contains one or more CPUs. A CPU may execute (e.g., run, etc.) an operating system (e.g., Microsoft Windows, Linux. MacOS, etc.). An operating system (OS) typically sees a storage array as a collection of disk sectors or just sectors (and sectors may also be called blocks). Disk sectors may be 512 bytes in length (and typically are in the 2011 timeframe). The sectors or blocks of a storage device are typically addressed as logical blocks using a logical block address (LBA).

[0048] To avoid confusion, the term host block address (HBA) is used herein for the LBA used to address a storage array controller. Unless explicitly stated otherwise, it is assumed that the host block size (HBS) is equal to the disk block size (DBS). The HBA may be a composite or union of a logical unit number (LUN) that identifies a logical portion of the storage array or disk or other device in the storage array; an LBA; the virtual machine (VM), if any; a UserID that identifies the user application; a VolumeID that identifies a logical target volume; and other data that may be used for logical access or management purposes. To simplify the description, clarify the figures, and in particular to make it clear that operations may be performed on different LUNs, the LUN may be shown separately from HBA in figures.

[0049] A disk number (D) may identify a disk or other storage device in the storage array. A disk logical block address (DBA) is the LBA that identifies the disk sector on the disk or other storage device. An array block address (ABA) is a composite or union of D and DBA, written <D, DBA>. The storage array may be a RAID array, JBOD, or any other particular type of storage array.

[0050] A disk controller for an HDD or SSD maintains the relationship between an ABA (or the DBA portion of the ABA) and the disk sectors that are physically part of a storage device (often called the physical disk sectors or physical sectors).

[0051] To summarize, with just a single disk, the host may provide an LBA directly to the disk; the disk controller may convert the LBA to the physical disk sector (e.g., for an HDD) or to the PBN (e.g.,for an SSD). In the presence of a storage array controller the host may still provide an LBA, but now to the storage array controller (and thus the LBA may be referred to as an HBA to avoid confusion); the storage array controller may then map this HBA to an ABA and may provide the ABA (or possibly just the DBA portion of the ABA) to the disk; the disk (e.g., an HDD or SSD, etc.) may then convert this DBA or ABA (treating the DBA portion of the ABA as though it were just an LBA, which it is) to a physical disk address: either the physical disk sector (e.g., for an HDD) or PBN (e.g., for an SSD).

[0052] In various embodiments, structures and their functions, operations and algorithms (e.g., methods, functions, etc.) may be described in terms of software operations, code and pseudo-code. It should be noted that the algorithms may be performed in hardware; software; firmware; microcode; a combination of hardware, software, firmware or microcode; or in any other manner that performs the same function and/or has the same effect. In various embodiments, the data structures, or parts of the structures, may be stored in the storage array controller in SRAM, DRAM, embedded flash, or other memory. Additionally, the data structures, or parts of them, may be stored outside the storage array controller. For example, the data structures may be stored on any of the storage devices of a storage array (the local storage or remote storage, i.e., remote from the storage array connected to the storage array controller) or on a host system (the local host or a remote host, i.e., remote from the host connected to the storage array controller).

[0053] A storage command may be directed to a storage device and may specify one or more operations, such as read, write, etc. A storage command may be referred to as a disk command or just command. To help prevent such confusion, the term storage command may be used when referencing commands in general. The term disk command (or disk write, etc.) may be utilized for the command as it arrives at (or is received by) the disk (either SSD or HDD, usually via a standard interface or storage bus, such as SATA, etc.). The term host command (or host write, etc.) may be

utilized for the command as it leaves (or is transmitted by) the OS. A disk command may be the same as a host command when there is a direct connection between the OS on a host system and a single disk.

[0054] A storage array controller may perform certain functions instead of (or in addition to) an OS running on a host system; and a storage array controller may also perform certain functions instead of (or in addition to) disk controller(s) in a storage array. A storage array controller may be logically located between a host system and storage array (or disk subsystem, storage subsystem, etc.). Each disk may contain its own disk controller, but a storage array controller may have more resources than a disk controller. The algorithms described here allow a storage array controller and attached storage accelerator units (SAUs) to use resources, such as memory, non-volatile memory, etc., as well as unique information (because a storage array controller is higher than a disk controller in a storage array hierarchy, i.e., further from the storage devices) in order to manage and control a storage array as well as provide information to disk controller(s). For example, a storage array controller may be aware of LUNs but a disk controller may not be aware of LUNs. This hierarchical management approach has advantages and potential uses that are explained throughout this description in the forms of various algorithms that may be employed by themselves or in combination.

[0055] A device driver is typically (though not necessarily) software that may be manufactured with and sold with a storage array controller. In various embodiments, the device driver may be implemented in software, hardware, firmware or a combination, and may be designed, manufactured and/or sold separately.

[0056] In one embodiment, a computer system may comprise multiple virtual machines (VMs), each VM including an operating system, and a hypervisor.

[0057] Each OS may include a file system and one or more storage drivers. The file system (sometimes considered part of an OS) may translate or convert from file-based access (i.e., in terms of directories, file names and offsets, etc.) to disk-based access (i.e., in terms of LBAs etc.). The storage driver (sometimes considered part of an OS) may be responsible for handling a disk or other storage device(s). The storage driver may be separate and distinct from the device driver. The storage driver may or may not be part of a storage stack, which is the software that controls access to a file system.

[0058] In the context of solid-state storage, typically flash memory, when a flash page (or some other portion) of a storage device is no longer required (i.e., it is obsolete, no longer valid, or is invalid, etc.) that flash page may be marked as dirty. When an entire flash block (e.g., typically

between 16 to 256 flash pages) is dirty, the entire flash block may be erased and free space may be reclaimed. If free space on the device is low, a flash block may be chosen that has some dirty flash pages and some clean (i.e., pages that are not dirty, are good, or valid, etc.) flash pages. The clean flash pages may be transferred (i.e., written, moved or copied) to a new flash block. All the original clean flash pages may be marked as dirty and the old flash block may be erased. In the context of solid-state storage, this process of transferring flash pages to new flash blocks and erasing old flash blocks may be referred to as garbage collection

[0059] Example embodiments described in this disclosure include one or more computer systems with one or more central processor units (CPUs) and possibly one or more I/O systems coupled to one or more storage systems that contain one or more storage array controllers and one or more storage devices.

[0060] In one embodiment, the storage system may include one or more bus structures. Depending on the constraints (e.g., signaling methods used, the intended operating frequencies, space, power, cost, and other constraints, etc.) various alternate bus structures may be used. A point-to-point bus may provide the optimal performance in systems requiring high-speed interconnections, due to the reduced signal degradation compared to bus structures having branched signal lines, switch devices, or stubs. However, when used in systems requiring communication with multiple devices or subsystems, a point-to-point or other similar bus will often result in significant added cost (e.g., component cost, board area, increased system power, etc.) and may reduce the potential memory density due to the need for intermediate devices (e.g., buffers, re-drive circuits, etc.).

[0061] Functions and performance similar to that of a point-to-point bus can be obtained by using switch devices. Switch devices and other similar solutions offer advantages (e.g., increased memory packaging density, lower power, etc.) while retaining many of the characteristics of a point-to-point bus. Multi-drop bus solutions provide an alternate solution, and though often limited to a lower operating frequency can offer a cost/performance advantage for many applications. Optical bus solutions permit significantly increased frequency and bandwidth potential, either in point-to-point or multi-drop applications, but may incur cost and space impacts.

[0062] Although not necessarily shown in all the Figures, the storage systems may also include one or more separate control (e.g., command distribution, information retrieval, data gathering, reporting mechanism, signaling mechanism, register read/write, configuration, etc.) buses (e.g., a presence detect bus, an I2C bus, an SMBus, combinations of these and other buses or signals, etc.) that may be used for one or more purposes including the determination of the storage device and/or storage system attributes (generally after power-up), the reporting of fault or other status information

to part(s) of the system, calibration, temperature monitoring, the configuration of storage device(s) and/or storage subsystem(s) after power-up or during normal operation or for other purposes. Depending on the control bus characteristics, the control bus(es) might also provide a means by which the valid completion of operations could be reported by storage device(s) to the storage controller(s), or the identification of failures occurring during the execution of storage controller requests, etc.

[0063] As used herein, the term bus refers to one of the sets of conductors (e.g., signals, wires, traces, and printed circuit board traces or connections in an integrated circuit) connecting two or more functional units in a computing system. The data bus, address bus and control signals may also be referred to together as constituting a single bus. A bus may include a plurality of signal lines (or signals), each signal line having two or more connection points that form a main transmission line that electrically connects two or more transceivers, transmitters and/or receivers.

[0064] As used herein, a signal (or line, signal line, etc.) refers to one or more electrical conductors or optical carriers, generally configured as a single carrier or as two or more carriers, in a twisted, parallel, or concentric arrangement, used to transport at least one logical signal. A logical signal may be multiplexed with one or more other logical signals generally using a single physical signal but logical signal(s) may also be multiplexed using more than one physical signal.

[0065] As used herein, memory devices are generally defined as integrated circuits that are composed primarily of memory (e.g., storage, etc.) cells, such as DRAMs (Dynamic Random Access Memories), SRAMs (Static Random Access Memories), FeRAMs (Ferro-Electric RAMs), MRAMs (Magnetic Random Access Memories), Flash Memory (e.g., NAND flash, NOR flash, etc.) and other forms of random access and related memories that store information in the form of electrical, optical, magnetic, chemical, biological, combination(s) of these, and/or in other forms.

[0066] Dynamic memory device types may include FPM DRAMs (Fast Page Mode Dynamic Random Access Memories), EDO (Extended Data Out) DRAMs, BEDO (Burst EDO) DRAMs, SDR (Single Data Rate) Synchronous DRAMs, DDR (Double Data Rate) Synchronous DRAMs, DDR2, DDR3, DDR4, or any of the expected follow-on devices and related technologies such as Graphics RAMs, Video RAMs, LP RAM (Low Power DRAMs) which are often based on the fundamental functions, features and/or interfaces found on related DRAMs.

[0067] Flash memory device types may include: NAND, NOR, SLC, MLC, TLC using any interface (e.g., standard interface (e.g., ONFI, etc.); non-standard interface; etc.). Flash memory device types may also include any of the expected follow-on devices and related technologies.

[0068] Memory devices may include chips (die) and/or single or multi-chip or multi-die packages of various types, assemblies, forms, and configurations. In multi-chip packages, the memory devices may be packaged with other device types (e.g., other memory devices, logic chips, CPUs, hubs, buffers, intermediate devices, analog devices, programmable devices, etc.) and may also include passive devices (e.g., resistors, capacitors, inductors, etc.). These multi-chip packages may include cooling enhancements (e.g., an integrated heat sink, heat slug, fluids, gases, micromachined structures, micropipes, capillaries, etc.) that may be further attached to the carrier or another nearby carrier or other heat removal or cooling system. Other forms of packaging (e.g., assemblies, modules, cards, units, molding, encapsulation, etc.) for memory devices are also possible.

[0069] Although not necessarily shown in all the Figures, storage and memory support devices (e.g., storage controller(s), network controller(s), chipset(s), adapter(s), expander(s), buffer(s), buffer circuit(s), buffer chip(s), register(s), intermediate circuit(s), power supply regulator(s), VRMs, hub(s), re-driver(s), PLL(s), DLL(s), non-volatile memory, SRAM, DRAM, logic circuits, analog circuits, digital circuits, diodes, switches, LEDs, crystals, active components, passive components, combinations of these and other circuits, etc.) may be comprised of multiple separate chips (e.g., die, dies, dice, integrated circuits, etc.) and/or components, may be combined as multiple separate chips onto one or more substrates, may be combined into a single package (e.g., using die stacking, multi-chip packaging, etc.) or even integrated onto a single device based on tradeoffs such as: technology, power, space, weight, cost, etc.

[0070] One or more of the various passive devices (e.g., resistors, capacitors, inductors, combination(a) of these, etc.) may be integrated into the support chip packages, or into the substrate, board, PCB, or raw card itself, based on tradeoffs such as: technology, power, space, cost, weight, etc. These packages may include an integrated heat sink or other cooling enhancements (e.g., such as those described above, etc.) that may be further attached to the carrier or another nearby carrier or other heat removal or cooling system.

[0071] Memory and storage devices, intermediate devices and circuits, hubs, buffers, registers, clock devices, passives and other memory and storage support devices etc. and/or other components may be attached (e.g., coupled, connected, etc.) to the storage system(s) and/or subsystem(s) and/or other component(s) via various methods including solder interconnects, conductive adhesives, socket structures, pressure contacts, electrical/mechanical/optical and/or other methods that enable communication between two or more devices (e.g., via electrical, optical, wireless, combinations of these, or alternate means, etc.).

[0072] The one or more storage system(s) and/or subsystem(s) and/or other components/devices may be connected (e.g., electrically, optically, wireless, etc.) to the CPU complex, computer system or other system environment via one or more methods such as soldered interconnects, connectors, pressure contacts, conductive adhesives, optical interconnects (e.g., laser, LED, optic fiber, etc.), wireless links (e.g., coupling, coils, etc.) and/or other signal communication and/or power delivery methods. Physical connector systems may include mating connectors (male/female), conductive contacts and/or pins on one carrier mating with a male or female connector, optical connections, pressure contacts (often in conjunction with a retaining, alignment, and/or closure mechanism) and/or one or more of various other communication and power delivery methods. The interconnection(s) may be disposed along one or more edges of an assembly (e.g., module, card, adapter, etc.) and/or placed a distance from the storage or other subsystem depending on such application requirements as ease of upgrade, ease of repair, cost, available space and/or volume, heat transfer constraints, component size and shape and other related physical, electrical, optical, visual/physical access, requirements and constraints, etc. Electrical interconnections on a card are often referred to as contacts, pins, connection pins, tabs, etc. Electrical interconnections on a connector are often referred to as contacts or pins.

[0073] The integrity, reliability, availability, serviceability, performance etc. of a communication path, data storage contents, and all functional operations associated with each element of a storage system or storage subsystem may be improved by using one or more fault detection and/or correction methods. Any or all of the various elements of a storage system or storage subsystem may include error detection and/or correction methods such as CRC (cyclic redundancy code, or cyclic redundancy check), ECC (error-correcting code), EDC (error detecting code, or error detection and correction), LDPC (low-density parity check), parity, checksum or other encoding/decoding methods suited for this purpose. Further reliability enhancements may include operation re-try (e.g., repeat, re-send, etc.) to overcome intermittent or other faults such as those associated with the transfer of information, the use of one or more alternate, stand-by, or replacement communication paths to replace failing paths and/or lines, complement and/or re-complement techniques or alternate methods used in computer, storage, communication, and related systems.

[0074] Additional functions that may reside local to the storage subsystem and/or storage system include write and/or read buffers, one or more levels of cache, protocol translation, error detection and/or correction circuitry, data scrubbing, local power management circuitry and/or reporting, operational and/or status registers, initialization circuitry, performance monitoring and/or control, and other functions.

[0075] Terminology

[0076] The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting of the invention. As used herein, the singular forms (e.g., a, an, the, etc.) are intended to include the plural forms as well, unless the context clearly indicates otherwise.

[0077] The terms comprises and/or comprising, when used in this specification, specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof.

[0078] In the following description and claims, the terms include and comprise, along with their derivatives, may be used, and are intended to be treated as synonyms for each other.

[0079] In the following description and claims, the terms coupled and connected may be used, along with their derivatives. It should be understood that these terms are not necessarily intended as synonyms for each other. For example, connected may be used to indicate that two or more elements are in direct physical or electrical contact with each other. Further, coupled may be used to indicate that that two or more elements are in direct or indirect physical or electrical contact. For example, coupled may be used to indicate that that two or more elements are not in direct contact with each other, but the two or more elements still cooperate or interact with each other.

[0080] The corresponding structures, materials, acts, and equivalents of all means or step plus function elements in the claims below are intended to include any structure, material, or act for performing the function in combination with other claimed elements as specifically claimed. The description of the present invention has been presented for purposes of illustration and description, but is not intended to be exhaustive or limited to the invention in the form disclosed. Many modifications and variations will be apparent to those of ordinary skill in the art without departing from the scope and spirit of the invention. The embodiment was chosen and described in order to best explain the principles of the invention and the practical application, and to enable others of ordinary skill in the art to understand the invention for various embodiments with various modifications as are suited to the particular use contemplated.

[0081] As will be appreciated by one skilled in the art, aspects of the present invention may be embodied as a system, method or computer program product. Accordingly, aspects of the present invention may take the form of an entirely hardware embodiment, an entirely software embodiment (including firmware, resident software, micro-code, etc.) or an embodiment combining software and hardware aspects that may all generally be referred to herein as a circuit, component, module or system. Furthermore, aspects of the present invention may take the form of a computer program

product embodied in one or more computer readable medium(s) having computer readable program code embodied thereon.

[0082] In this description a portable multifunction device (a *device*) is used as an example. It should be understood, however, that one or more of the embodiments described herein may be applied to any device (e.g., consumer device, phone, phone system, cell phone, internet phone, music player, video player, camera, social interaction device, radios, TV, watch, personal communication device, electronic wallet, smart jewelry, personal computer, tablet, laptop computer, computer, server, embedded system, electronic glasses, displays, projector, computer appliance, kitchen appliance, home control appliance, lighting control, network device, router, switch, TiVO, AppleTV, GoogleTV, set-top box, cable box, modem, cable modem, PC, tablet, media box, streaming device, entertainment center, GPS device, automobile system, ATM, toy, gaming system, camera, video camera, music device, storage device, back-up device, exercise machine, e-book reader, PDA, combinations of these, etc.).

[0083] The device may support one or more *applications* e.g., search applications contacts and/or friends applications, messaging applications, telephone applications, video conferencing applications, e-mail applications, communications applications, voice recognition applications, instant messaging (IM) applications, blog and/or blogging applications, photographic applications (e.g., catalog, management, upload, editing, etc.), shopping, payment, digital camera applications, digital video camera applications, web browsing and browser applications, digital music player applications, digital video player applications, cloud applications, office productivity applications, backup and storage applications, other applications or combinations or multiple instances (e.g., versions, etc.) of these, etc.

[0084] Devices themselves may include (e.g., comprise, be capable of including, have features to include, have attachments, communicate with, etc.) one or more devices, e.g., as separate components, working in cooperation, as a collection of devices, as a multi-function device, with sockets or ports for extra devices and/or components, attached (e.g., direct attach, network attached, etc.) devices, upgrade components, expansion devices and/or modules, etc.

[0085] The device may have (e.g., execute, perform, capable of being programmed to perform, etc.) multiple functions (e.g., telephone, video conferencing, e-mail, instant messaging, blogging, digital photography, digital video, web browsing, digital music playing, social interaction, shopping, searching, combinations of these, etc.). Instructions for performing the device functions may be included in a computer readable storage medium or other computer program product configured for execution by one or more processors.

[0086] Language

[0087] The terminology and language used herein is for the purpose of describing particular embodiments only and is not intended to be limiting.

[0088] As used herein, the singular forms (e.g., a, an, the, one, etc.) are intended to include the plural forms as well, unless the context clearly indicates otherwise.

[0089] As used herein, the terms comprises and/or comprising, when used in this specification, specify the presence of stated features, numbers, integers, steps, operations, elements, and/or components, etc, but do not preclude the presence or addition of one or more other features, numbers, integers, steps, operations, elements, components, etc. and/or groups thereof.

[0090] In the following description and claims, the terms include and comprise, along with their derivatives, may be used, and are intended to be treated as synonyms for each other.

[0091] In the following description and claims, the terms coupled and connected may be used, along with their derivatives. It should be understood that these terms are not necessarily intended as synonyms for each other. For example, connected may be used to indicate that two or more elements are in direct physical or electrical contact with each other. Further, coupled may be used to indicate that that two or more elements are in direct or indirect physical or electrical contact. For example, coupled may be used to indicate that that two or more elements are not in direct contact with each other, but the two or more elements still cooperate or interact with each other.

[0092] The corresponding structures, materials, acts, and equivalents of all means or step plus function elements in the following claims are intended to include any structure, material, or act for performing the function in combination with other claimed elements as specifically claimed.

[0093] This description is presented for purposes of illustration and explanation, but is not intended to be exhaustive or limited to the invention in the forms disclosed. Modifications, permutations, combinations, and variations of embodiments will be understood and apparent to those of ordinary skill in the art without departing from the scope and spirit of this description.

[0094] The embodiments chosen and described herein are presented in order to best explain the principles of the embodiments and their practical applications, and to enable others of ordinary skill in the art to understand the embodiments with various modifications as are suited to the particular use contemplated.

[0095] As will be understood and appreciated by one skilled in the art, one or more embodiments described herein may be a system, device, method, or computer program product, etc. Accordingly, one or more embodiments described herein may take the form of an entirely hardware embodiment, an entirely software embodiment (including firmware, resident software, micro-code, etc.) or an

embodiment combining software and hardware aspects that may all generally be referred to herein as a circuit, component, module or system. Furthermore, one or more embodiments described herein may take the form of a computer program product embodied in one or more computer readable medium(s) having computer readable program code embodied thereon.

[0096] Figure 1 illustrates a network architecture 100, in accordance with one embodiment. As shown, a plurality of networks 102 is provided. In the context of the present network architecture 100, the networks 102 may each take any form including, but not limited to a local area network (LAN), a wireless network, a wide area network (WAN) such as the Internet, peer-to-peer network, etc.

[0097] Coupled to the networks 102 are servers 104 which are capable of communicating over the networks 102. Also coupled to the networks 102 and the servers 104 is a plurality of clients 106. Such servers 104 and/or clients 106 may each include a desktop computer, lap-top computer, hand-held computer, mobile phone, personal digital assistant (PDA), tablet computer, peripheral (e.g., printer, etc.), any component of a computer, and/or any other type of logic. In order to facilitate communication among the networks 102, at least one gateway 108 is optionally coupled therebetween.

[0098] Figure 2 shows a representative hardware environment that may be associated with the servers 104 and/or clients 106 of Figure 1, in accordance with one embodiment. Such figure illustrates a typical hardware configuration of a mobile device in accordance with one embodiment having a central processing unit 210, such as a microprocessor, and a number of other units interconnected via a system bus 212.

[0099] The mobile device shown in Figure 2 includes a Random Access Memory (RAM) 214, Read Only Memory (ROM) 216, an I/O adapter 218 for connecting peripheral devices such as disk storage units 220 to the bus 212, a user interface adapter 222 for connecting a keyboard 224, a mouse 226, a speaker 228, a microphone 232, and/or other user interface devices such as a touch screen (not shown) to the bus 212, communication adapter 234 for connecting the mobile device to a communication network 235 (e.g., a data processing network) and a display adapter 236 for connecting the bus 212 to a display device 238.

[00100] The mobile device may have resident thereon any desired operating system. It will be appreciated that an embodiment may also be implemented on platforms and operating systems other than those mentioned. One embodiment may be written using JAVA, C, Objective C, and/or C++ language, or other programming languages, along with an object oriented programming

methodology. Object oriented programming (OOP) has become increasingly used to develop complex applications.

[00101] Of course, the various embodiments set forth herein may be implemented utilizing hardware, software, or any desired combination thereof. For that matter, any type of logic may be utilized which is capable of implementing the various functionality set forth herein.

[00102] Figure 3 shows a method 300, in accordance with one embodiment. As an option, the method may be implemented in the context of the architecture and environment of any subsequent Figure(s). Of course, however, the method may be implemented in any desired environment.

[00103] As shown in operation 302, a signal is received in association with a touch interface of a device. In one embodiment, the signal may include a pressure signal which is indicative of a magnitude of pressure. In the context of the present description, such pressure signal may include any signal that is a function of or related to a pressure applied to the device. In one embodiment, such pressure signal may be indicative of a magnitude of pressure being applied to a touch interface of the device. In various embodiments, such pressure signal may be generated by a pressure sensor including, but not limited to those described in the context of subsequently described embodiments, or any other mechanism, for that matter, that is capable of generating the pressure signal.

[00104] In other embodiments, the signal may include a touch signal indicative of a touch interface being touched. In the context of the present description, such touch signal may or may not be indicative of a magnitude of pressure being applied to a touch interface of the device. For example, such touch signal may, in one embodiment, simply indicate whether applied pressure is sensed, or not, e.g., not necessarily gauge any more than two pressure states, including pressure-sensed and pressure-not-sensed, etc.

[00105] Also in the context of the present description, the aforementioned device may include any device including, but not limited to those described in the context of this and/or subsequently described embodiments. Further, in various embodiments, the touch interface may or may not be combined with a display. For example, if the touch interface is combined with a display, the touch interface may include a touch screen. Thus, the touch interface may, in various embodiments, include, but is not limited to a touch screen or any other interface responsive to touch that is described in the context of this and/or subsequently described embodiments.

[00106] In one optional embodiment, the touch interface may be positioned on a first face of a device that includes a display on a second face thereof. Further, the first face and second face may include any respective faces (e.g., front, back, left side, right side, top side, bottom side, etc.) that are different. Just by way of example, in various embodiments, the first face and the second face may

be on opposite faces of the device of the device. Further, the first face may include a side face and the second face may include a front face of the device. Even still, the first face may include a back face and the second face may include a front face of the device. Of course, the touch interface may be positioned on the same face as the display, in other embodiments.

[00107] As indicated in operation 304, a user experience may be altered, utilizing the signal. In the context of the present description, the user experience may include any aspect of the device that is capable of being directly or indirectly experienced by a user including, but not limited to those described in the context of this and/or subsequently described embodiments.

[00108] For example, in the context of an embodiment involving the pressure signal, the user experience may be altered as a function of the magnitude of the pressure being applied to the touch interface, utilizing the pressure signal. Just by way of example, in various embodiments, the user experience may be altered by causing input to the device, by causing output from the device, by causing processing by the device, etc. In other embodiments involving a touch signal, the user experience may be altered in any manner, utilizing the touch signal (dependent or independent of any fluctuation of pressure).

[00109] Of course, the foregoing embodiments may be altered by adding and/or removing various features. For example, in one embodiment, the pressure signal may be received which is indicative of the magnitude of pressure being applied to a touch interface positioned on a first face of a device that includes a display on a second face thereof. To this end, the user experience may be altered as a function of the magnitude of the pressure being applied to the touch interface, utilizing the pressure signal.

[00110] In another embodiment, a pressure signal may be received which is indicative of a magnitude of pressure being applied to a touch screen. To this end, the user experience may be altered as a function of the magnitude of the pressure being applied to the touch screen, utilizing the pressure signal. In still yet another optional embodiment, a touch signal may be received which is indicative of a touch interface being touched, where the touch interface is positioned on a first face of a device that includes a display on a second face thereof. To this end, the user experience may be altered, utilizing the touch signal. Again, any of the features described above (or hereinafter, for that matter) may or may not be combined in any desired manner.

[00111] More illustrative information will now be set forth regarding various optional architectures and features with which the foregoing techniques discussed in the context of any of the present or previous figure(s) may or may not be implemented, per the desires of the user. For instance, various optional examples and/or options associated with the operations 302 and/or 304,

and/or other optional features have been and will be set forth in the context of a variety of possible embodiments. It should be strongly noted, however, that such information is set forth for illustrative purposes and should not be construed as limiting in any manner. Any of such features may be optionally incorporated with or without the inclusion of other features described.

[00112] Figure 4 shows a method 400 for defining a selection made within a user interface based in part on contact pressure, in accordance with one embodiment. As an option, the method 400 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the method 400 may be carried out in any desired environment. It should also be noted that the aforementioned definitions may apply during the present description.

[00113] As shown, it is determined whether sufficient initial contact pressure is being exerted on an interaction surface. See determination 402.

[00114] In the context of the present description, an interaction surface refers to a surface through which a user may interact with a device. It may take up the majority of a device face, or just a subset. In various embodiments, an interaction surface may be sensitive to one or more types of interaction, including but not limited to, contact, pressure, and/or proximity. In one embodiment, an interaction surface is receptive to multitouch input. In another embodiment, an interaction surface may be non-planar. In yet another embodiment, an interaction surface may be transparent, and combined with a display. In still another embodiment, an interaction surface may be replaceable. Some embodiments of an interaction surface may have more than one texture, to provide tactile guides to a user when used on the back face of a device. Other embodiments of an interaction surface are non-rectangular.

[00115] In various embodiments, an interaction surface may utilize one or more forms of technology to sense contact. These contact-sensing technologies may include, but are not limited to, capacitive, resistive, optical, surface acoustic wave based, and/or any other contact sensing technologies now known or later developed.

[00116] In various embodiments, an interaction surface may utilize one or more forms of technology to sense proximity. These proximity-sensing technologies may include, but are not limited to, capacitive, resistive, eddy current, optical, ultrasonic, heat, electric field based, and/or any other contact sensing technologies now known or later developed.

[00117] In various embodiments, an interaction surface may utilize one or more forms of technology to sense pressure. These pressure-sensing technologies may include, but are not limited to, conductive, resistive, piezoelectric, and/or any other pressure sensing technologies now known or

later developed. In some embodiments, an interaction surface may be able to only detect the total pressure being exerted on the surface. In other embodiments, an interaction surface may be able to discern the contact pressures associated with one or more points or areas of contact.

[00118] In the context of the present description, contact pressure is the pressure associated with one or more contact points or contact areas, the pressure being exerted on an interaction surface. For example, in one embodiment, contact pressure may be the pressure exerted on an interaction surface by a single finger press.

[00119] In the context of the present description, a contact area refers to the area of an interaction surface which is in physical contact with an implement of interaction. In various embodiments, the contact area may be described, stored, and processed, as a collection of cells that are part of an array. In one embodiment, this array may directly correspond to pixels of a display. In another embodiment, the array may correspond to a grid of discrete areas on an interaction surface which sense contact, pressure, or both. In still another embodiment, the contact area is represented as a primitive shape (e.g., circle, square, etc.) which best fits the actual area in contact with an implement of interaction.

[00120] In the context of the present description, an implement of interaction refers to an object which is detectable by an interaction surface in one or more ways (e.g., proximity, contact, pressure, etc.). In various embodiments, implements of interaction may include, but are not limited to, fingers, skin, a stylus, and/or any other object with which a user may interact with a device.

[00121] In the context of the present description, a contact point refers to a single location on an interaction surface which is associated with physical contact with an implement of interaction. In various embodiments, the contact point may be determined from a contact area. For example, in one embodiment, a contact point may be located in the center of its associated contact area. In another embodiment, a contact point may be located on an edge of its associated contact area.

[00122] Determining whether sufficient initial contact pressure is being exerted on an interaction surface depends on a threshold contact pressure. In some embodiments, the smallest degree of contact pressure may be sufficient, such that the definition of a selection may be triggered by any contact. In other embodiments, the definition of a selection does not occur until a non-negligible threshold contact pressure has been detected. In one embodiment, this threshold contact pressure may be defined by the user. In this way, accidental definitions of a selection may be avoided.

[00123] In some embodiments, determination 402 may be performed only after certain events have occurred. For example, in one embodiment, the determination may be made only after receipt of an input or combination of inputs. Possible inputs include, but are not limited to, object proximity

to the interaction surface, activation of a hardware switch or button, activation of a software switch or button, and/or any other input capable of being detected. In one embodiment, the determination may not be made until the host device is woken from a sleep state. In another embodiment, the determination itself may also wake the host device from a sleep state.

[00124] If the result of determination 402 is that there is sufficient initial contact pressure being exerted on an interaction surface, the current contact pressure level is determined. See operation 404.

[00125] In the context of the present description, a contact pressure level is the pressure reading generated from the raw data received from a touch sensor. In various embodiments, the contact pressure level may be represented by a number. For example, in some embodiments, the contact pressure level may be represented by an integer. In another embodiment, the contact pressure level may be represented by a floating-point number. In various embodiments, the contact pressure level may be represented by a percentage of the measurable range of contact pressures. In one embodiment, the contact pressure level may be represented by a unit less number. In another embodiment, the contact pressure level may be represented by an actual measure of the contact pressure, associated with a unit of pressure.

[00126] In various embodiments, the contact pressure level may be represented by a touch state. In the context of the present description, a touch state refers to a predefined subset of the range of measurable contact pressures. For example, in one embodiment, contact pressure levels may be represented as one of four predefined touch states: no touch, light touch, medium touch, and heavy touch. As an option, the lowest touch state may require some form of proximity. In some embodiments, the user may be able to specify how the measurable range of contact pressures is partitioned across a predefined number of touch states. In one embodiment, the number and boundaries of touch states may be defined system-wide, for all applications. In another embodiment, the number and boundaries of touch states may be defined on a per-application basis.

[00127] As shown, the selection area is calculated. See operation 406. In the context of the present description, the selection area refers to a region of the display, or a region of an object pictured on the display, which has been chosen for selection. The calculation of the selection area may be based upon one or more factors, including, but not limited to, a contact pressure level, a touch state, a contact area, a contact point, a selection boundary, a selection boundary geometry, and/or any other information derived from user interaction. In some embodiments, the selection area may be described as the pixels contained within a selection boundary.

[00128] In the context of the present description, a selection boundary describes the boundary of an associated selection area, and is based upon a selection boundary geometry. Additionally, in the context of the present description, a selection boundary geometry refers to the shape of a selection boundary. In some embodiments, a selection boundary geometry may not have reference to actual size or location. For example, in one embodiment, a selection boundary geometry may be described using fractional coordinates on a unit square.

[00129] In various embodiments, a selection area may be described, stored, and/or processed as the area contained within a selection boundary. A selection boundary may be represented by a selection boundary geometry, a screen location, and one or more transformations, such as scale or orientation. In one embodiment, the screen location is the point on which the transformed selection boundary geometry is centered.

[00130] In some embodiments, the selection area may be described, stored, and/or processed, as a collection of cells that are part of an array. In one embodiment, this array may directly correspond to pixels of a display. In another embodiment, the array may correspond to a grid based on a coordinate system specific to an object being displayed. In still another embodiment, the selection area may be described, stored, and processed as a mathematical function that defines the boundary of the selection area.

[00131] In one embodiment, the shape of a selection boundary may be one of a plurality of selection boundary geometries predefined within an operating system. In another embodiment, the shape of a selection boundary may be predefined within an application, independent of selection boundary geometries defined within the operating system. In yet another embodiment, the selection boundary geometry may be specified by a user. In still another embodiment, the geometry of the selection boundary may depend upon at least one form of user input, including but not limited to contact pressure, number of fingers in contact with the screen, device orientation, location of user fingers, and/or any other form of user input. Finally, in another embodiment, the geometry of a selection boundary may depend upon the content within or near a location associated with the selection (e.g., contact point, finger location, focal point of user's eyes, cursor location, etc.).

[00132] In some embodiments, selection boundaries may have geometries based upon simple shapes, including, but not limited to, ovals, circles, triangles, squares, rectangles, and/or higher order polygons. In other embodiments, selection boundaries may be based upon regular shapes (e.g., a star, a plus sign, etc.). In one embodiment, a selection boundary may be based upon the geometry of a contact area.

[00133] There are numerous ways in which a selection boundary may be described, stored, and/or processed. In various embodiments, a selection boundary may be represented by the combination of an established selection boundary geometry with a location, a scale, and/or a rotation.

[00134] In one embodiment, a selection boundary may be described using the vertex coordinates of a selection boundary geometry, in conjunction with location, scale, and/or rotation factors. For example, a rectangular selection boundary geometry may be described by the coordinates of the four corners. As an option, the vertices of a selection boundary geometry may be described using coordinates within the unit square.

[00135] In another embodiment, a selection boundary may be described using a mathematical function representing an established selection boundary geometry, in conjunction with location, scale, and/or rotation factors. For example, an elliptical selection boundary geometry may be described by an ellipse function whose foci depend upon the scale factor.

[00136] In yet another embodiment, a selection boundary may be described using a spline-based representation of a selection boundary geometry, in conjunction with location, scale, and/or rotation factors. For example, a curled selection boundary geometry may be described using splines combined with location, scale, and rotation factors.

[00137] In other embodiments, a selection boundary may be described by a bitmap representation of a selection boundary geometry, in conjunction with location, scale, and/or rotation factors. For example, in one embodiment, a bitmap representation of a contact area may be used as a selection boundary geometry associated with a selection boundary. In another embodiment, a bitmap representation of an irregular shape may be used as a selection boundary geometry associated with a selection boundary. In this way, geometries which may be difficult to describe using vertices, formulas, or splines may be used as the bases for a selection boundary.

[00138] The selection area is calculated by determining the selection boundary. In various embodiments, the selection boundary may be determined by transforming an appropriate selection boundary geometry as a function of user input, including but not limited to, contact pressure level, contact point, contact area, number of fingers detected, device orientation, etc. Once the selection boundary has been determined, the selection area is known.

[00139] In various embodiments, the selection boundary may be defined by transforming the scale of an appropriate selection boundary geometry as a function of user input. For example, in one embodiment, a selection boundary with a circular geometry may have a larger radius at higher contact pressure levels. In another embodiment, a rectangular selection boundary geometry may be scaled linearly by a factor proportional to the contact pressure level. In some embodiments, the

relationship between selection boundary geometry scale and a contact pressure level is proportional. In other embodiments, the relationship between selection boundary geometry scale and a contact pressure level is inversely proportional, such that higher pressure may make the geometry smaller.

[00140] In various embodiments, the selection boundary may be defined by transforming the orientation of an appropriate selection boundary geometry as a function of user input. For example, in one embodiment, a selection boundary with a star-shaped geometry may be rotated further clockwise at higher contact pressure levels. In some embodiments, the relationship between selection boundary geometry orientation and a contact pressure level is proportional, such that an increase in pressure may result in a clockwise rotation. In other embodiments, the relationship between selection boundary geometry orientation and a contact pressure level is inversely proportional, such that higher pressure may cause a counterclockwise rotation.

[00141] In some embodiments, a selection boundary may have an anchor point. In the context of the present description, an anchor point refers to a point located on or near the selection boundary geometry which remains fixed as the geometry is transformed. In one embodiment, a selection boundary may have a scaling anchor point, which remains fixed as the geometry is scaled. For example, a square selection boundary may have a scaling anchor point in the upper left corner, causing the square to expand down and to the right, keeping the upper left corner stationary.

[00142] In another embodiment, a selection boundary may have a rotational anchor point, which is used as an axis of rotation as the selection boundary geometry is rotated. For example, a star-shaped selection boundary may have a rotational anchor point located in the center, such that it rotates along an axis of symmetry.

[00143] In various embodiments, the calculation of the selection area may depend upon the context of the selection. Specifically, the selection boundary may be dependent upon the type of content on or near a point or area associated with the selection, including but not limited to, a contact point, a contact area, a cursor, a user focus, etc. In various embodiments, the selection boundary geometry and the manner in which it transforms as a function of user input may be context dependent. For example, in one embodiment, a selection made on or near a text field may cause the selection boundary geometry to be rectangular, with a scaling anchor point located in an upper corner appropriate for the text language (e.g., upper left corner for English, upper right corner for Arabic, etc.). In another embodiment, a selection on or near a text field may cause the rectangular boundary geometry to scale in increments of the same scale as the height and width of the text. In this way, it may be clear to the user which text has been selected, as there may never exist a selection boundary which contains only half a line or character.

[00144] In another embodiment, a selection on or near a text field may result in a rectangular selection boundary geometry which scales proportionally to a contact pressure level in a manner similar to how text is selected using a cursor. In this way, a user may select text in a familiar manner, while only having to vary the pressure being exerted on a contact point, for example. In one embodiment, the text selection begins to increase once a predefined contact pressure level has been achieved. As an option, the rate at which the selection grows may be a function of the contact pressure level, once the predefined contact pressure level has been achieved and the selection grown initiated. In another embodiment, the text selection scaling may be tiered, such that at one touch state, the selection grows character by character, at an intermediate touch state the selection grows word by word, and so on, such that the user is able to enlarge the text selection in increments of characters, words, lines, paragraphs, and pages, depending on the touch state. As an option, the selection may also be incremented by sentences.

[00145] In other embodiments, the above-mentioned methods for selecting text using a selection which expands in the direction the text would be read in may also be applied to the selection of other linear subject matter. For example, in one embodiment, this method may be used to select a video segment. As an option, the selection scaling may be tiered, growing from frame-by-frame to second-by-second to minute-by-minute, and so on. In another embodiment, this method may be used in the selection of a portion of chronologically arranged material. Possible material with a temporal arrangement may include, but is not limited to, a collection of photos, messages in an email account, text messages, web browser history, and/or any other collection of items which may be arranged chronologically.

[00146] In various embodiments, a selection made within a graphic (e.g., photograph, drawing, movie still, bitmapped or rasterized text, etc.) may utilize a default selection boundary geometry with a default scaling anchor point. In one embodiment, the user may be able to predefine the default selection boundary geometry and/or default scaling anchor point, to be used when making a selection within a graphic. In still another embodiment, the default selection boundary geometry and/or default scaling anchor point may be predefined within the operating system. As an option, these defaults may be predefined on a per-application basis.

[00147] In various embodiments, a selection made within a photograph may result in the use of a context-specific selection boundary geometry which transforms in a context specific manner. For example, in one embodiment, a selection made within a photograph containing one or more people may utilize the rough shape of the subjects' faces as a selection boundary geometry. As an option, the selection boundary geometry may be composed of the perimeter of all faces within a certain

distance of a point related to the selection (e.g., contact point, user focus, etc.), the distance being proportional to a user input (e.g., contact pressure level, touch state, etc.). Face selection may be used to assist the user in establishing the identity of photographed individuals, allowing future identification to be performed automatically using facial recognition. In one embodiment, facial and other forms of recognition may be performed by a host device, a remote computer, a cloud service, or any other computational resource, or combination of these and other resources.

[00148] In another embodiment, a selection made within a photograph on or near an eye may utilize a rough shape of the eye as a selection boundary geometry. As an option, the exactness of the method used to automatically detect the shape of an eye may vary as a function of a user input, such as contact pressure level. Eye selection may be used to assist the user in removing the "red eye" effect sometimes seen in photographs.

[00149] In one embodiment, a selection made within a graphic may cause the selection boundary geometry to be defined by the collection of pixels near a point associated with the selection (e.g., contact point, user focus, etc.) which are similar in at least one aspect. Possible aspects include, but are not limited to, color, one or more dimensions of an associated color space, brightness, transparency, and/or any other aspect that may be associated with a pixel. As an option, the degree of similarity between pixels required to influence the selection boundary geometry may be a function of a user input, such as a contact pressure level. In this way, a user may be assisted in separating an object within the graphic from a background or other visual elements.

[00150] In various embodiments, there may exist limits to the amount a selection boundary geometry may be transformed as a function of user input. For example, in one embodiment, the selection boundary geometry may increase in size as the contact pressure level increases, until an upper contact pressure threshold is reached. Contact pressure levels beyond the upper threshold may not increase the size of the selection boundary geometry any further. In another embodiment, the scale of the selection boundary geometry may be limited by a lower contact pressure threshold, such that reducing the contact pressure level below the threshold may not reduce the scale of the selection boundary geometry any further. In yet another embodiment, both upper and lower contact pressure thresholds may be implemented. In other embodiments, this concept of thresholds may be applied to other variable aspects of the selection boundary, such as the orientation of the selection boundary geometry, and as a function of other user input, including but not limited to the location of a contact point, the size of a contact area, user focus, and/or any other type of user input.

[00151] In one embodiment, the user may be able to predefine one or more contact pressure thresholds associated with the limits of a transformation of the selection boundary geometry. As an

option, the user may also predefine the limits of the transformation, in addition to the maximum and/or minimum contact pressure level which may affect said transformation. In another embodiment, these contact pressure thresholds and/or transformation limits may be predefined within the operating system. In still another embodiment, the contact pressure thresholds may be automatically optimized over time, by observing the typical range of pressures the user exerts in various use scenarios.

[00152] In one embodiment, the selection boundary geometry and/or transformation of the selection boundary geometry may depend upon the proximity of an object to an interaction surface, rather than an aspect of physical contact with an interaction surface.

[00153] In various embodiments, the selection boundary may depend, at least in part, upon the user focus. In the context of the present description, user focus refers to a point or area on a display which is the visual and/or interactive focus of the user. For example, in one embodiment, the user focus may be determined by tracking the eyes of a user with one or more device-mounted cameras, and calculating where the user is looking. This may also be referred to as user gaze, or user gaze tracking. As an option, eye movement may also be monitored, to ascertain the manner in which the user is using the device (e.g., methodically reading text, quickly scanning text, examining a picture, visually searching for an icon, etc.). In another embodiment, the user focus may be defined as the location of a cursor in a text environment. In still another embodiment, the user focus may be established through user input, such as a finger tap.

[00154] Various aspects of the selection boundary may depend upon the user focus. For example, in one embodiment, the user focus may be used to determine the context of a selection. In another embodiment, the user focus may be used to determine the location of a selection, allowing the user to make a selection without having to change the location of a contact point. In still another embodiment, the tracking of eye movement may be used to determine the type of selection (e.g., reading eye movement may trigger a text selection, etc.).

[00155] Once the selection boundary has been determined using an appropriate selection boundary geometry that has been transformed as a function of a user input, the selection area may be calculated.

[00156] As shown, the selection area is displayed. See operation 408. In various embodiments, a selection area may be displayed using one or more selection functions. In the context of the present description, a selection function refers to a function of one or more inputs which determines one or more properties of a selection. For example, in one embodiment, possible selection function inputs may include, but are not limited to, touch state, contact pressure level, selection state, finger

locations, device orientation, user focus, pressure uncertainty, touch uncertainty, contact point, contact area, gestures, application type and/or context, application flags, operating system flags, and/or any other form of user or system input.

[00157] Within the context of the present description, pressure uncertainty refers to any data associated with the uncertainty inherent in measuring pressure exerted on an interaction surface. Pressure uncertainty may include, but is not limited to, the uncertainty of a measured contact pressure level, a multidimensional array of values representing the variance of contact pressure measured for each cell/pixel in the vicinity of a contact point, an uncertainty value inherent to a particular pressure sensor, and/or any other type of data associated with uncertainty in pressure measurement.

[00158] Within the context of the present description, touch uncertainty refers to any data associated with the uncertainty inherent in sensing contact with an interaction surface. Touch uncertainty may include, but is not limited to, the error range associated with the location of a contact point, a multidimensional array of values representing the probabilities of contact measured for each cell/pixel in the vicinity of a contact point, an uncertainty value inherent to a particular touch sensor, and/or any other type of data associated with uncertainty in sensing contact.

[00159] Within the context of the present description, a selection state refers to whether a selection is 'dynamic' and still able to vary as a function of user input, or 'static', and not currently varying as a function of user input.

[00160] In various embodiments, a selection function may determine one or more presentation properties of a selection. For example, possible presentation properties may include, but are not limited to, shading, color, contrast, brightness, line style, animation routine, transparency, pattern, border style, area style, and/or any other visual property that may describe an object on a display. Examples of animation routines include, but are not limited to, "marching ants", changing colors, flashing, simulated optical distortions, pulsing highlights, and/or any other routine which varies location, transparency, color, content, and/or any other graphical property over time. In some embodiments, an animation routine may be a function of user input.

[00161] In various embodiments, a selection function may vary one or more presentation properties as a function of contact pressure. In this way, the user has visual feedback as to the level of pressure they are exerting on the device. For example, in one embodiment, the selection function may indicate the contact pressure level by shading the selection with a color which is somewhere between a pair of colors which represent the extrema of measurable contact pressure levels.

[00162] In various embodiments, a selection function may determine one or more fundamental properties of a selection. Within the context of this description, fundamental selection properties may include, but are not limited to, selection boundary geometry, transformation(s) to be applied to the selection boundary geometry as a function of user input, anchor point(s), and/or any other property which may be associated with a selection area.

[00163] In various embodiments, the application of a selection function may display a secondary boundary. Within the context of this description, a secondary boundary is any boundary, radius, or area associated with a selection area, which is not the selection boundary. For example, in one embodiment, a secondary boundary may be the area within which facial detection is being performed, as opposed to the selection boundary, which may be the outline of detected faces. In another embodiment, a secondary boundary may be the area within which eye detection is being performed. In yet another embodiment, the secondary boundary may represent the pressure uncertainty or touch uncertainty associated with a contact area.

[00164] In various embodiments, the secondary boundary may be displayed in addition to, or instead of, the selection boundary. For example, in one embodiment where face detection is being performed as part of calculating the selection area, the selection boundary may be indicated with a solid color line while the secondary boundary may be indicated with a thin dotted line.

[00165] In various embodiments, the area unique to the secondary boundary (i.e. the portion of the enclosed area which does not overlap with the selection area) may have presentation properties that differ from the selection area. For example, in one embodiment, a user may make a text selection of which the intended boundaries are uncertain. The portion of the text which was almost certainly intended to be selected may be shaded in green, while the text which may or may not have been selected intentionally may be shaded in red. The user intention may be extrapolated from uncertainty associated with the contact and/or contact pressure used to make the selection, in accordance with one embodiment.

[00166] In various embodiments, the secondary boundary may be used to indicate uncertainty associated with a form of machine recognition including, but not limited to, facial recognition, OCR, and/or any other form of machine recognition. For example, faces within a selection which have been recognized with a threshold degree of confidence may be outlined in green, while faces whose recognition is suspect (i.e. multiple viable matches, etc.) may be outlined in red (i.e. a secondary border).

[00167] As shown, after the selection area has been displayed, it is determined whether the selection establishment conditions have been met. See determination 410.

[00168] Within the context of the present description, selection establishment conditions refer to one or more predefined conditions whose satisfaction may cause the selection state to switch from 'dynamic' to 'static'. For example, in one embodiment, once the selection establishment conditions have been satisfied, the selection may no longer vary with contact pressure levels until determination 402 once again detects sufficient initial contact pressure. In various embodiments, the selection establishment conditions may be defined within a selection function.

[00169] In various embodiments, one or more selection establishment conditions may depend upon changes in the contact pressure level. For example, in some embodiments, selection establishment may be conditioned upon whether the contact pressure level drops below a predefined level. In one embodiment, this threshold contact pressure level may be defined as being a set amount of pressure less than the current contact pressure level. In this way, a user may reduce the contact pressure a small amount to modify their selection, with further reduction causing a selection establishment condition to be satisfied. In another embodiment, the threshold contact pressure level may be a set pressure amount.

[00170] In various embodiments, a selection establishment condition may depend upon contact pressure velocity, or the rate at which the contact pressure level is changing. For example, in one embodiment, a user may be able to satisfy a selection establishment condition by quickly reducing the contact pressure level to a predefined level within a predefined amount of time. In another embodiment, selection establishment may be conditioned upon whether a user has increased the contact pressure level to a predefined level within a predefined amount of time. In yet another embodiment, a selection may be established by exceeding a predefined contact pressure velocity, without regard to the actual pressure levels. As a specific example, a user may establish their selection by a quick pulse of their finger, without having to reach a particular pressure level.

[00171] In various embodiments, a selection establishment condition may depend upon how much time has elapsed since a particular event. For example, in one embodiment, a selection may be established if the user maintains a contact pressure level for a predefined amount of time. As an option, there may be a predefine tolerance level for pressure variations which may not reset this timing, allowing for small fluctuations in contact pressure which may be difficult for a user to control. In another embodiment, a selection establishment condition may be satisfied once a predefined amount of time has elapsed since the satisfaction of determination 402.

[00172] In various embodiments, a selection establishment condition may depend upon forms of user input that are not related to contact pressure. These forms of user input may include, but are not limited to, gestures, a change in the number of fingers in contact with the device, change in device

orientation, surpassing a threshold level of accelerations (e.g., wrist flick, etc.), and/or any other form of user input. It should be noted that selection establishment may also be conditioned upon the satisfaction of a combination of any of the previously described conditions.

[00173] If it is determined that the selection establishment conditions have not been met, the selection is updated in a loop through performing operations 404, 406, and 408. The selection may continue to vary as a function of user input until the selection establishment conditions have been met.

[00174] If it is determined that the selection establishment conditions have been met, the selection state is changed from 'dynamic' to 'static'. See operation 412.

[00175] Setting the selection state to 'static' means the selection is no longer being modified by user input. In various embodiments, the selection function may depend in part on the selection state. For example, in one embodiment, when the selection state is 'static', the secondary boundary may be removed from the display. In another embodiment, a 'static' selection state may cause the selection area to be displayed in a different color, or with a different style of selection boundary. In yet another embodiment, changing a selection state from 'dynamic' to 'static' may cause one or more application and/or operating system flags to be set.

[00176] In various embodiments, changing a selection state from 'dynamic' to 'static' may prompt the user to choose an action to be performed on or with the contents of the selection. For example, in one embodiment, after the desired faces have been highlighted and the user has reduced the contact pressure level below the dynamic selection minimum threshold pressure, they may be prompted to confirm the identity of the selected faces. In another embodiment, after a text selection has been given a 'static' selection state, the user may be prompted with operations that may be performed on the selected text, including but not limited to copy, cut, paste, spell check, style (e.g., bold, underlined, italic, etc.), font, font size, and/or any other operation which may be performed on text.

[00177] In some embodiments, once a selection has become 'static', it can no longer be modified and may be destroyed upon creation of a new selection. In other embodiments, a user may further modify a static selection by first applying a contact pressure sufficient to satisfy determination 402. In one embodiment, satisfying determination 402 with a static selection already in existence may change the selection state of the previous selection from static to dynamic, allowing further variation as a function of user input. In another embodiment, satisfying determination 402 with a static selection already in existence may create a new selection, as a function of user input, which is combined with the previously made selection. In yet another embodiment, a user may chose

whether to replace a previously made selection or augment (i.e. add to, subtract from, etc.) a previously made selection with a new selection. As an option, the user choice may be indicated through gesture, voice command, toggling a hardware control, toggling a software control, and/or any other form of user input.

[00178] In various embodiments, method 400 may be adapted to allow for the definition, establishment, and modification of selections through other types of user input. Other types of user input may include, but are not limited to, proximity to an interaction surface, number of contact points, gestures, and/or any other form of user input. For example, in one embodiment, a user may expand a text selection by bringing their finger into proximity to the interaction surface.

[00179] Figure 5 shows a pressure sensitive user interface 500 for making a selection, in accordance with one embodiment. As an option, the user interface 500 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the user interface 500 may be implemented in any desired environment. The aforementioned definitions may apply during the present description.

[00180] As shown, the user interface 500 may be utilized in making a selection based in part on pressure exerted by the user upon one or more interaction surfaces located on a device. For example, in one embodiment, a user's finger 502 may exert a small amount of force over contact area 504, which is centered on contact point 506 located on a pressure sensitive touch screen. If the contact pressure level is sufficient, then a selection area 508 having a selection boundary 510 is calculated and displayed. As the contact pressure is increased, the selection boundary expands to encompass a larger selection area 512.

[00181] Figure 6 shows a method 600 for determining the context of a contact pressure-based selection and choosing an appropriate selection function, in accordance with one embodiment. As an option, the method 600 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the method 600 may be implemented in any desired environment. The aforementioned definitions may apply during the present description.

[00182] As shown, the context determination zone is defined. See operation 602. Within the context of the present description, a context determination zone refers to the area that is examined while determining the context of a selection. In various embodiments, the context determination zone may be initially defined as a function of one or more elements of user input upon which the selection itself is based. For example, in one embodiment, the context determination zone may be initially defined to be the contact area. In another embodiment, the context determination zone may

be a predefined shape (e.g., circle, square, etc.) of predefined size, centered on the contact point. As an option, the user may be able to specify the initial size and shape of the context determination zone. In yet another embodiment, the context determination zone may be located such that the contact point is off-center, to provide a more intuitive user experience (e.g., the zone may be offset to compensate for the user's view being obstructed by their finger, etc.).

[00183] In still another embodiment, the context determination zone may have a predefined size. As an option, the predefined initial size for a context determination zone may be chosen such that it is smaller than any user interface elements which may be detected. As an additional option, the predefined initial size may be chosen such that it is large enough to assist a user in distinguishing between potential selection targets which are close to each other.

[00184] As shown, once the context determination zone has been defined, it is then determined whether there is a user interface control widget within the context determination zone. See determination 604.

[00185] Within the context of the present description, a user interface control widget refers to any element within a user interface which may receive user input, which are typically non-textual. For example, in various embodiments, user interface control widgets may include, but are not limited to, buttons, radio boxes, check boxes, drop down lists, sliders, tabs, and/or any other non-textual UI widget.

[00186] In some embodiments, user interface control widgets may also include hyperlinks which are isolated from a text field. For example, text that responds to user interaction like a button, but is not located within a selectable text field. Selectable text fields and hyperlinks embedded within a text field (e.g., links within a web page, links within a word processing document, etc.) are specifically excluded from this definition of user interface control widgets, as they are treated as separate cases within this method.

[00187] In various embodiments, the determination as to whether there is a user interface control widget within the context determination zone begins with determining whether there is a UI control widget located at the contact point upon which the zone is based. In this way, time is not wasted determining the context of a well-aimed contact point.

[00188] If a UI control widget is not located at the contact point, then it may be determined if there is a UI control widget in the vicinity, within the context determination zone. In various embodiments, this determination may be performed using the bounding boxes associated with user interface elements. Within the context of the present description, a bounding box refers to a rectangle within which a user interface control widget may reside. In some embodiments, a

bounding box may be the smallest rectangle which may contain a particular user interface control widget. In this way, detection of user interface control widgets whose shape is not rectangular is simplified.

[00189] For example, in one embodiment, the determination as to whether there is a user interface control widget within the context determination zone may be performed by determining if the boundary of the context determination zone intersects with the bounding box of any user interface control widgets. As an option, if the initial size of the context determination zone is larger than a predefined minimum (e.g., smallest bounding box associated with a typical UI control widget, smallest bounding box present within the present UI, etc.), the determination may also verify the absence of any bounding boxes completely contained within the context determination zone, on the initial pass.

[00190] In another embodiment, the determination may be performed by calculating the distances between the center of the context determination zone and the center of every UI control widget present in the interface, and comparing them with a distance related to the size of the context determination zone.

[00191] If it is determined in 604 that there is at least one user interface control widget within the context determination zone, then a context sensitive UI control widget selection function is chosen. See operation 606. In various embodiments, once an appropriate selection function is chosen, a selection is defined based upon user input. In one embodiment, the selection is defined using method 4.

[00192] Within the context of the present description, a context sensitive selection function refers to a selection function adapted for use in making a selection in a context which has been automatically determined. In various embodiments, a context sensitive selection function may include logic to use a different context sensitive selection function to define the user's selection, based upon user input. In this way, a user may be able to indicate that the initial context determination is not correct, and that another selection function should be used.

[00193] For example, in one embodiment, a context sensitive UI control widget selection function may include logic such that, if the contact pressure level exceeds a predefined limit P_0, further definition of the selection is handled by a different context sensitive selection function, such as one adapted for selecting hyperlinks. In another embodiment, a contact pressure level exceeding P_0 may cause the context determination zone to expand, and the process of choosing an appropriate selection function to resume, ignoring the UI control widget previously detected within the zone. As an option, future determinations may ignore all UI control widgets. In this way, a context-aware user

selection initiated with a contact point in the vicinity of a UI control widget may be redirected to a different type of subject matter without forcing the user to reposition their finger, for example.

[00194] In various embodiments, a context sensitive UI control widget selection function may depend upon the context determination zone. For example, in one embodiment, a context sensitive UI control widget selection function may use the context determination zone as a secondary boundary. In this way, the selection function may be able to continue searching the context determination zone for additional UI control widgets.

[00195] In various embodiments, a context sensitive UI control widget selection function may include logic to handle the case where there is more that one UI control widget within the context determination zone. In one embodiment, the selection function may choose the UI control widget whose center is closest to the center of the context determination zone. In another embodiment, the selection function may choose the UI control widget whose bounding box has greatest overlap with the context determination zone. In still another embodiment, the selection function may choose the UI control widget whose bounding box has an edge or corner closest to the center of the context determination zone.

[00196] In various embodiments, a context sensitive UI control widget selection function may include logic to allow the user to toggle between multiple widgets found within the context determination zone. For example, in one embodiment, the selection function may include a list of all UI control widgets found at least partially within the context determination zone. As an option, the widgets may be arranged in the list in order of distance from the center of the context determination zone. In another embodiment, the selection function may traverse the list sequentially, selecting a different widget. As an option, the list traversal may occur as a function of user input, including but not limited to, gestures, contact pressure velocity, accelerometer data, and/or any other user input. In still another embodiment, switching between different widgets found within the context determination may occur after a predefined amount of time has elapsed, and the selection establishment conditions have not yet been satisfied. In yet another embodiment, a context sensitive UI control widget selection function may use user focus to choose between multiple UI control widgets found within the context determination zone.

[00197] In various embodiments, a context sensitive UI control widget selection function may visually indicate the selection of a widget to the user before the selection has been established. For example, in one embodiment, the selection function may highlight the outline of the widget. In another embodiment, the selection function may shade the widget using a predefined mask of the widget. In still another embodiment, the selection function may shade and/or outline the widget

bounding box. In yet another embodiment, the selection function may change and aspect of text associated with the widget, aspects including but not limited to font, text style, text color, and/or any other text property. As a specific example, a context sensitive UI control widget selection function may cause the name of a button to be displayed in blue italics if it is the current context-based selection derived from user input. In this way, the user may see what control is about to be activated before satisfying the selection establishment conditions.

[00198] In various embodiments, a context sensitive UI control widget selection function may have selection establishment conditions that depend upon the type of user interface control widget that is being selected. Some user interface control widgets are multi-state in nature (e.g., sliders, drop down lists, etc.), while others are bi-state (e.g., buttons, check boxes, etc.). In some embodiments, it may be assumed that when a user satisfies the selection establishment conditions for a bi-state UI control widget, they intend for the state of the widget to be toggled. The selection establishment conditions for multi-state UI control widgets, on the other hand, may include the election of a widget state.

[00199] For example, in one embodiment, the selection establishment conditions for a multi-state widget may include one or more primary conditions to establish that the user intends for that particular multi-state widget to be selected, and a secondary condition, to establish the state of that widget.

[00200] In various embodiments, the secondary condition may be satisfied (and the widget state chosen) through user input which includes, but is not limited to, contact pressure. As an option, after the primary selection establishment conditions have been satisfied, the selection function may disregard pre-established pressure triggers (e.g., P_0, global pressure triggers, etc.) until the secondary selection establishment condition has been satisfied.

[00201] For example, in one embodiment, once the primary conditions for selecting a slider widget have been satisfied, a user may select a slider value by varying the contact pressure level between two predefined threshold pressures which represent the slider state extrema. In another embodiment, the contact pressure level at the time of satisfaction of the primary conditions may be used as a zero point, represented by the middle of the slider values. Increasing the contact pressure may increase the slider value, decreasing the contact pressure may decrease the slider value. In other embodiments, these methods may be used to traverse the items within a drop down list, or any other multi-state UI control widgets which may be assigned a value.

[00202] In various embodiments, the secondary selection establishment conditions may be finally satisfied using methods previously discussed, including but not limited to, a contact pressure velocity trigger.

[00203] Once the selection establishment conditions have been satisfied, the state of the UI control widget may be set. For example, a button may be toggled, a check box may be checked or unchecked, a slider value may be set, etc.

[00204] As a specific example of one embodiment, from a user perspective, a user may make contact with and exert pressure upon an interaction surface, with a contact point near a drop down menu. The user may increase the contact pressure until the drop down menu is highlighted. After maintaining that contact pressure level for a few seconds, the list of menu items becomes visible, after which the user may select an item by varying the contact pressure. Once the desired menu item is highlighted, the user may execute a rapid increase in pressure to finalize the selection of that menu item.

[00205] If it is determined in 604 that there is no user interface control widget within the context determination zone, it is then determined whether there is an embedded hyperlink within the context determination zone. See determination 608.

[00206] Within the context of the present description, an embedded hyperlink refers to a hyperlink which is embedded within a text field. For example, iIn one embodiment, embedded hyperlinks may include, but are not limited to, text or image links within a web page, text or image links within a word processing document, and/or any other type of link which may be contained within a document. It should be noted that any link which may be classified as a hyperlink may fall within this definition of embedded hyperlink, or within the definition of a UI control widget.

[00207] In various embodiments, the determination as to whether there is an embedded hyperlink within the context determination zone begins with determining whether there is an embedded hyperlink located at the contact point upon which the zone is based.

[00208] If an embedded hyperlink is not located at the contact point, then it may be determined if there is an embedded hyperlink in the vicinity, within the context determination zone. In various embodiments, the methods described for locating a UI control widget within the context determination zone may also be applied to determining whether there is an embedded hyperlink in the zone. In one embodiment, the bounding boxes may be handled by the application displaying the document in which an embedded hyperlink may be found. In another embodiment, the bounding boxes may be handled at a lower level, by the operating system.

[00209] If it is determined in 608 that there is at least one embedded hyperlink within the context determination zone, then a context sensitive embedded hyperlink selection function is chosen. See operation 610. In various embodiments, once an appropriate selection function is chosen, a selection may be defined based upon user input. In one embodiment, the selection may be defined using method 4.

[00210] In various embodiments, a context sensitive embedded hyperlink selection function may include logic to use a different context sensitive selection function to define the user's selection, based upon user input. In this way, a user may be able to indicate that the initial context determination is not correct, and that another selection function should be used.

[00211] For example, in one embodiment, a context sensitive embedded hyperlink selection function may include logic such that, if the contact pressure level exceeds a predefined limit P_2, further definition of the selection is handled by a different context sensitive selection function, such as one adapted for selecting text. In another embodiment, a contact pressure level exceeding P_2 may cause the context determination zone to expand, and the process of choosing an appropriate selection function to resume, ignoring the embedded hyperlink previously detected within the zone. As an option, future determinations may ignore all embedded hyperlinks. In this way, a context-aware user selection initiated with a contact point in the vicinity of an embedded hyperlink may be redirected to a different type of subject matter without forcing the user to reposition their finger, for example.

[00212] In various embodiments, a context sensitive embedded hyperlink selection function may depend upon the context determination zone. For example, in one embodiment, a context sensitive embedded hyperlink selection function may use the context determination zone as a secondary boundary. In this way, the selection function may be able to continue searching the context determination zone for additional embedded hyperlinks.

[00213] In various embodiments, a context sensitive embedded hyperlink selection function may include logic similar to that used in a context sensitive UI control widget selection function to handle the case where there is more that one embedded hyperlink within the context determination zone. Additionally, in various embodiments, a context sensitive embedded hyperlink selection function may include logic similar to that used in a context sensitive UI control widget selection function to allow a user to toggle between multiple embedded hyperlinks found within the context determination zone.

[00214] In various embodiments, a context sensitive embedded hyperlink selection function may visually indicate the selection of an embedded hyperlink before the selection has been established. For example, in one embodiment, the selection function may change the color of an embedded text

hyperlink. In another embodiment, the selection function may change the font, style, or font size of an embedded text hyperlink. In yet another embodiment, the selection function may highlight the borders of a linked image. In this way, the user may see which embedded hyperlink is about to be activated before satisfying the selection establishment conditions.

[00215] In various embodiments, a context sensitive embedded hyperlink selection function may have selection establishment conditions which change, depending upon previous user input. For example, in one embodiment, if the contact pressure level surpasses a value of P_1, but not P_2, the selection establishment condition may change to require the selection of an option from a hyperlink contextual menu. The contextual menu may provide options common to web browsers, including but not limited to "open link", "copy link", and/or any other action which may be performed on or with a hyperlink. In various embodiments, the selection of the contextual menu item may be established using methods including, but not limited to, those described for multi-state UI control widgets, or other types of selections.

[00216] In various embodiments, once the selection establishment conditions have been satisfied, the selected embedded hyperlink may be activated.

[00217] If it is determined in 608 that there are no embedded hyperlinks within the context determination zone, it is then determined whether there is a selectable text field within the context determination zone. See determination 612.

[00218] Within the context of the present description, a selectable text field refers to a field of text which a user may select and perform operations upon (e.g., copy, cut, paste, etc.). In one embodiment, a selectable text field may also include any rasterized text which is recognized using an optical character recognition routine.

[00219] In various embodiments, the determination as to whether there is a selectable text field within the context determination zone begins with determining whether there is a selectable text field located at the contact point upon which the zone is based.

[00220] If a selectable text field is not located at the contact point, then it may be determined if there is a selectable text field in the vicinity of the contact point and within the context determination zone. In various embodiments, the methods described for locating a UI control widget within the context determination zone may also be applied to determining whether there is a selectable text field in the zone, including the use of bounding boxes.

[00221] If it is determined in 612 that there is at least one selectable text field intersecting with or within the context determination zone, then a context sensitive selectable text selection function is chosen. See operation 614. In various embodiments, once an appropriate selection function is

chosen, a selection may be defined based upon user input. In one embodiment, the selection may be defined using method 4.

[00222] In various embodiments, if there is a selectable text field located at the contact point, the context sensitive selectable text selection function may behave like other text selection functions. For example, in one embodiment, the selection of the text would start at the contact point, and expand with pressure in the direction in which the text would be read.

[00223] In various embodiments, if there is a selectable text field within the context determination zone, but not at the contact point, the selection function may define the selection based upon the entire selectable text field. For example, in one embodiment, the text within selectable text field found in the context determination zone may be selected starting at the beginning of the text field, even if it is not near the contact point. In another embodiment, the selection of the text begins at the location closest to the contact point.

[00224] In various embodiments, a context sensitive selectable text selection function may depend upon the context determination zone. For example, in one embodiment, a context sensitive selectable text selection function may use the context determination zone as a secondary boundary. In this way, the selection function may be able to continue searching the context determination zone for additional selectable text fields.

[00225] In various embodiments, a context sensitive selectable text selection function may include logic to handle the case where there is more than one selectable text field within the context determination zone. In one embodiment, the selection function may choose the selectable text field which is closest to the contact point, the selection not extending beyond that text field. In another embodiment, the selection function may start the text selection in the selectable text field closest to the contact point; once all of the text in that closest field has been selected, the selection may continue to expand into the next closest text field, starting at the beginning of the field. In still another embodiment, the selection function may include logic similar to that used in a context sensitive UI control widget selection function to handle the case where there is more that one selectable text field within the context determination zone. Additionally, in yet another embodiment, a context sensitive selectable text selection function may include logic similar to that used in a context sensitive UI control widget selection function to allow a user to toggle between multiple selectable text fields found within the context determination zone.

[00226] In various embodiments, a context sensitive selectable text selection function may include logic to use a different context sensitive selection function to define the user's selection,

based upon user input. In this way, a user may be able to indicate that the initial context determination is not correct, and that another selection function should be used.

[00227] For example, in one embodiment, a context sensitive selectable text selection function may include logic such that, if the contact pressure level exceeds a predefined limit P_4, further definition of the selection is handled by a different context sensitive selection function, such as one adapted for selecting graphics. In another embodiment, a contact pressure level exceeding P_4 may cause the context determination zone to expand, and the process of choosing an appropriate selection function to resume, ignoring the selectable text field previously detected within the zone. As an option, future determinations may ignore all selectable text fields. In this way, a context-aware user selection initiated with a contact point in the vicinity of a selectable text field may be redirected to a different type of subject matter without forcing the user to reposition their finger, for example.

[00228] In various embodiments, a context sensitive selectable text selection function may visually indicate the selection of a selectable text field before the selection has been established. For example, in one embodiment, the selection function may shade the selected text within a selectable text field. In another embodiment, the selection function may highlight the borders of an entire selectable text field which has been selected.

[00229] In various embodiments, a context sensitive selectable text selection function may have selection establishment conditions which change, depending upon previous user input. For example, in one embodiment, if the contact pressure level surpasses a value of P_3, but not P_4, the selection establishment condition may change to require the selection of an option from a text selection contextual menu. The contextual menu may provide options including, but not limited to, copy, cut, paste, style, send via email, send via SMS, lookup online, and/or any other action which may be performed on selected text. In various embodiments, the selection of the contextual menu item may be established using methods including, but not limited to, those described for multi-state UI control widgets, or other types of selections.

[00230] If it is determined in 612 that there is no text within the context determination zone, it is then determined whether there is a selectable graphic within the context determination zone. See determination 616.

[00231] Within the context of the present description, a selectable graphic refers to an image or display, or a portion of an image or display, which a user is able to select and perform operations upon (e.g., copy, cut, paste, save, etc.). In one embodiment, a selectable graphic may refer to any portion of a user interface which is able to be captured with a screenshot.

[00232] In various embodiments, the determination as to whether there is a selectable graphic within the context determination zone begins with determining whether there is a selectable graphic located at the contact point upon which the zone is based.

[00233] If a selectable graphic is not located at the contact point, then it may be determined if there is a selectable graphic in the vicinity of the contact point and within the context determination zone. In various embodiments, the methods described for locating a UI control widget within the context determination zone may also be applied to determining whether there is a selectable text field in the zone, including the use of bounding boxes. As an option, in addition to determining the boundaries of the bounding boxes within the context determination zone, it may also be determined whether they are able to be selected (e.g., checking a system flag, DRM, copy protection, etc.).

[00234] If it is determined in 616 that there is at least one selectable graphic within the context determination zone, then a context sensitive selectable graphic selection function is chosen. See operation 618. In various embodiments, once an appropriate selection function is chosen, a selection may be defined based upon user input. In one embodiment, the selection may be defined using method 4.

[00235] In various embodiments, if there is a selectable graphic located at the contact point, the context sensitive selectable graphic selection function may behave like other graphic selection functions. For example, in one embodiment, the selection of the graphic may be defined using method 4.

[00236] In various embodiments, if there is a selectable graphic within the context determination zone, but not at the contact point, the selection function may define the selection based upon the entire selectable graphic object. For example, in one embodiment, an image file embedded in a document near the contact point and at least partially within the context determination zone may be selected in its entirety. In another embodiment, said image file may be partially selected, starting at a location within the image that is closest to the contact point, and scaling as a function of user input and in a manner defined by the selection function.

[00237] In various embodiments, a context sensitive selectable graphic selection function may depend upon the context determination zone. For example, in one embodiment, a context sensitive selectable graphic selection function may use the context determination zone as a secondary boundary. In this way, the selection function may be able to continue searching the context determination zone for additional selectable graphic objects.

[00238] In various embodiments, a context sensitive selectable graphics selection function may include logic to handle the case where there is more than one selectable graphic object within the

context determination zone. In one embodiment, the selection function may choose the selectable graphic object which is closest to the contact point.

[00239] In another embodiment, the selection function may include logic similar to that used in a context sensitive UI control widget selection function to handle the case where there is more that one selectable graphic object within the context determination zone. Additionally, in yet another embodiment, a context sensitive selectable graphic selection function may include logic similar to that used in a context sensitive UI control widget selection function to allow a user to toggle between multiple selectable graphic objects found within the context determination zone.

[00240] In various embodiments, a context sensitive selectable graphics function may pass control to another user interface function, depending upon user input. In this way, a user may be able to indicate that the initial context determination is not correct, and that they wish to activate a different user interface routine (e.g., application launcher, favorites list, system settings, etc.).

[00241] For example, in one embodiment, a context sensitive selectable graphic selection function may include logic such that, if the contact pressure level exceeds a predefined limit P_6, further user input is handled by a different context sensitive selection function, such as one adapted for selecting graphics. In another embodiment, a contact pressure level exceeding P_4 may cause the context determination zone to expand, and the process of choosing an appropriate selection function to resume, ignoring the selectable graphic previously detected within the zone. As an option, future determinations may ignore all selectable graphics. In this way, a context-aware user selection initiated with a contact point in the vicinity of a selectable graphic may be redirected to a different type of subject matter without forcing the user to reposition their finger, for example.

[00242] In various embodiments, a context sensitive selectable graphics selection function may visually indicate the selection of a selectable graphic object before the selection has been established. For example, in one embodiment, the selection function may shade the selected graphic object. In another embodiment, the selection function may highlight the borders of a graphic object which has been selected.

[00243] In various embodiments, a context sensitive selectable graphics selection function may have selection establishment conditions which change, depending upon previous user input. For example, in one embodiment, if the contact pressure level surpasses a value of P_5, but not P_6, the selection establishment condition may change to require the selection of an option from a graphic selection contextual menu. The contextual menu may provide options including, but not limited to, copy, cut, paste, set as wallpaper, send via email, send via SMS, and/or any other action which may be performed on selected graphics. In various embodiments, the selection of the contextual menu

item may be established using methods including, but not limited to, those described for multi-state UI control widgets, or other types of selections.

[00244] If it is determined in 616 that there is no selectable graphics within the context determination zone, then the determination zone is expanded. See operation 620.

[00245] In one embodiment, the context determination zone may be expanded by a fixed number of pixels. In another embodiment, the determination zone may be expanded by a scaling factor. Once the context determination zone has been expanded, the context determinations are performed again.

[00246] In one embodiment, if the context determination zone reaches a predefined threshold size, the user may be informed that a context could not be determined and a selection cannot be made. Other forms of user feedback indicating a failure to determine context include an alert, a prompt, audio feedback, visual feedback, LED light, and/or any other type of feedback.

[00247] In various embodiments, the user may be able to specify which contexts they wish to be detected automatically. In some embodiments, additional types of subject matter may be detectable, including types of text data, such as dates, email addresses, phone numbers, and/or any other type of text information.

[00248] In some embodiments, contextual selections may be performed using method 600 only in situations where a contact pressure based form of user interaction has not been defined. In other embodiments, contextual selections may be made system wide using method 600 or similar methods.

[00249] Figure 7 shows a device 700 having a backtouch interface, in accordance with one embodiment. As an option, the device 700 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the device 700 may be implemented out in any desired environment. It should also be noted that the aforementioned definitions may apply during the present description.

[00250] In the context of the present description, a device with a backtouch interface refers to a device with one or more backtouch sensors or backtouch switches. In one embodiment, a device with a backtouch interface may also include one or more other sensors and/or buttons, including but not limited to cameras, hardware buttons, and/or any other type of device or control. A device with a backtouch interface may also be referred to as a backtouch-enabled device.

[00251] Within the context of the present description, a backtouch sensor refers to an interaction surface located on a device which has reduced user visibility while the device is being operated, because it is obscured by the device itself. For example, in one embodiment, a backtouch sensor may be located on the back of the device, facing away from the user as they look at a display on the

front side. A backtouch sensor may result in a better user interface experience since the user is able to interact with the device without obscuring the front display with an implement of interaction.

[00252] Additional embodiments may be described using the terms 'front' and 'back', but a backtouch-enabled device is not limited to those having parallel surfaces. Within the context of the present description, the terms 'front' or 'front surface' and 'back' or 'back surface' refer to any two surfaces of any portion, piece, section, slice, component, part, and/or face of a device or its parts.

[00253] In various embodiments, a backtouch interface may also be a display. For example, in one embodiment, a device may have high-resolution touchscreens on the front and back. In another embodiment of a multi-display, backtouch-enabled device, the front face may be a high-resolution touchscreen and the back face may be a low-resolution touchscreen. As an option, one or more of the touch screens in these embodiments may be black and white. In still another embodiment, the front and back displays may utilized different display technologies and/or different display properties. For example, in one embodiment, the front display may be a high-resolution trans missive touchscreen and the back display may be a low-resolution reflective touchscreen.

[00254] As shown, device 700 is an example of one embodiment of a backtouch-enabled device, possessing a backtouch sensor 702 and a display 704. In various embodiments, the display 704 may also be an interaction surface.

[00255] As previously defined, an interaction surface is a surface capable of sensing touch, pressure, proximity, or any combination thereof. In various embodiments, a backtouch sensor may be capable of sensing one or more of touch, pressure, or proximity.

[00256] For example, in one embodiment, a backtouch sensor may be a track pad. Within the context of the present description, a track pad is a touch sensitive pointing device which can detect the motion and position of an implement of interaction (e.g., user finger, stylus, etc.).

[00257] In various embodiments, a backtouch sensor may include a resistive touch sensor. In one embodiment, a resistive touch sensor is made up of two thin, conducting layers separated by a narrow gap. When an implement of interaction presses down on the outer layer, the two layers make contact at that point. A voltage may be applied across the upper layer, from top to bottom. The resistive touch sensor may act as a voltage divider; by measuring the output voltage on the lower layer, the vertical position of the touch position may be sensed. Swapping the voltage to the sides of the upper layer may allow the horizontal touch position to be sensed.

[00258] In various embodiments, a backtouch sensor may include a capacitive touch sensor. In one embodiment, a capacitive touch sensor is made of two layers of parallel conductive lines, separated by an insulator. The layers are arranged such that the conductive lines are perpendicular.

When an implement of interaction is placed over the conducting lines, there is a change in capacitance. A high frequency signal may be applied to pairs of conducting lines; the resulting current that passes between the conducting lings is proportional to the capacitance between the conducting lines. This current may be used to sense the touch or proximity of an implement of interaction. A capacitive touch sensor may be capable of detecting more than one contact point or contact area.

[00259] The backtouch-enabled device shown in Figure 7 is one exemplary embodiment. The geometry of a backtouch-enabled device need not be confined to parallel surfaces, with a distinct front and back. For example, in one embodiment, the device may have fold-out sections with interaction surfaces which become backtouch interfaces once the sections are folded out. In another embodiment, the backtouch-enabled device may be composed of curved parts, multiple parts, or complex plan form parts. In still another embodiment, the backtouch-enabled device may not be rectilinear in any outline and/or cross section. In yet another embodiment, the device may have one or more curved or non-planar surfaces, including but not limited to surfaces which are concave or convex. In some embodiments, the device may have one or more surfaces which are rigid or hard. In other embodiments, the device may have one or more surfaces which are soft or flexible. In still other embodiments, the device may change shape, depending on the mode of operation (e.g., slide-out hardware keyboard, plug-in modules, etc.).

[00260] In one embodiment, a backtouch-enabled device may have one or more backtouch sensors located on plane(s) parallel to the plane of a display. For example, see device 700. In another embodiment, a backtouch-enabled device may have one or more backtouch sensors located on plane(s) that are at an angle to the plane of a display.

[00261] In one embodiment, a backtouch sensor may be located on a plane which is completely obscured from the display. In another embodiment, a backtouch sensor may be located on a plane which is partially obscured from the display. For example, a backtouch sensor may be located on the back side of a transparent or translucent display.

[00262] In one embodiment, a backtouch interface is an interaction surface which may be made up of one or more touch sensors, one or more pressure sensors, one or more proximity sensors, one or more switches, or any combination of one or more such sensors or switches. In another embodiment, the switches which are part of a backtouch interface may be real or virtual, displayed or mechanical, soft or hard, or any combination of these properties.

[00263] In various embodiments, gestures and interactions described in terms of a backtouch interface may also be performed on sidetouch (left and right sides of a device) and captouch (top and bottom sides of a device) interfaces.

[00264] Figure 8 shows a method 800 for providing feedback to the user of a backtouch interface, in accordance with one embodiment. As an option, the method 800 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the method 800 may be implemented in any desired environment. The aforementioned definitions may apply during the present description.

[00265] As shown, it is determined whether the backtouch interface is enabled. See determination 802.

[00266] Within the context of the present description, an enabled interface or surface refers to an interface or surface which is not disabled. Within the context of the present description, a disabled interface or surface refers to an interface or surface which is not passing user input to any process, system, application, or routine. In one embodiment, a disabled interface may continue to sense user input, even though it is not used. In another embodiment, a disabled interface may be able to recognize a predefined form or type of user input which then places the interface in an enabled state. As a specific example, in one embodiment, a disabled backtouch interface may not be used to make a selection until it detects a predefined pattern of increases and decreases of contact pressure. In this way, interfaces may be disabled to avoid unwanted input, and easily enabled when desired.

[00267] It is important to note that in various embodiments, an interface or surface may be enabled with respect to one type of user input, and disabled with respect to another type of user input. For example, it may be possible for an interaction surface to be enabled with respect to touch interactions, and disabled with respect to contact pressure or proximity.

[00268] In various embodiments, a backtouch interface may be enabled in response to user input. For example, in one embodiment, a backtouch interface may be enabled in response to a predefined gesture performed on an interaction surface receptive to touch. In another embodiment, a backtouch interface may be enabled in response to a predefined pattern of increases and decreases of contact pressure exerted upon an interaction surface receptive to pressure. In yet another embodiment, a backtouch interface may be enabled by a predefined series of taps or impacts with the device. As an option, the taps or impacts may be detected by an accelerometer. In still another embodiment, a backtouch interface may be enabled by toggling a hardware or software control (e.g., button, switch, etc.).

[00269] In various embodiments, a backtouch interface may be enabled without specific user input. For example, in one embodiment, a backtouch interface may be enabled by a backtouch-enabled application. In another embodiment, a backtouch interface may be enabled when the device orientation is within a predefined range. In yet another embodiment, a backtouch interface may always be enabled.

[00270] If it is determined that the backtouch interface is enabled, then it is determined whether there is an implement of interaction in proximity of the backtouch interface. See determination 804.

[00271] In various embodiments, there may be a threshold proximity that may be achieved before determination 804 is satisfied. In one embodiment, a user may define the threshold proximity. In another embodiment, the threshold proximity may be predefined within the operating system. In still another embodiment, the threshold proximity may be predefined on a per-application basis.

[00272] If it is determined that an implement of interaction is in proximity to the backtouch interface, a visual indication of the proximity is displayed. See operation 806.

[00273] In various embodiments, the location of the implement of interaction in proximity to the backtouch interface may be indicated to the user. For example, in some embodiments, a point associated with the location of the implement may be displayed. In one embodiment, the point may be the centroid of the area with the highest proximity value. As an option, the point may be represented as a circle, a crosshair, and/or any other shape or icon.

[00274] In one embodiment, the point associated with the location of the implement may be displayed using a predefined color. As an option, the user may be able to select the color used. In yet another embodiment, the point may be displayed by inverting the preexisting contents of the display located at that point.

[00275] In various embodiments, an area associated with the location of the implement may be displayed. For example, in one embodiment, the area may be the area with proximity values above a preset threshold value. In another embodiment, the area may be a circle centered upon the centroid of maximum proximity values. As an option, the size of the circle may be similar to a fingertip.

[00276] In one embodiment, the area associated with the location of the implement may be displayed with colored shading. As an option, the user may preset the color of the shading. In another embodiment, the area may be indicated by increasing the color brightness (e.g., moving towards white within a color space, etc.) of the display content within the area. In yet another embodiment, the area may be displayed by reducing the color brightness (e.g., moving towards black within a color space, etc.) of the display content outside the area. As an option, the area may be displayed with a sharp boundary, or with a softened boundary, creating a glow effect.

[00277] In various embodiments, the degree of proximity of the implement of interaction to the backtouch interface may be indicated to the user. For example, in one embodiment, the color of a point or area being displayed may be given a degree of transparency dependent upon the proximity values, allowing the original display content to be viewed. As an option, the proximity value may be averaged over the area, and a single transparency value given to the color applied. In another embodiment, the color of the content displayed within the area may be given a color brightness based upon the proximity, such that the area is white right before contact is made. In yet another embodiment, the color of the content displayed outside the area may be given a color brightness based upon an inverse relationship with the proximity, such that all but the area is black right before contact is made.

[00278] As shown, it is determined if an implement of interaction is in contact with the backtouch interface. See determination 808. If it is determined that there is no contact, the proximity may continue to be determined and displayed.

[00279] If it is determined that an implement of interaction is in contact with the backtouch interface, a visual indication of the contact is displayed. See operation 810.

[00280] In various embodiments, a visual indication of contact with a backtouch interface may differ from a visual indication of contact with a front display, where the contact point and area is usually obscured by an implement of interaction. For example, in one embodiment, the contact point may be displayed, instead of or in addition to the contact area. In another embodiment, the visual representation of the interior of the contact area may be colored. In yet another embodiment, the contact area may be represented by an iconic version of a fingerprint. In still another embodiment, the contact area may be distorted so as to appear to bulge out of the display. As an option, this distortion may increase as a function of contact pressure.

[00281] As shown, once the user has been given feedback regarding contact with the backtouch interface, further user interaction is handled by a different routine. See operation 8. For example, methods 4 or 6 may be implemented at this point, utilizing backtouch contact pressure and contact point to define a selection.

[00282] Figure 9 shows a pressure-sensitive user interface 900 for making a selection using a backtouch interface, in accordance with one embodiment. As an option, the user interface 900 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the user interface 900 may be implemented in any desired environment. The aforementioned definitions may apply during the present description.

[00283] As shown, the user interface 900 may be utilized in making a selection based in part on pressure exerted by the user upon a backtouch interface. For example, in one embodiment, a user's finger 902 may exert a small amount of force over contact area 904, which is centered on contact point 906. In one embodiment, contact area 904 and contact point 906 may be displayed on top of the content already being displayed, to assist the user in making contact at the desired location. In another embodiment, the contact point 906 may be displayed as a symbol, such as a plus sign, which may be rotated to an orientation estimated to match that of the contacting finger. As an option, the finger orientation may be estimated using the size and shape of the contact area, detected location of other fingers, and/or any other user input or observable properties.

[00284] If the contact pressure level is sufficient, then a selection area 908 having a selection boundary 910 and a secondary boundary 912 (indicating uncertainty related to the contact area) is calculated and displayed. As an option, the selection may be defined using method 4 or 6, or any other method of defining a selection based upon contact pressure.

[00285] Figure 10 shows a user interface 1000 for defining settings associated with a backtouch interface, in accordance with one embodiment. As an option, the user interface 1000 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the user interface 1000 may be implemented in any desired environment. The aforementioned definitions may apply during the present description.

[00286] In one embodiment, the user interface 1000 may include a plurality of check boxes 1002 which represent various types of user interactions detectable by the backtouch interface. The types of interactions may include, but are not limited to, pressure, touch, proximity, and/or any other type of user interaction. Through these checkboxes, a user may limit a backtouch interface to only certain types of interactions. As an option, the user interface 1000 may only present checkboxes for interaction types detectable by the particular backtouch interface associated with the settings being defined.

[00287] In one embodiment, the user interface 1000 may include a plurality of check boxes 1004 which represent various methods of enabling a backtouch interface. As an option, in one embodiment, more than one method of activation may be selected.

[00288] In one embodiment, the collection of backtouch interface enablement methods 1004 may include a checkbox 1006 which allows the interface to be activated by a gesture. In one embodiment, the gesture may be predefined within an application or operating system. In another embodiment, the user interface 1000 may include a button 1008 to allow a user to specify a gesture to activate the backtouch interface. As an option, the user may be presented with an interface where

they may specify the gesture by performing it. In yet another embodiment, the user may choose from a plurality of predefined gestures.

[00289] In one embodiment, the collection of backtouch interface enablement methods 1004 may include a checkbox 1010 which allows the interface to be activated by a grip. In the context of the present description, a grip refers to the set of sensor data associated with a particular manner of holding a device. The sensor data associated with a grip may include, but is not limited to, points and areas of contact on one or more interaction surfaces, device orientation, contact pressure levels exerted in one or more contact areas, proximity data (e.g., proximity to portions of a users hand not in contact with the device, etc.), and/or any other sensor data.

[00290] In one embodiment, the backtouch interface-enabling grip may be predefined within an application or operating system. In another embodiment, the user interface 1000 may include a button 1012 to allow a user to specify a grip to enable the backtouch interface. As an option, the user may be presented with an interface where they may specify the grip by performing it. In yet another embodiment, the user may choose from a plurality of predefined grips.

[00291] In one embodiment, the collection of backtouch interface enablement methods 1004 may include a checkbox 1014 which keeps the backtouch interface enabled whenever the device is powered on, similar to a primary touch screen, for example. In another embodiment, the collection of backtouch interface enablement methods 1004 may include a checkbox 1016 which keeps the backtouch interface disabled.

[00292] In one embodiment, the user interface 1000 may include a check box 1018 which allows the criteria for backtouch interface enablement to be set on a per-application basis. As an option, check box 1018 may allow any application to override the preferences set with the plurality of check boxes 1004.

[00293] In one embodiment, the user interface 1000 may include a plurality of check boxes 1020 which represent various methods of indicating that a backtouch interface is enabled. As an option, in one embodiment, more than one indicator may be selected.

[00294] In one embodiment, the collection of indicator check boxes 1020 may include a checkbox 1022 which indicates that the backtouch interface is enabled by displaying a colored border around the edge of a display. In one embodiment, the colored border may be animated.

[00295] In one embodiment, the collection of indicator check boxes 1020 may include a checkbox 1024 which indicates that the backtouch interface is enabled using an LED. In one embodiment, the LED may indicate the enabled backtouch interface through a specific color, with other colors being

reserved for indicating other device states. In another embodiment, the LED may pulse or flash when the backtouch interface is enabled.

[00296] In one embodiment, the collection of indicator check boxes 1020 may include a checkbox 1026 which indicates that the backtouch interface is enabled by displaying a colored border around a status bar (e.g., a minimal bar common to most user interfaces, etc.). In one embodiment, the colored border may be animated.

[00297] In one embodiment, the collection of indicator check boxes 1020 may include a checkbox 1028 which indicates that the backtouch interface is enabled by displaying an icon. In one embodiment, the icon may be located within a status bar.

[00298] In one embodiment, the collection of indicator check boxes 1020 may include a checkbox 1030 which indicates that the backtouch interface is enabled by changing the color of a status bar. In one embodiment, the color change may be animated.

[00299] In one embodiment, the collection of indicator check boxes 1020 may include a checkbox 1032 which allows the backtouch interface to be enabled without any indication to the user. As an option, this preference may be overridden by an application.

[00300] In various embodiments, the user interface 1000 may allow a user to configure the type and style of feedback provided while an enabled backtouch interface is being used. For example, in one embodiment, the user interface 70.0002.3-00 may include a button 1034 which allows a user to specify whether or not feedback is provided while the backtouch interface is being used. As an option, this preference may be overridden by applications (e.g., an application may be configured such that it provides backtouch interface feedback independent of any system preferences, etc.).

[00301] In one embodiment, the user interface 1000 may include a button 1036, which presents a user interface which allows a user to specify the style of feedback provided when a backtouch interface is being used. For example, a user may configure the feedback provided when an implement of interaction is in proximity to, contact with, and/or exerting pressure on the backtouch interface.

[00302] In one embodiment, the user interface 1000 may include a button 1038, which allows a user to test the style parameters they defined using button 1036. For example, in one embodiment, button 1038 may present a user interface where a user may experiment with a backtouch interface, observing the feedback styles they have configured. As an option, this interface may provide a quick way to reconfigure the feedback style.

[00303] In various embodiments, the user interface 1000 may allow a user to configure the sensitivity of a backtouch interface. In the context of the present description, the sensitivity of a

backtouch interface refers to the threshold level of interaction (e.g., proximity, contact, pressure, etc.) which a backtouch interface may receive before treating the interaction as being intentionally made by a user. In this way, backtouch interactions incidental to device usage may be ignored, while intentional backtouch user interactions may be acted upon.

[00304] In one embodiment, the user interface 70.0002.3-00 may include a plurality of checkboxes 1040 that represent a plurality of backtouch interface sensitivity levels. The backtouch interface sensitivity levels may include, but are not limited to, predefined levels (e.g., "high", "standard", "low", etc.), user defined levels, automatically defined levels, and/or any other type of sensitivity level.

[00305] In one embodiment, the user interface 1000 may allow a user to specify the sensitivity levels for particular aspects of a backtouch interface (e.g., proximity, contact, pressure, etc.). As an option, the user interface may provide the user with the ability to save and load user defined backtouch interface sensitivity profiles.

[00306] In the context of the present description, an interface sensitivity profile refers to a collection of sensitivity parameters associated with various aspects of an interaction interface. The sensitivity parameters may include, but are not limited to, an activation threshold, a maximum signal beyond which interaction is ignored, sample rate(s), and/or any other parameter which may be associated with an interaction interface. As an option, the sensitivity parameters may be specific to particular types of interaction (e.g., proximity, contact, pressure, etc.).

[00307] In the context of the present description, an activation threshold refers to a threshold signal below which interaction is ignored. An activation threshold may be set for different types of user interaction (e.g., pressure, contact, proximity, etc.). For example, in one embodiment, an interaction surface may have a pressure activation threshold of P, below which all pressure interactions are ignored.

[00308] It is important to recognize the distinction between activation and enablement. In various embodiments, activation serves as a filter of incidental interactions, defining the weakest sensor signal which may not be ignored. Enablement serves a similar purpose, to ignore unwanted interactions; a disabled interface may not act upon any sensor signals except those related to enabling the interface. In other words, activation filters sensor signals based on strength, while enablement filters sensor signals based on the signal itself.

[00309] In one embodiment, the plurality of checkboxes 1040 may include an "automatic" checkbox, representing a backtouch interface sensitivity profile automatically determined by the device. As an option, if an automatic sensitivity profile has not been created, the user may be

presented with the option of initiating the process of automatically determining an optimal backtouch interface sensitivity profile.

[00310] In one embodiment, the user interface 1000 may include a button 1042 which allows a user to initiate the process of automatically determining an optimal backtouch interface sensitivity profile. In the context of the present description, an optimal interface sensitivity profile refers to a sensitivity profile which would allow an interface to remain enabled all the time, with minimal accidental inputs. In one embodiment, the process of automatically determining an optimal backtouch interface sensitivity profile may include gathering data over a predefined amount of time. As an option, the time remaining may be displayed in user interface 1000. During this learning period, the backtouch enablement preferences specified in checkboxes 1004 may be overridden, and instead the user is required to enable the backtouch interface with a specific method, chosen such that accidental enablement is highly unlikely (e.g., two step activation using gestures, hardware switch with on-screen confirmation, etc.). This facilitates separating intentional interactions from incidental interactions. Once enabled, the backtouch interface may remain enabled for a short period of time. During the learning period, the device may gather data, including but not limited to sensor data from the backtouch interface, changes in orientation, backtouch interface enablements, and/or any other data related to use of the device. Once the learning period has elapsed, the gathered data may be used to estimate the levels of meaningless, incidental backtouch interaction, such as interaction due to holding the device. As an option, in another embodiment, the user may be able to specify the length of the learning period. In yet another embodiment, the user may be able to specify desired accuracy of the sensitivity level, balancing the reduction of unwanted interactions with a possible increase in intentional interactions being missed.

[00311] In one embodiment, the user interface 1000 may include a button 1044 which allows a user to test the specified sensitivity settings. For example, in one embodiment, button 1044 may present a user interface which provides feedback regarding interactions with the backtouch interface. As an option, the testing user interface may utilize a default set of backtouch feedback settings, if the user had previously turned feedback off. In another embodiment, button 1044 may activate a backtouch interface, and present feedback to the user within user interface 1000. As an option, user interface 1000 may ignore any input received from the backtouch interface, only provide feedback related to the user interactions. In this way, a user may test the settings with the backtouch interface without accidentally interacting with any checkboxes, buttons, or other element of user interface 1000.

[00312] In various embodiments, the interfaces of Figure 10, as well as any other previous or subsequent interfaces, may take the form of webpages displayed utilizing a web browser on any desired computer, handheld device, etc. In such case, any of the parameters or other input disclosed herein may be entered without the use of the host device, whereby such parameters or other input (or derivatives thereof) may be pushed to the device for configuration/updating purposes.

[00313] Figure 11 shows a user interface 1100 for defining settings associated with a pressure-sensitive interface, in accordance with one embodiment. As an option, the user interface 1100 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the user interface 1100 may be implemented in any desired environment. The aforementioned definitions may apply during the present description.

[00314] In one embodiment, the user interface 1100 may include a checkbox 1102 to allow the user to enable the pressure-receptive aspect of one or more interaction surfaces. In one embodiment, this checkbox may enable all pressure-receptive surfaces. In another embodiment, the user may be able to specify which pressure-receptive surfaces shall be enabled. In various other embodiments, enablement of pressure-receptive surfaces may be accomplished through user input outside of user interface 1100. Pressure-receptive surface enabling user input may include, but is not limited to, gestures, software buttons, hardware buttons, accelerometer data, contact pressure patterns, and/or any other form of user input.

[00315] In one embodiment, the user interface 1100 may include a plurality of check boxes 1104 which allow a user to specify which types of feedback to provide when the pressure-sensitive interface(s) is activated, if any at all. For example, in one embodiment, the user may specify a sound which plays whenever the pressure-sensitive interface is activated. In another embodiment, the user may specify a form of visual feedback to be given when the pressure-sensitive interface is activated. As an option, the user may select from a plurality of predefined forms of feedback.

[00316] In one embodiment, the user interface 1100 may include a checkbox 1106 which allows a user to specify whether they want visual feedback regarding contact pressure level. As previously described, contact pressure level may be visually represented in a number of ways, including, but not limited to, a color which is part of a two color spectrum, a percentage, a unitless number, and/or any other representation of a value located within a finite range. In one embodiment, user interface 1100 may allow a user to specify the type of contact pressure level feedback. As an option, a separate user interface may be presented to the user to define the form of the feedback.

[00317] In various embodiments, the user interface 1100 may be used to define the pressure activation threshold. In the context of the present description, a pressure activation threshold is the

smallest contact pressure level which may not be ignored. In one embodiment, the current pressure activation threshold level 1108 may be displayed within user interface 1100. The current pressure activation threshold level may be displayed as a unitless number, a percentage of the maximum measurable contact pressure level, a color, a scale, and/or any other method of representing a value located within a finite range.

[00318] In one embodiment, the user interface 1100 may include a button 1110 which allows a user to manually specify the pressure activation threshold level. In one embodiment, the user may be presented with an interface where they may enter a specific value to be used as the pressure activation threshold. In another embodiment, the user may be prompted to exert the desired threshold pressure on a pressure-sensitive interface, confirming their selection by maintaining the desired contact pressure for a predefined amount of time. As an option, the user may be prompted to repeat this process more than one time, after which the resulting pressure levels may be averages. In yet another embodiment, the user may be given the chance to test the newly specified pressure activation threshold level.

[00319] In one embodiment, the user interface 1100 may include a button 1112 which resets the pressure activation threshold level to a predefined, default value. As an option, the user may be prompted to confirm this action before the default value is applied.

[00320] In one embodiment, the user interface 1100 may include a button 1114 which initiates a process which determines an optimal pressure activation threshold level. In the context of the present description, an optimal pressure activation threshold level refers to an activation threshold which would allow an interface to remain enabled all the time, with minimal erroneous inputs. In one embodiment, the process of automatically determining an optimal pressure activation threshold level may include gathering data over a predefined amount of time. As an option, the time remaining may be displayed in user interface 1100.

[00321] During this learning period, the pressure activation threshold may temporarily be set to a level sufficiently high that an accidental activation is highly unlikely. This facilitates separating intentional interactions from incidental interactions. During the learning period, the device may gather data, including but not limited to sensor data from the pressure-sensitive interface, changes in orientation, pressure-sensitive interface activations, and/or any other data related to use of the device. Once the learning period has elapsed, the gathered data may be used to estimate the levels of meaningless, incidental pressure interaction, such as interaction due to holding the device. As an option, in another embodiment, the user may be able to specify the length of the learning period. In yet another embodiment, the user may be able to specify desired accuracy of the pressure activation

threshold level optimization, balancing the reduction of unwanted interactions with a possible increase in intentional interactions being missed.

[00322] In one embodiment, the user interface 1100 may display the amount of time remaining in an ongoing learning period. See, for example, text field 1116. In various embodiments, the time remaining in the learning period may be displayed in user interfaces other than 1100. User interfaces where the remaining time may be displayed include, but are not limited to, a status bar, a contextual menu, a shortcut menu, a pop-up interface adapted for managing various interaction interfaces, and/or any other user interface.

[00323] In one embodiment, the user interface 1100 may include a plurality of checkboxes 1118 which represent a plurality of forms of feedback associated with the automatic determination of an optimal pressure activation threshold level. During the learning period, it may be helpful to provide the user with feedback every time the pressure-sensitive interface is activated. The forms of feedback include, but are not limited to, a sound, vibration, screen flash, and/or any other form of feedback. In one embodiment, the feedback associated with the automatic determination of an optimal pressure activation threshold level may override preferences set elsewhere. In another embodiment, the user may specify the parameters of these forms of feedback.

[00324] The user interface 1100 may be used to define and manage touch states. In one embodiment, a preset number of global touch states may be defined, which the operating system and applications may make use of. In another embodiment, the touch states may be defined on a per-application basis.

[00325] In one embodiment, the user interface 1100 may include a button 1120 which presents the user with a user interface that facilitates the definition of touch states. As an option, the user may be able to select from a plurality of predefined touch state definitions. Additionally, the user interface 1100 may display the currently defined touch states. See, for example, text field 1124. The touch states may be represented as a unitless number, a percentage of the range of allowable contact pressure levels, a color, and/or any other representation of a contact pressure level.

[00326] In one embodiment, the user interface 1100 may include a button 1122 which allows the user to reset the touch state definitions to a predefined default definition. As an option, the user may be prompted for confirmation before resetting the touch state definition to default values.

[00327] Figure 12 shows a method 1200 for assisting a user in defining touch states, in accordance with one embodiment. As an option, the method 1200 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of

course, however, the method 1200 may be implemented in any desired environment. The aforementioned definitions may apply during the present description.

[00328] As shown, the highest touch state is defined. See operation 1202. In one embodiment, the highest touch state may be predefined within the operating system. In another embodiment, the highest touch state may be specified by the user, in the form of a contact pressure value.

[00329] In various embodiments, the highest touch state may be defined through user interaction with a pressure-sensitive interface. For example, in one embodiment, a user may be prompted to exert a level of contact pressure beyond which the highest touch state may be triggered. As an option, the user may be prompted to exert this pressure multiple times, with the resulting values averaged. In another embodiment, the user may be prompted to exert the highest contact pressure level which is comfortable, and then defining the highest touch state using a contact pressure level slightly lower than that being exerted.

[00330] Once the highest touch state has been defined, the remaining spectrum of contact pressures is partitioned into the remaining touch states and displayed. See operation 1204.

[00331] In the context of the present description, the spectrum of contact pressures refers to the range of contact pressure levels a user may exert to interact with the device. For example, in one embodiment, the lower end of a spectrum of contact pressures may be equivalent to the pressure activation threshold level. In various embodiments, there may be multiple contact pressure spectrums defined. For example, in one embodiment, there may exist a distinct spectrum of contact pressures for each pressure-sensitive interaction surface. In another embodiment, there may exist a spectrum of contact pressures which is partitioned into touch states (a touch state spectrum), and a different spectrum of contact pressures for use with contact pressure levels (a contact pressure level spectrum).

[00332] In one embodiment, the touch state spectrum may have extrema defined by the user. As an option, the lower bound of the touch state spectrum may be the same as pressure activation threshold level.

[00333] In one embodiment, the touch state spectrum may be partitioned such that all touch states contain the same fraction of the touch state spectrum. In another embodiment, the touch state spectrum may be partitioned such that all touch states have equal portions of the touch state spectrum except for the highest touch state. In yet another embodiment, the touch state spectrum may be partitioned such that the touch states are weighted, some containing larger fractions of the spectrum than others. As an option, the weight factors may be predefined or may be user definable.

[00334] In one embodiment, the partitioned touch state spectrum may be displayed as a geometric shape (e.g., circle, rectangle, etc.) which has been segmented according to the touch state partitions. In another embodiment, the partitioned touch state spectrum may be displayed as an array of percentages of the total spectrum. In yet another embodiment, the touch state spectrum may be displayed as an array of contact pressure levels associated with the boundaries of the partitions.

[00335] Once the touch state spectrum has been partitioned and displayed, the user is given the opportunity to adjust the touch states. See operation 1206.

[00336] In one embodiment, the user may adjust the contact pressure levels associated with the touch states by specifying the numerical values of specific contact pressure levels. In another embodiment, the user may adjust the touch states by interacting with a graphical representation of the partitioned touch state spectrum. In yet another embodiment, the user may adjust the touch states by defining new partitions using a pressure-sensitive interface. As an option, the user may exert the desired contact pressure level to set the boundaries of a touch state.

[00337] Once the touch states have been adjusted, the newly partitioned touch state spectrum is verified. See operation 1208.

[00338] In one embodiment, the touch state spectrum may be verified by asking the user to confirm their choice through a user interface. In another embodiment, the user may verify the touch state spectrum by utilizing it in a testing interface. As an option, the user may be given visual feedback regarding the exact contact pressure level being exerted, in addition to the current touch state.

[00339] Figure 13 shows a user interface 1300 for assisting a user in defining touch states, in accordance with one embodiment. As an option, the user interface 1300 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the user interface 1300 may be implemented in any desired environment. The aforementioned definitions may apply during the present description.

[00340] In one embodiment, the user interface 1300 may include a graphical representation 1302 of a touch state spectrum, hereinafter referred to as touch space spectrum rendering 1302. As another embodiment, the touch space spectrum rendering 1302 may be colored with the spectrum of colors between two colors representing spectrum extrema. As an option, the same colors used to provide pressure dependent feedback to the user of a pressure-sensitive interface may be used here.

[00341] The touch space spectrum rendering 1302 found in user interface 1300 may be broken up into ranges of contact pressure representing touch states. In various embodiments, the touch space spectrum rendering may be partitioned by one or more touch state dividers 1304. In one

embodiment, the touch state dividers may simply be a line drawn between two touch states. In another embodiment, the touch state dividers may also display the contact pressure level separating those two touch states.

[00342] In various embodiments, a plurality of touch states may be defined. In one embodiment, the user may specify the number of touch states to define. In another embodiment, the number of touch states may defined within the operating system. In still another embodiment, the number of touch states may be defined on a per-application basis, by the applications themselves or by the user (if so allowed by the application). In yet another embodiment, there may exist a set of default touch states of a fixed number which may be overridden by a different set of touch states defined within an application.

[00343] In various embodiments, the touch space spectrum rendering 1302 found in user interface 1300 may have a labeled scale. For example, in one embodiment, the lower boundary 1306 of the lowest touch state (e.g., the touch state associated with the lowest contact pressures) may be displayed. As an option, the lower boundary of the touch space spectrum may be equivalent to the pressure activation threshold, which the user may define using, for example, user interface 1100.

[00344] In another embodiment, the upper boundary 1308 of the touch space spectrum rendering may be displayed. As an option, upper boundary 1308 may be automatically set to a value slightly higher than the lower boundary of the highest touch state, since the highest touch state is made up of all pressures above that lower boundary. In this way, the scale of the touch space spectrum rendering is not skewed due to the potentially large range of contact pressures making up the highest touch state. In yet another embodiment, the touch space spectrum rendering may change in scale due to user interaction, with upper boundary 1308 being automatically updated.

[00345] In various embodiments, the touch state dividers 1304 found in the user interface 1300 may possess touch state divider handles 1310 with which a user may adjust the partitioning of touch states. For example, in one embodiment, a user may touch and drag a touch state divider handle to change the value of the associated divider. In another embodiment, a user may select a touch state divider handle; after the touch state divider handle has been selected, the divider may be assigned a value equivalent to whatever contact pressure level the user exerts for a predefined amount of time. As a specific example, a user may select a touch state divider handle and then press on an interaction surface. Once the desired contact pressure level is reached, the user maintains the pressure for 3 seconds, after which the value of the touch state divider is updated.

[00346] In one embodiment, the user interface 1300 may include a contact pressure gauge 1312 which reports the contact pressure level currently being exerted, to assist the user in selecting a

practical partitioning of the touch state spectrum. In another embodiment, the scale of the contact pressure gauge may match that of touch state spectrum rendering 1302. As an option, the scale of both contact pressure gauge 1312 and touch state spectrum rendering 1302 may be set to accommodate the larger of two values: the current contact pressure level, or a value slightly higher than the lower boundary of the highest touch state.

[00347] In various embodiments, the touch state dividers 1304 found in the user interface 1300 may each be associated with a plurality of icon buttons 1314 which a user may use to lock a touch state divider at a particular value. In one embodiment, adjusting one touch state divider may cause all other unlocked dividers to shift such that the remaining portions of the touch state spectrum are partitioned as evenly as possible. As an option, the user interface 1300 may include a button to unlock all touch state dividers. In another embodiment, the user interface 1300 may include a button 1316 which distributes all unlocked touch state dividers evenly throughout the remaining parts of the touch state spectrum.

[00348] In one embodiment, the user interface 1300 may include a button 1318 which allows the user to establish the highest touch state boundary through pressure-based user input. In another embodiment, the user may be prompted to establish this touch state boundary as soon as user interface 1300 is displayed, in accordance with method 1200. In one embodiment, the user may only specify the highest touch state, with the remaining touch state spectrum being evenly partitioned across the touch states.

[00349] In one embodiment, the user interface 1300 may include a button 1320 which resets all touch state boundaries to default values. In another embodiment, the highest touch state boundary may be preserved, only able to be reset within the interface used to define it that may be displayed in response to activating button 1318.

[00350] In various embodiments, the user interface 1300 may include a button 1322 which allows a user to test the currently defined touch states. For example, in one embodiment, a user may be asked to achieve various touch states, and maintain them for a certain period of time. In another embodiment, the user may be presented with an interface similar to 1300, but where the touch state spectrum rendering 1302 and the contact pressure gauge 1312 are more predominantly displayed. As an option, a sound may be played every time a touch state boundary is crossed.

[00351] Figure 14 shows a user interface 1400 for indicating that a backtouch and/or pressure-sensitive interface is activated, in accordance with one embodiment. As an option, the user interface 1400 may be implemented in the context of the architecture and environment of the previous Figures

or any subsequent Figure(s). Of course, however, the user interface 1400 may be implemented in any desired environment. The aforementioned definitions may apply during the present description.

[00352] In one embodiment, the user interface 1400 may include one or more icons 1402 to indicate that a backtouch and/or pressure-sensitive interface has been activated. As an option, the icons may also indicate whether an interface is enabled. For example, an icon may only be visible if the interface is enabled, and only in color if the interface is activated. In another embodiment, the icons may have a color which depends upon the contact pressure level currently being exerted on that particular interface.

[00353] In various embodiments, the user interface 1400 may include a status bar 1404 which provides the user feedback regarding various device functions, in addition to other information, such as the date and/or time. The status bar itself may be used to indicate whether a backtouch and/or pressure-sensitive interface has been activated. For example, in one embodiment, the status bar may have a shading color which depends upon the contact pressure level currently being exerted on an activated interface. This may be done in conjunction with displaying an icon 1402 to indicate which interface has been activated. In another embodiment, the change in color may be restricted to just the border 1406 of the status bar. In yet another embodiment, the type of interface which has been activated may be indicated through an animation routine, including, but not limited to, a pulsing of the border, a cyclical variation of transparency of the status bar shading, "marching ants" along the status bar border, and/or any other animation routine.

[00354] In one embodiment, the status bar 1404 within the user interface 1400 may include one or more items of textual information 1408. The items of textual information may include, but are not limited to, date, time, network type, battery level, other device or application status information, and/or any other type of textual information.

[00355] In one embodiment, the activation of a backtouch and/or pressure-sensitive interface may be indicated through the presentation properties of the textual information 1408. Presentation properties for textual information which may be altered to indicate the activation of an interface include, but are not limited to, font, style, size, color, animation routine (e.g., flashing text, cycling colors, etc.), and/or any other type of presentation property. In another embodiment, activation of a backtouch and/or pressure-sensitive interface may be indicated by temporarily replacing textual information 1408 with a message, which may include, but is not limited to, the identity of the activated interface.

[00356] In one embodiment, the user interface 1400 may indicate the activation of a backtouch and/or pressure-sensitive interface by displaying a border 1410 around the display. As an option, border 1410 may change color depending upon the current contact pressure level.

[00357] Figure 15 shows a user interface 1500 for defining a backtouch feedback style, in accordance with one embodiment. As an option, the user interface 1500 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the user interface 1500 may be implemented in any desired environment. The aforementioned definitions may apply during the present description.

[00358] When interacting with a backtouch interface, it may or may not be important to provide the user with some form of feedback regarding the location and/or activity of their chosen implement of interaction. Providing interaction feedback allows the user to interact with the device using an interaction surface they may not be able to see.

[00359] In one embodiment, the user interface 1500 may include a plurality of checkboxes 1502 which represent various types of feedback which may be provided as an implement of interaction is in proximity to the backtouch interface. The types of feedback may include, but are not limited to, visual (e.g., screen flashes, status bar icons, iconic depictions of the location of the implement, etc.), sound, vibration, and/or any other form of feedback. In another embodiment, one or more of these types of feedback may be configured by the user. For example, in one embodiment, the user may select a sound to be played whenever an implement of interaction is in proximity to the backtouch interface. In yet another embodiment, the feedback may be limited to only those instances where the proximity to the backtouch interface appears intentional, rather than incidental. As a specific example, in one embodiment, feedback might be given for a fingertip, but not for a palm which is in proximity to the backtouch interface due to the user's grip.

[00360] In one embodiment, the user interface 1500 may include a plurality of checkboxes 1504 which represent various types of visual feedback that may indicate that an implement of interaction is in proximity to a backtouch interface. The types of visual feedback include, but are not limited to, graphical representation of probable implement location, status bar icon, screen flash, and/or any other type of visual feedback.

[00361] In various embodiments, a backtouch interface may be able to estimate the location of an implement of interaction in proximity to the backtouch interaction surface. This information can be used to provide useful feedback to the user. For example, in one embodiment, a point associated with the location may be displayed. As an option, the point may be the centroid of the area with the

highest proximity value within a predefine threshold. In another embodiment, the point may be replaced or combined with an icon, shape, or symbol.

[00362] In another embodiment, the user may be provided with proximity feedback in the form of a visual representation of the proximity data received from the backtouch interface. As an option, the proximity values may be scaled such that the visual representation has the appearance of a glow, centered on the estimated location of the implement.

[00363] In one embodiment, the user interface 1500 may include a plurality of checkboxes 1506 which represent various styles of visual proximity feedback. The styles include, but are not limited to, dynamic coloring, the feedback described in conjunction with operation 806 of method 800, and/or any other type or style of visual feedback. In the context of the present description, dynamic coloring refers to coloring which varies as a function of proximity to the backtouch interface. For example, in one embodiment, the color of the visual proximity feedback may vary between two colors which represent the least discernable proximity and the greatest proximity before contact. As an option, the colors may include a transparency factor, so the visual feedback does not obstruct display contents any more than necessary.

[00364] In one embodiment, the user interface 1500 may include a plurality of checkboxes 1508 which represent various types of feedback which may be provided as an implement of interaction comes in contact with the backtouch interface. The types of feedback may include, but are not limited to, visual (e.g., screen flashes, status bar icons, iconic depictions of the location of the implement, etc.), sound, vibration, and/or any other form of feedback. In another embodiment, one or more of these types of feedback may be configured by the user. For example, in one embodiment, the user may select a sound to be played whenever an implement of interaction makes contact with the backtouch interface. In yet another embodiment, the feedback may be limited to only those instances where the contact with the backtouch interface is estimated to be intentional, rather than incidental. As a specific example, in one embodiment, feedback might be given for contact with a fingertip, but not for a palm which is in contact with the backtouch interface due to the user's grip.

[00365] In one embodiment, the user interface 1500 may include a plurality of checkboxes 1510 which represent various types of visual feedback indicating contact with the backtouch interface. The types of visual feedback include, but are not limited to, graphical representations of contact location and extent (e.g., contact point, contact area, etc.), a status bar icon, screen flash, and/or any other type of visual feedback, including those described in other embodiments.

[00366] In one embodiment, the user interface 1500 may include a plurality of checkboxes 1512 which cause the visual feedback indicating contact with the backtouch interface to fade after a set

amount of time. In another embodiment, the user may specify the amount of time before fading begins, how quickly the fade occurs, and/or the limits of the fade (e.g., completely disappear, fade to 70% transparency, etc.). As an option, the fading of the visual feedback may be reversed if the implement of interaction moves beyond a preset threshold while still in contact with the backtouch interface.

[00367] In one embodiment, the user interface 1500 may include a plurality of checkboxes 1514 which allow the user to specify the style of visual feedback associated with making contact with the backtouch interface. The styles may include, but are not limited to, shading of a contact area, line style of the border of a contact area, animation routine, and/or any other style aspect of visual feedback, including those described in other embodiments.

[00368] In one embodiment, the user interface 1500 may include a plurality of checkboxes 1516 which represent various types of feedback which may be provided as an implement of interaction exerts pressure on the backtouch interface. The types of feedback may include, but are not limited to, visual (e.g., screen flashes, status bar icons, iconic depictions of the contact pressure of the implement, etc.), sound, vibration, and/or any other form of feedback. In another embodiment, one or more of these types of feedback may be configured by the user. For example, in one embodiment, the user may select a sound to be played whenever an implement of interaction exceeds a predefined contact pressure level with the backtouch interface. In another embodiment, the sound may play whenever there is a change in touch state. In yet another embodiment, the feedback may be limited to only those instances where the contact pressure on the backtouch interface is estimated to be intentional, rather than incidental. As a specific example, in one embodiment, feedback might be given for a finger press, but not for a palm squeeze incidental to the user's grip.

[00369] In one embodiment, the user interface 1500 may include buttons 1518 which allow the user to specify the colors which represent the extrema of measurable contact pressure levels. As an option, the colors may be specified with a transparency value.

[00370] In one embodiment, the user interface 1500 may include a plurality of checkboxes 1520 which represent various venues for presenting visual feedback based upon the current contact pressure level. The venues for pressure-related visual feedback include, but are not limited to, an area equivalent to or based upon the contact area, the contact point, the border of the display, the status bar, and/or any other type or example of visual feedback, including those described in other embodiments.

[00371] In one embodiment, the user interface 7.002.8-00 may include a button 1522 which returns all settings defined within user interface 7.002.8-00 to predefined default values. As an option, the user may be prompted to confirm the reset before restoring the default values.

[00372] In one embodiment, the user interface 7.002.8-00 may include buttons 1524 which allow a user to save and load collections of backtouch feedback settings. As an option, the user may be prompted to confirm loading a new collection of settings before overwriting the current collection.

[00373] In one embodiment, the user interface 1500 may include a button 1526 which allows a user to test the current backtouch feedback style settings. In one embodiment, button 1526 may enable the backtouch interface (if not already enabled) and allow the user to experience the current backtouch feedback style without being able to interact with user interface 1500 through the backtouch interface. In other words, the user may be able to expose the backtouch interface to a range of proximity, contact, and pressure interactions without accidentally changing any of the settings found within 1500.

[00374] In another embodiment, button 1526 may present to the user a user interface which allows the user to experience the current backtouch feedback style settings within a variety of simulated scenarios. The simulated scenarios may include, but are not limited to, web browsing, photo viewing, an application launcher, an eBook, word processing, and/or any other common use scenario. As an option, the simulated use scenarios may be defined such that the user is able to experience the current feedback style in a wide range of color schemes, subject matter, degrees of screen clutter, etc.

[00375] As a specific example of a backtouch feedback style collection in use, in one embodiment, a user may configure the backtouch interface through user interface 1500 such that having a finger in proximity to the backtouch interface causes a faint blue glow to appear on the display, over the location of the finger. The blue glow becomes brighter as the distance between the finger and the backtouch interface decreases, until contact is made. Upon contact, the display shows a small plus sign at the contact point and a thin "marching ants" border around the contact area. The contact area is not shaded. As the user increases contact pressure, the contact area is shaded red, which becomes more opaque as the pressure increases.

[00376] Figure 16 shows an alternative method 1600 for defining a selection made within a user interface based in part on contact pressure, in accordance with one embodiment. As an option, the method 1600 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the method 1600 may be carried out in

any desired environment. It should also be noted that the aforementioned definitions may apply during the present description.

[00377] As shown, it is determined if a touch event has occurred. See determination 1602.

[00378] In the context of the present description, a touch event refers to an event in which an implement of interaction comes into contact with an interaction surface. For example, in one embodiment, pressing on a pressure-sensitive backtouch interface with a finger may be a touch event. Another example may be making contact with a touch-sensitive display with a stylus.

[00379] If it is determined that a touch event has occurred, then the touch event attributes are determined. See operation 1604.

[00380] In the context of the present description, touch event attributes refer to one or more measurable aspects of the user interaction which resulted in a touch event. The measurable aspects may include, but are not limited to, touch state, contact area, contact point, contact pressure level, pressure uncertainty, touch uncertainty, and/or any other measurable aspect of user interaction.

[00381] As shown, it is determined whether the system is in a selection mode. See determination 1606.

[00382] In the context of the present description, a selection mode refers to a system state where a user may create or modify a selection in a display. In various embodiments, a selection mode may be represented by a system flag. Examples of when a system may be in a selection mode include, but are not limited to, instances where a selection already exists, instances where a user has indicated a desire to create a selection.

[00383] In various embodiments, a system may be placed in a selection mode through user input. For example, in one embodiment, the user may activate a selection mode by performing a predefined gesture on an interaction surface. In another embodiment, a user may activate a selection mode by exerting contact pressure on an interaction surface for a sufficient amount of time, the contact pressure exceeding a predefined threshold.

[00384] If the system is in a selection mode, then a selection is created and/or modified as a function of the touch event attributes, then displayed. See operation 1608.

[00385] In one embodiment, the selection may be created, modified, and/or displayed using one or more selection functions. In another embodiment, a display function may be applied in addition to a selection function, to display the selection.

[00386] In the context of the present description, a display function refers to a function of one or more inputs which determines one or more properties of a display. Properties of a display may include, but are not limited to, color values for individual pixels, brightness of a display backlight or

portions of a backlight, and/or any other properties of a display. Display functions may apply to an entire display and/or multiple displays.

[00387] In one embodiment, the selection may be displayed with a secondary boundary representing the uncertainty in the selection. As a specific example, there may be displayed a small, pale green tinged transparent circle to show the area that the device is certain the user selected and a surrounding pale-red tinged transparent area (a secondary boundary) representing the area where the device thinks the user may have tried to select, but is not certain.

[00388] Operation 1608 may continue to be performed, updating the selection with each iteration, until there is a change in the touch state. See determination 1614.

[00389] If it is determined in 1606 that the system is not in a selection mode, then it is determined if a gesture has been detected. See determination 1610. In one embodiment, a user may be given feedback when a gesture is detected. Possible feedback may include, but is not limited to, sound, flashing display, appearance of an icon, a colored border on the display, and/or any other form of user feedback.

[00390] If a gesture has been detected, then an associated action is performed. See operation 1612. In one embodiment, any gesture may be mapped to any command or operation of the device. In another embodiment, a user may be provided feedback when the action is performed. Possible feedback may include, but is not limited to, sound, flashing display, appearance of an icon, a colored border on the display, and/or any other form of user feedback.

[00391] A gesture may be associated with a variety of different actions. These actions may include, but are not limited to, scrolling a display or user interface element, zooming in or out, modifying the display brightness, and/or any other action. With respect to making or modifying a selection through method 1600, it is important to note that, in one embodiment, a gesture may be associated with placing the system in a selection mode.

[00392]

[00393] Figure 17 shows a user interface 1700 for performing operations on a selection, in accordance with one embodiment. As an option, the user interface 1700 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the user interface 1700 may be implemented in any desired environment. The aforementioned definitions may apply during the present description.

[00394] After selecting an object, using methods, interfaces, and embodiments described above or others, a user may wish to perform an operation upon the object. Providing easily accessible methods to perform operations on a selected object may enhance the user experience. The

availability of multiple interaction surfaces and/or multiple sensitivities increases the number of simple, intuitive ways a user may interact with the device.

[00395] In various embodiments, once a selection is static, a user may perform operations on the selected object. Possible operations include, but are not limited to, replication operations (i.e. copy, cut, paste, etc.), relocation operations, text-specific operations, image-specific operations, cross-application operations, and/or any other type of operation.

[00396] In various embodiments, a user may perform replication operations on a selected object through simple gestures and other types of user input. For example, in one embodiment, a user may copy a selected object to a clipboard (i.e. temporary storage, etc.) by pressing sharply on a pressure-sensitive front interaction surface, on top of the selected object. In another embodiment, a user may cut a selected object by pinching the object (i.e. applying contact pressure on the object through a front and back interaction surface), then applying greater contact pressure on the front interaction surface than the back interaction surface. In yet another embodiment, a user may perform a paste operation, replacing the selected object with the contents of a clipboard, by pinching the selected object, then applying greater contact pressure on the back interaction surface than the front interaction surface. Of course, in other embodiments, these operations and those following may be assigned to any other gesture, depending upon the location, number, and sensing ability of the host device's interaction surface(s).

[00397] In various embodiments, a user may perform relocation operations on a selected object through simple gestures and other types of user input. For example, in one embodiment, a user may move a selected object by making contact with the object on an interaction surface (front or back) and dragging the contact point to relocate the object. As an option, if the selection was made within a sequential or ordered environment (i.e. word processing document, etc.), the selected object may become transparent or translucent while being relocated, so the user may better see the insertion point (i.e. cursor, etc.). As shown in this example, the same dragging gesture may have different effects, depending on the state of the selection (i.e. static vs. active, etc.).

[00398] In various embodiments, a user may perform text-specific operations on a selected text object using simple gestures and other types of user input. See, for example, user interface 1700 in Figure 17. As shown, a selection 1702 has been made within a block of text 1704. In accordance with one embodiment, a user has temporarily magnified the selected text by bringing a finger into proximity to a back interaction surface, said proximity localized in an area 1706 on the selection. As an option, the degree of magnification may increase as the finger is brought closer to the interaction surface.

[00399] Another example of a text-specific operation is data detection, in accordance with one embodiment. For example, in one embodiment, a user may perform a data detection operation on a selected text object by pressing on the selection with two fingers through a back interaction surface. In various embodiments, the data detection operation may highlight detectable information found within the selected text including, but not limited to, email addresses, phone numbers, dates and times, addresses, web addresses, and/or any other form of information. In another embodiment, the data detection may only highlight types of information which may be further acted upon by the device, such that after detection, a user may initiation further action by touching the highlighted information. For example, in one embodiment, touching a highlighted phone number may dial the number, touching a highlighted address may activate a navigation application, touching a date may create an appointment in a calendar application, and so forth.

[00400] Other examples of text-specific operations may include, but are not limited to, highlighting, modifying the style (i.e. bold, italic, underline, strikethrough, color, shadow, etc.), modifying the font, modifying the font size, translating to a different language, and/or any other operation which may be performed on text. In one embodiment, a user may perform a gesture, such as a two finger, double press on the selected text, to bring up a menu of different text operations (or any other operation in the present description). In another embodiment, each operation may be assigned a different gesture.

[00401] In various embodiments, a user may perform image-specific operations on a selected object through simple gestures intuitively related to the operation being performed. For example, in one embodiment, a user may apply facial recognition and/or red eye removal by simply tapping (on a front or back interaction surface) on peoples faces within the selection. In another embodiment, a user may resize the selected object using the two finger pinch-to-zoom gesture. In still another embodiment, a user may rotate the selected object by making two points of contact on the object, then twisting the contacting hand. In yet another embodiment, a user may warp or distort a selected object by applying different levels of contact pressure to the selection via a front or back interaction surface. As an option, a front interaction may cause puckering, while a back interaction may cause bulging.

[00402] In various embodiments, a user may perform cross-application operations on a selected object through simple gestures. Cross-application operations may include, but are not limited to, placing the selected object in a new email or SMS message, placing the selected object in a social network posting, sending the object to an application capable of performing further operations (i.e. image editing application, word processing application, etc.), and/or any other operation which may

involve another application. In other embodiments, a user may be presented with application-specific operations in a menu, in addition to cross-application operations, upon performing a predefined gesture.

[00403] Figure 18 shows a method 1800 for utilizing contact pressure-based gestures, in accordance with one embodiment. As an option, the method 1800 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the method 1800 may be carried out in any desired environment. It should also be noted that the aforementioned definitions may apply during the present description.

[00404] As shown, it is determined if a touch event has occurred. See determination 1802.

[00405] If it is determined that a touch event has occurred, then the initial touch event attributes are determined. See operation 1804.

[00406] As shown, the gesture is identified from gesture input. See operation 1806.

[00407] In the context of the present description, gesture input refers to the collection of inputs, flags, and signals by which a gesture is identified and parameterized. For example, in one embodiment, a two-finger pinch gesture may be identified by two contact points combined with their motion with respect to each other, and parameterized by the extent of the motion. Possible gesture inputs may include, but are not limited to, touch event attributes (both initial and over time), system and/or application flags, switches, buttons, states, sensor data, and/or any other possible input.

[00408] For example, in one embodiment, a gesture may be made up of one or more contact points on an interaction surface, each associated with a different contact pressure level.

[00409] In various embodiments, a gesture may be identified from gesture input. Some gestures may be able to be identified solely from initial touch event attributes. Other gestures may only be identified after the gesture has been performed for some period of time. As a specific example, a two finger pinch gesture and a two finger swipe are indistinguishable based solely on initial touch event attributes. However, once the swipe or pinch motion has begun, the gestures are immediately distinguished from each other.

[00410] In various embodiments, gestures may include one or more contact pressures being exerted upon an interaction surface. In some embodiments, pressure may be used to distinguish between two gestures. For example, in one embodiment, two gestures involving a two finger pinch on the front display and one finger contact with the backtouch interface may be defined based on the contact pressure level exerted on the back touch interface. In other embodiments, pressure may be used to specify one or more dimensions of the operation linked to a gesture. For example, in one embodiment, a swipe gesture to control scrolling of a text field may use contact pressure to

determine the speed of the scrolling (e.g., higher pressure yields faster scrolling, etc.). In still other embodiments, contact pressure may be used to both identify as well as parameterize a gesture.

[00411] Once the gesture has been identified, the corresponding operation is performed. See operation 1808.

[00412] In various embodiments, a gesture may be associated with the modification of one or more device audio settings. For example, in one embodiment, a user may adjust the device volume by applying contact pressure to a back interaction surface, and dragging the contact point up and down to increase or decrease the device volume. As an option, the ringer volume may be adjusted by dragging left and right. In another embodiment, a user may change where audio is sent (i.e. internal speakers, headphone jack, Bluetooth device, etc.) by quickly pressing twice on a back interaction surface, then selecting an audio destination from a pop-up menu presented in response to the rapid double press. In yet another embodiment, a user may mute the audio by applying pressure on front and back interaction surfaces (i.e. a pinching motion), in a predefined corner of the device. In various embodiments, some or all of these device audio related operations may be available through gesture only after the user provides some form of activation input (i.e. touching an icon in the status bar, performing a simple gesture, etc.). In this way, gesture collisions (i.e. assignment of more than one operation to the same gesture, etc.) may be avoided. Of course, these and the following operations may be associated with any gesture or other user input, in various embodiments.

[00413] In various embodiments, a gesture may be associated with the modification of one or more display attributes. For example, in one embodiment, a user may adjust the intensity of a display backlight by applying contact pressure with three fingers on the display of interest. As an option, the backlight intensity may vary as a function of average contact pressure among the three contacts. In another embodiment, a user may activate a "night mode" (i.e. use of a monochrome red/black color space, inverting the display, etc.) by sequentially applying and releasing contact pressure on each corner of a front interaction surface. In various embodiments, some or all of these display attribute related operations may be available through gesture only after the user provides some form of activation input (i.e. touching an icon in the status bar, performing a simple gesture, etc.). In this way, gesture collisions (i.e. assignment of more than one operation to the same gesture, etc.) may be avoided.

[00414] In various embodiments, a gesture may be associated with the modification of one or more device attributes. For example, in various embodiments, a device may have a status bar along one side of a display which indicates the status of device hardware including, but not limited to, Wi-

Fi signal strength, cellular network type and signal strength, Bluetooth status (i.e. on, off, etc.), system volume, battery remaining, etc. In some embodiments, a user may modify the status of these device attributes by interacting with status bar icons. For example, in one embodiment, a user may apply front surface contact pressure, above a predefined threshold for a predefined amount of time, to a status bar icon to turn off the associated device hardware (i.e. Wi-Fi, cellular modem, Bluetooth, etc.). In another embodiment, a user may apply similar pressure via a back interaction surface to a deactivated status bar icon to turn the associated hardware back on. As an option, applying said contact pressure may present the user with a menu of options associated with that device hardware (i.e. Wi-Fi networks to join, Bluetooth devices to pair, activate cellular voice/data/both, etc.).

[00415] In yet another embodiment, a user may apply contact pressure to a status bar battery indicator icon to activate a menu populated with one or more predefined collections of settings for various power scenarios (i.e. extreme cutbacks for low battery, high performance for charged battery, maximum performance while charging, etc.). In this way, a user may activate a power saving mode that allows them to stay connected to a Wi-Fi network while saving power by diming the display (i.e. while web browsing), and a different power saving mode which turns off Wi-Fi without having to dim the display as much (i.e. reading an eBook, etc.).

[00416] In various embodiments, some or all of these device attribute related operations may be available through gesture only after the user provides some form of activation input (i.e. touching an icon in the status bar, performing a simple gesture, etc.). In this way, gesture collisions (i.e. assignment of more than one operation to the same gesture, etc.) may be avoided.

[00417] In various embodiments, a gesture may be associated with application-specific operations. For example, in some embodiments, a user may interact with an email client through multiple interaction surfaces. In one embodiment, a user may scroll through a list of messages and select one for viewing using a back interaction surface. In another embodiment, a user may apply a contact pressure on a back interaction surface, then swipe downward, to forward the current message. In yet another embodiment, a user may apply a contact pressure on a back interaction surface, then swipe upward, to reply to the current message. As an option, a user may perform this gesture using two fingers to reply to all recipients of the message.

[00418] In other embodiments, a user may interact with a web browser through multiple interaction surfaces. In one embodiment, for example, a user may apply contact pressure on a link within a webpage, then perform a quick flicking gesture, in any direction, to open the link in a background tab or window. In another embodiment, a user may open a link in a new tab or window by pressing on the link through a back interaction surface for a predetermined amount of time.

[00419] In still other embodiments, a user may interact with a camera application through multiple interaction surfaces. For example, in one embodiment, a user may indicate a point to be used for white balancing by making contact with the displayed point through a back interaction surface. In another embodiment, a user may adjust one or more camera properties by applying different amounts of contact pressure on an icon shown on the front display. Possible camera properties may include, but are not limited to, aperture settings, simulated film speed, f-stop, degree of fill flash, and/or any other camera property or setting.

[00420] In even more embodiments, a user may interact with a movie player through a back interaction surface. For example, in one embodiment, a menu may fade into view when a user applies a contact pressure on the back interaction surface. The menu may allow the user to perform one or more movie-related operations, including but not limited to, toggling subtitles, selecting an audio track, selecting a chapter or bookmark, and/or any other movie related operation or setting.

[00421] In other embodiments, a user may interact with a navigation application using a back interaction surface. For example, in one embodiment, a user may cycle through a plurality of map layers by applying different levels of contact pressure on the back interaction surface. Possible map layers may include, but are not limited to, satellite images, street maps, weather maps, traffic maps, points of interest, navigational route, and/or any other type of map or navigational information.

[00422] In various embodiments, some or all of these application-specific operations may be available through gesture only after the user provides some form of activation input (i.e. touching an icon in the status bar, performing a simple gesture, etc.). In this way, gesture collisions (i.e. assignment of more than one operation to the same gesture, etc.) may be avoided.

[00423] In various embodiments, gestures may be associated with operations that are carried out as functions of the gesture input, when the gesture is performed and identified.

[00424] In various embodiments, the operations associated with a gesture may be carried out as a function of the associated gesture dynamics. In the context of the present description, gesture dynamics are aspects of a gesture that may vary without changing the identity of the gesture. Possible aspects may include, but are not limited to, contact point velocity, contact point acceleration, contact pressure velocity, contact pressure acceleration, time to complete gesture, and/or any other aspect which may be associated with a gesture.

[00425] In various embodiments, the association between gesture and operation may be context-dependent. In some embodiments, the association depends on application context (e.g., which application is active, etc.). For example, in one embodiment, a gesture which scrolls a text field in one application may turn a page when performed in a different application.

[00426] In other embodiments, the association may depend on application or state context (e.g., whether or not there is an active selection, whether or not a control has been activated, etc.). For example, in one embodiment, a gesture which may be used to select text may move text if performed when text has already been selected.

[00427] In other embodiments, the association may be independent of context, such that performing the gesture may cause the same operation to be carried out, regardless of what application is active. For example, a gesture which brings up an interface to adjust screen brightness and volume may be defined such that it is always available.

[00428] In various embodiments, a user may be given feedback as a gesture is performed. For example, in one embodiment, a representation of the gesture may be temporarily displayed as the gesture is performed. In this way, a user may be more aware of the form of the gesture they are performing. As an option, the geometry of the displayed gesture may be smoothed or otherwise modified.

[00429] Figure 19 shows an exemplary contact pressure-based gesture 1900 for scrolling a text field, in accordance with one embodiment. As an option, the gesture 1900 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the gesture 1900 may be carried out in any desired environment. It should also be noted that the aforementioned definitions may apply during the present description.

[00430] In one embodiment of a pressure-based gesture, the display properties of one or more display(s) may be altered by the gesture, including the scroll speeds of one or more scrollable objects (e.g., text fields, images, cover art, etc.). Scrolling is a common operation, and is often assigned to a gesture in touch-based devices.

[00431] In one embodiment of a pressure-based gesture, one or more inputs may alter the scrolling speeds of one or more areas on the display. As a specific example, a user may wish to scroll quickly through a very large collection of objects (e.g., contact names, pages of text, photographs, etc.), and desires to control the speed of scrolling in a simple fashion. While performing a classic swipe gesture to scroll through the collection, the user may also apply increasing contact pressure to a pressure-sensitive surface as a means of controlling the scroll speed (e.g., increased contact pressure yields increased scroll speed, etc.). A swipe, slide or other simple gesture may be used.

[00432] See, for example, exemplary pressure-based gesture 1900. As shown, the gesture starts at touch event 1902, which involves a single finger is making contact at location L1, at time T1, while exerting contact pressure P1, in accordance with one embodiment. The gesture ends at touch event

1904, with touch event attributes L2, T2, and P2. In one embodiment, the sliding motion from L1 to L2 may be described as a swipe gesture.

[00433] As shown in plot 1906, as the contact pressure increases from P1 to P2, the scroll speed increases as well, from S1 to S2. In one embodiment, scroll speed may be a display function (in this case, a function of contact pressure). As an option, pressure-dependent display functions may be step-wise, changing in response to changes in discrete touch states, or continuous functions of a contact pressure level.

[00434] In various embodiments, pressure-based gestures may be classified as either dynamic gestures or static gestures. In the context of the present description, a dynamic gesture is a gesture that requires movement across or in proximity to an interaction surface. For example, in one embodiment, a swipe gesture may be classified as a dynamic gesture.

[00435] In the context of the present description, a static gesture refers to a gesture which does not involve movement across or in proximity to an interaction surface. Examples of static gestures may include, but are not limited to, button presses (real or virtual), multi-finger taps, operating a mechanical switch, a squeeze, and/or any other gesture which does not require motion.

[00436] In one embodiment of a pressure-based gesture that alters display properties, a scroll speed display function may be defined such that scroll speed increases in a non-linear fashion with respect to the contact pressure exerted in a swipe gesture.

[00437] In various embodiments, pressure-based gestures may be associated with different operations. For example, in one embodiment, pressure-based gestures may alter one or more display properties. Display properties may include, but are not limited to, backlight intensity, pixel color, scroll bar sensitivity, slideshow rate, and/or any other property associated with a display or its contents. As a specific example, a device may be in a sleep mode with the display and backlight inactive. A user may move his finger into proximity of a backtouch sensor in order to activate the display and the display backlight intensity to a low intensity level. By increasing the pressure on the backtouch sensor, the backlight intensity may be increased. Alternatively, the backlight intensity may be initially activated at a high level (e.g., depending on ambient light sensor etc.). In this case increasing pressure on the backtouch display may dim the backlight.

[00438] In one embodiment of a pressure-based gesture that alters a scroll speed, as the gesture magnitude is increased, the rate of scroll speed increase is increased. In other words, the scroll acceleration is increased.

[00439] In the context of the present description, gesture magnitude refers to the magnitude of the associated gesture dynamics. For example, in one embodiment, the gesture magnitude of a swipe gesture may include the length of the swipe and/or the contact pressure exerted during the swipe.

[00440] In one embodiment of a pressure-based gesture to control scroll acceleration, the scroll acceleration may depend on the gesture acceleration. Thus, if the contact is such that the contact point is accelerating with time (e.g., positive contact point acceleration), the scroll acceleration may be positive. In another embodiment, if the contact point acceleration is negative then the scroll acceleration may be negative (e.g., scroll speed decreased, etc.).

[00441] In one embodiment of a pressure-based gesture to control scroll acceleration, the scroll acceleration may be both positive and negative, depending on the contact point movement.

[00442] In one embodiment of a pressure-based gesture to control scroll acceleration, other display functions may also be altered. Possible display functions include, but are not limited to, selection(s), color, shape, image and/or text magnification, indicator(s) to provide feedback to user, and/or any other display function.

[00443] The addition of pressure dependence to already established touch gestures may facilitate user interactions with the device. Often, the efficacy of a gesture is limited by the size of the device. For example, on a device which uses the pinch-to-zoom gesture, zooming far in or out may require repetition of the gesture multiple times, due to screen size.

[00444] In one embodiment, the pinch-to-zoom touch gesture may be enhanced as a pressure-based gesture; after performing the pinch motion, the user exerts pressure on the two contact points. So long as the pressure remains above a predefined threshold, the zoom operation may continue inward/outward without requiring additional pinch motions. As an option, the speed of the zooming may be modified by changing the contact pressure level. As another option, any differences in contact pressure level between the two contact points may be dealt with by using the average pressure.

[00445] In another embodiment, the swipe to scroll touch gesture may be enhanced as a pressure-based gesture; after performing the swipe, the user exerts pressure on the contact point without further motion. So long as the pressure remains above a predefined threshold, the scroll operation may continue without requiring additional swiping motions. As an option, the scroll speed may vary as a function of the contact pressure level.

[00446] Figure 20 shows an exemplary multitouch pressure gesture 2000 for indicating a direction, in accordance with one embodiment. As an option, the gesture 2000 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent

Figure(s). Of course, however, the gesture 2000 may be carried out in any desired environment. It should also be noted that the aforementioned definitions may apply during the present description.

[00447] As previously discussed, touch gestures may sometimes be modified to be pressure-dependent. In various embodiments, multitouch gestures may also be modified to depend upon pressure. As an option, the modified multitouch gestures may depend upon contact pressure differences between different contact points. In the context of the present description, a multitouch pressure gesture refers to a multitouch gesture whose definition relies in part on differences in contact pressure between different contacts. The definition of multitouch pressure gestures may rely on a variation in pressure differences over time, but it is not required of all multitouch pressure gestures.

[00448] See, for example, multitouch pressure gesture 2000 shown in Figure 20. This static gesture is based upon two points of contact, 2002 and 2004. In various embodiments, this gesture may be used to indicate a direction. As depicted in Figure 20, this multitouch pressure gesture is indicating a left-to-right direction, in accordance with one embodiment. In other embodiments, this gesture may be associated with any other operation, function, or action.

[00449] In various embodiments, multitouch pressure gesture 2000 may be performed by first exerting a contact pressure upon contact point 2002 which exceeds a contact pressure being exerted upon contact point 2004. As an option, various embodiments may require that both of these initial contact pressures exceed a predefined threshold contact pressure level. The gesture is completed by altering the contact pressures on the two contact points such that the pressure exerted on 2004 now exceeds that being exerted on 2002. As an option, a user may be required to maintain this pressure inequality for a predefined amount of time. When this gesture is performed using two digits on the same hand, the user's hand may appear to be rocking from left to right. A right to left direction may be indicated by changing the order of the pressures. This type of multitouch pressure gesture is hereinafter referred to as a rocker pressure gesture.

[00450] In various embodiments, a rocker pressure gesture may be preferable over simply indicating a side of the device through touch or pressure because it is less likely to be accidentally performed.

[00451] In various embodiments, a rocker pressure gesture may be used to modify a selection. For example, in one embodiment, a text selection may be expanded in a particular direction by performing a rocker pressure gesture in the desired direction, and maintaining the contact pressure difference between the two contact points until the text selection is the desired size. As an option, the speed at which the selection expands may be increased/decreased by increasing/decreasing the

contact pressure differential. In another embodiment, this gesture may be used to modify the shape of a selection. For example, it may be used to modify the aspect ratio of the selection boundary geometry associated with the selection.

[00452] In various embodiments, a rocker pressure gesture may be used in conjunction with a user interface adapted for the visually impaired. For example, in one embodiment, the rocker pressure gesture may be used to move a selection from one UI element (e.g., button, slider, drop down menu, etc.) to the next. When a UI element is selected, the assistive interface may speak the object name and/or magnify it such that the visually impaired user understands. In this way, a visually impaired user may operate a user interface displayed on a screen which often provides zero tactile feedback.

[00453] In various embodiments, a rocker pressure gesture may be used to facilitate interaction with the operating system. For example, in one embodiment, this gesture may be used to traverse a list of applications running in a multi-tasking environment. In another embodiment, this gesture may be used to switch between windows in a windowed user environment. In yet another embodiment, a rocker pressure gesture may be used to increase/decrease system settings such as volume and display brightness.

[00454] In various embodiments, a rocker pressure gesture may be advantageous in an application environment. For example, in one embodiment, a rocker pressure gesture may be used to turn the pages of an electronic book, or other multipage document displayed as a book. Using a rocker pressure gesture would allow a user to hold the device with both hands while reading, thumbs in contact with the screen, without danger of accidentally triggering a page turn, nor requiring movement of hands or fingers to turn the page.

[00455] Figure 21 shows an exemplary multitouch pressure gesture 2100 for indicating a rotation, in accordance with one embodiment. As an option, the gesture 2100 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the gesture 2100 may be carried out in any desired environment. It should also be noted that the aforementioned definitions may apply during the present description.

[00456] In various embodiments, multitouch gestures may enhance the user experience with the addition of pressure sensitivity. For example, in one embodiment, the measured difference in contact pressure levels among different contact points associated with a gesture may determine one or more parameters associated with the gesture. As an option, the one or more parameters may vary as a function of the pressure differential. Possible parameters may include, but are not limited to,

speed of transformation, direction of transformation, stringency of a color matching selection, and/or any other parameter which may be associated with any type of action, command, or operation.

[00457] In another embodiment, the presence of a pressure differential among contact points associated with a gesture may change the identity of the gesture itself. For example, see Figure 21.

[00458] As shown, multitouch pressure gesture 2100 is a static gesture based upon two points of contact, 2102 and 2104. In various embodiments, this gesture may be used to indicate a rotation. As depicted in Figure 21, this multitouch pressure gesture is indicating a clockwise rotation, in accordance with one embodiment. In other embodiments, this gesture may be associated with any operation, function, or action.

[00459] In various embodiments, multitouch pressure gesture 2100 may be performed by exerting contact pressure upon contact points 2102 and 2104 such that there is a pressure differential. For example, as seen in Figure 21, the contact pressure associated with contact point 2104 is greater than that associated with contact point 2102. As an option, various embodiments may require that both of these contact pressures exceed a predefined threshold contact pressure level. The gesture is completed by ending one or both contacts, or by performing a different gesture. As an option, a user may be required to maintain this pressure inequality for a predefined amount of time. This type of multitouch pressure gesture is hereinafter referred to as a tipping pressure gesture.

[00460] In various embodiments, a tipping pressure gesture may be used to rotate an object or element on a display. For example, in one embodiment, an image or selected portion of an image may be rotated by performing a tipping pressure gesture. As an option, the speed of rotation may depend upon the pressure differential between the two contact points. In another embodiment, the speed of rotation may vary as a function of the distance between the two contact points.

[00461] In one embodiment, the rotation may be performed in small angular increments, continuing until the tipping pressure gesture has ended. In another embodiment, the rotation is performed in 90º increments (e.g., changing the orientation of photographs, etc.), independent of gesture length or pressure differential. In some embodiments, the rotation may be performed using one of the contact points as the axis of rotation.

[00462] In some embodiments, a tipping pressure gesture may only cause a rotation in one direction (e.g., clockwise, etc.). In other embodiments, the direction of rotation caused by a tipping pressure gesture may depend on the positions of the two contact points with respect to each other. For example, in one embodiment, if the high pressure contact point is to the right of the low pressure contact point, the rotation may be in a clockwise direction, and in a counterclockwise direction otherwise. See, for example, multitouch pressure gesture 2100. In one embodiment, the axis used to

make the left/right determination may be the horizontal axis as defined by the current device orientation. In another embodiment, the horizontal axis used to make the left/right determination is defined by device geometry, and is orientation independent. In still other embodiments, the axis used to determine left/right may be independent of device geometry or orientation (e.g., display diagonal, vertical, etc.).

[00463] In various embodiments, a tipping pressure gesture may be used to interact with user interface elements. For example, in one embodiment, a tipping pressure gesture may be used to increase/decrease the value of a selected slider or scale. In another embodiment, a tipping pressure gesture may be used to cycle through options on a circular pop-up menu. In still another embodiment, a tipping pressure gesture may be used to quickly scroll through a list of items. Possible items may include, but are not limited to, email messages, songs or videos, files, photos, and/or any other object or data.

[00464] In some embodiments, there may exist two or more gestures which are the same or similar in execution. For example, see multitouch pressure gestures 2000 and 2100. While performing a tipping pressure gesture, if a user allows the contact pressure differential to switch sign (i.e. low pressure contact point becomes the high pressure contact point, and visa versa), a rocker pressure gesture may be recognized by the device. In various embodiments, constraints may be placed upon gestures to assist the operating system in differentiating between similar gestures.

[00465] In various embodiments, similar or identical gestures may be distinguished from each other through the context of their use. For example, in one embodiment, the recognition of a tipping pressure gesture may be limited to instances where there is a rotatable object selected; the rocker pressure gesture would be available in all other instances. By ensuring similar gestures are not recognizable in the same context, user confusion and erroneous gestures may be reduced. These contexts may include, but are not limited to, selection status, device state, active application, system flags, selection subject matter, and/or any other property or attribute by which contexts may be defined.

[00466] In various embodiments, similar or identical gestures may be distinguished from each other by the positions of points of interaction, relative to a common axis system. In the context of the present description, a point of interaction refers to any point on an interaction surface where user interaction may be localized. Points of interaction include, but are not limited to, contact points, localized proximity and/or any other localized user interaction.

[00467] In the context of the present description, a common axis system refers to an axis system upon which all gesture data may be evaluated. For example, in one embodiment, the common axis

system may be tied to the device geometry (i.e. the "horizontal" axis is always parallel to the long edge of the main display, etc.). In another embodiment, the common axis system may be tied to device orientation, such that the axis system changes depending on accelerometer data (though it is still common to all gestures).

[00468] Using a common axis system, an examination of the relative positions of points of interaction associated with a gesture may facilitate differentiation. For example, in one embodiment, rocker pressure gestures may only be recognized if a line between the two contact points is within a predefined deviation from the common horizontal axis (and the tipping pressure gesture available in all other cases). In another embodiment, the similar gestures may all be available at all times, but the location of points of interaction with respect to the common axis system may be used to give priority to certain gestures over others in certain situations.

[00469] In various embodiments, similar or identical gestures may be distinguished from each other through the timing associated with their execution. For example, in one embodiment, the performance of a rocker pressure gesture may have to be done within a certain amount of time, otherwise it may be interpreted as multiple tipping pressure gestures. In another embodiment, a tipping pressure gesture may have to be held for a certain amount of time before being recognized, such that the beginning of a rocker pressure gesture may not be identified as a tipping pressure gesture.

[00470] In various embodiments, one or more pressure-based gestures may be combined with other multi-touch and/or pressure-based gestures, such that a user may give multiple gesture-based instructions without breaking contact with one or more interaction surfaces. For example, suppose a user finger is at 3 o'clock and a user thumb at 9 o'clock and finger and thumb are one inch apart, both on a front touchscreen. The user may slide finger and thumb further apart. In one embodiment, this may result in an increase in selection area, for example. The user may then increase finger pressure. This may result in the increased selection area being rotated.

[00471] In other embodiments, other combinations and permutations of various inputs and gestures on various surfaces and using various sensors may be used to simplify the user interface and make pressure-based gestures more intuitive. As an option, such gestures may be pre-programmed, or programmed by the user, or a combination of both.

[00472] Pattern-based gestures may be simple to perform and easy for a user to remember. For this reason, they are well suited to a number of applications. One of the most basic pattern-based gestures is the finger press. In various embodiments, a pattern-based gesture made up of one or more fluctuations of contact pressure between a low level and a higher level at a single contact point

may be associated with often used operations. For example, in one embodiment, a double press (i.e. increase then decrease contact pressure twice) may activate an interface to switch between active applications in a multitasking environment. In another embodiment, a triple press may activate a pop-up menu populated with iconic representations of the user's preferred actions, contacts, applications, and scripts. In one embodiment, these gestures may be surface agnostic. For example, the application switching interface may be activated no matter which interaction surface received the double press. In another embodiment, these gestures may be surface specific, allowing other system processes and applications to assign operations to these simple gestures without colliding with a system-wide gesture. For example, a triple press on a side surface may activate a pop-up favorites menu, while a triple press on a back surface may activate an application-specific contextual menu.

[00473] Another simple pattern-based gesture is the pinch gesture. In various embodiments, this gesture is performed by making simultaneous contact with two different interaction surfaces such a line connecting the two contact points is roughly parallel to the force vectors being applied at said points. An example is pinching a device between a finger and a thumb, the finger and thumb contacting different interaction surfaces. In another embodiment, this gesture may be pressure based. Variations on this gesture may incorporate multiple pinches (i.e. fluctuations of contact pressure between a low level and a higher level, similar to the finger presses previously described).

[00474] These simple gestures may be associated with often used operations, including but not limited to, activating device interfaces (i.e. backtouch interface, proximity sensitivity, pressure sensitivity, etc.), displaying a common system interface (i.e. application launcher, system settings, etc.), displaying a menu of user defined "favorites" (i.e. applications, contacts, songs, movies, web bookmarks, recently used documents, etc.), mute volume, and/or any other often used interface or operation. Of course, in other embodiments, these gestures may be associated with any operation, function, or interface.

[00475] Building off the previous gesture, a pinch slide gesture is an example of a pattern-based generalized gesture which combines a pinch with a sliding motion. In some embodiments, it may be described as a 1-6 gesture, though it is not limited to just front/back interaction. In various embodiments, this gesture may be performed by pinching the device, then sliding the pinch across the interaction surfaces while maintaining contact. In one embodiment, a contact pressure above a predefined threshold may also be required. This gesture mimics the tactile experience of pushing or pulling an object such as a lever or cord.

[00476] In one embodiment, a pinch slide gesture may be used to quickly move through an alphabetical list, similar to using tabs to quickly find a contact quickly in a paper address book. In

another embodiment, this operation may be adopted to moving quickly through other sorted lists of items, including but not limited to song lists, application lists, eBooks, and/or any other collection of organized data. As an option, the display may invite the use of this gesture by displaying virtual tabs (i.e. the alphabet, numbers, etc.) along a side of the display where the gesture would be performed.

[00477] In another embodiment, a pinch slide gesture may be used to quickly select text. For example, in one embodiment, a selection may be initiated by pinching at the desired location. The selection may be expanded by sliding the pinch to the desired selection end. In another embodiment, this method of selection may be adapted to selecting a portion of an image or graphic (i.e. pinch at one corner of desired selection bounding box and sliding to opposite corner, etc.).

[00478] In another embodiment, a pinch slide may be used to move quickly through a large document (i.e. word processing document, web page, image, etc.). For example, in one embodiment, the user may slide a pinch up and down the device, changing the displayed portion of the document relative to the position of the pinch (i.e. the top of the device represents the start of the document, the bottom of the device represents the end, and the relative location of the pinch becomes the portion of the document displayed. In another embodiment, the pinch slide may have to be initiated at a particular location to activate this document navigation functionality. For example, a web browser may have an icon near the top of the display that activates pinch slide navigation when the gesture is initiated on the icon. This functionality may be adapted to two dimensional navigation in a large image, displaying the portion of the image represented by the relative location of the pinch.

[00479] In yet another embodiment, a pinch slide gesture may be used to display menus of common operations or applications. For example, in one embodiment, a pinch slide gesture which begins near an edge of a display and then moves inward may cause a menu or window to slide in from that edge of the display. As an option, the menu or window may remain visible until a selection is made. In another embodiment, there may be different menus or windows associated with each edge of a display. In still another embodiment, a window may be closed (i.e. slid back out of view) by using a pinch slide to pull it out a bit farther, then releasing it, similar to rolling up a window shade.

[00480] In one embodiment, a user interface may be utilized to present a context based menu for the user. In one embodiment, a user may interact with a display element by exerting contact pressure on a front interaction surface over contact area. At the same time, the user may be in contact with a back interaction surface, over contact area. In various embodiments, contextual menu may be displayed near the backtouch contact, after the user performs a predefined static gesture

within contact area. The user may then select a menu item using small movements and contact pressure applied on the back interaction surface.

[00481] In one embodiment, the user interface may be utilized to provide easy, quick access to a plurality of favorite operations, applications, contacts, documents, and/or other types of objects. In various embodiments, favorites panel may be displayed in response to a gesture, the selection of a hardware or software button, voice command, accelerometer input (i.e. shaking the device, flicking the users wrist, etc.), and/or any other form of user input. In one embodiment, once favorites panel is displayed, a user may select an item using a slide pad located on the side of the device.

[00482] In one embodiment, a user may configure which items are displayed in the favorites panel. In another embodiment, the favorites panel may be automatically populated by the device, based upon factors which may include, but are not limited to, historical usage, date of last use, frequency of use, popularity information obtained from a remote system, and/or any other factors.

[00483] In the various embodiments described above, different combinations of user input have been associated with different actions. It should be understood that the described user inputs may be associated with any action, function, operation or interface, just as the described actions may be triggered by any combination of user inputs, according to different embodiments.

[00484] In the context of the present description, a cue refers to feedback, visual or otherwise, which is provided to the user. Examples of cues include, but are not limited to, the display logic within selection functions, visual representation of contact point movement, proximity feedback, contact pressure level feedback, and/or any other form of user feedback. For example, in one embodiment, the anchor object may be highlighted (e.g., change of color, text highlight, 3D representation, flashing or other dynamic selection area behavior, etc.)

[00485] In various embodiments, cues may include 3D or pseudo-3D effects. For example, in one embodiment, the anchor object may be made to appear to be floating above a background image, using 3D cues.

[00486] In various embodiments, a cue may modify a 2D representation into a pseudo-3D representation responsive to user inputs such as device orientation. For example, in one embodiment, the shadow of an object may be adjusted according to device orientation, to provide the illusion that an object is floating above a background. In another embodiment, the pseudo-3D representation may be responsive to user focus (including, in some embodiments, user gaze).

[00487] Figure 22 shows a 3D layered user interface 2200, in accordance with one embodiment. As an option, the user interface 2200 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the user

interface 2200 may be implemented in any desired environment. The aforementioned definitions may apply during the present description.

[00488] In the context of the present description, a 3D layered user interface refers to a user interface in which displayed objects may exist in one of a plurality of layers. For example, see Figure 22.

[00489] As shown, user interface 2200 is comprised of two layers, a front layer 2202 and a back layer 2204. These layers are depicted in a staggered arrangement, to illustrate the depth; it should be noted that in various embodiments, the layers would be aligned. Object 2206 exists in the front layer, while object 2208 exists in the back layer. In various embodiments, a user may interact with the layers separately.

[00490] In various embodiments, a 3D layered user interface may be implemented in a layered display device. In the context of the present description, a layered display device refers to a device with at least one display that is made up of a plurality of overlapping display layers, each layer able to display content independent of other layers, with all layers facing the same direction. For example, in one embodiment of a layered display device, the device may have a display made up of a transparent display located on top of a second display, both facing forward. In another embodiment, the display layers may be separated by a non-opaque material, to enhance the layered appearance.

[00491] In another embodiment of a layered display device, the display layers may include one or more e-ink layers. In yet another embodiment, the display layers may include one or more LCD layers. In still another embodiment, the display layers may include both e-ink and LCD layers. Other embodiments may include any combination of layers embodying any display technology.

[00492] In various embodiments, a 3D layered user interface may be implemented in a device having single layer displays through the use of virtual display layers. In the context of the present description, a virtual display layer refers to a collection of display elements which have all been assigned the same apparent depth within the 3D layered user interface. In various embodiments, a 3D layered user interface may make use of multiple virtual display layers. For example, in one embodiment, a 3D layered user interface may have a virtual foreground display layer and a virtual background display layer.

[00493] Additionally, in the context of the present description, a display element refers to the region of the display allotted to an identifiable visual object. Identifiable visual objects may include, but are not limited to, digital objects (i.e. images, text boxes, UI control widgets, selections, etc.), subject matter objects (i.e. people within a photograph, letters and/or words within text, etc.), and/or

any other type of identifiable visual object. When located in a virtual display layer, display elements may be referred to as 3D display elements.

[00494] In various embodiments, virtual display layers may be given the appearance of depth through the use of 3D depth cues. In the context of the present description, a 3D depth cue refers to an effect, manipulation, transformation, animation, or operation which gives a visual indication of simulated depth. For example, in one embodiment, a 3D depth cue may be a blur operation, such that layers located at successively greater depths may appear blurrier than those closer to the user. In various embodiments, one or more 3D depth cues may be used to give the appearance of depth to one or more virtual display layers. In one embodiment, different 3D depth cues may be used for different virtual display layers. In another embodiment, 3D depth cues may be used in conjunction with a 3D layered user interface implemented in a layered display device, to enhance the layered appearance.

[00495] In one embodiment, a 3D depth cue may include the addition of a shadow element to display elements located within a virtual display layer, making them to appear to float above the next virtual display layer. As an option, the location of the light source(s) casting the shadows may be based in part on data obtained from one or more cameras located on the host device.

[00496] In one embodiment, a 3D depth cue may include the addition of a depth-based fog, giving the appearance that the layers exist in an environment with a thin, uniform fog. In this way, distant objects may be "foggier" than objects close to the user.

[00497] In one embodiment, a 3D depth cue may include a depth-based apparent rate of movement. For example, in a situation where a user is swiping through multiple screens of layered content, the layers closer to the user may appear to move faster than those more distant, giving the appearance of depth.

[00498] In one embodiment, a 3D depth cue may include a time-dependent visual transformation. For example, in one embodiment, a background layer may be transformed such that it appears to be below rippling water, while the foreground layer appears to be floating on the surface. In another embodiment, the visual transformation may be static.

[00499] In one embodiment, a 3D depth cue may include animated visual elements which appear to exist in between layers. Elements may include, but are not limited to, birds or insects flying, shooting stars, tiny people walking, grass blowing in the wind, and/or any other visual element.

[00500] In one embodiment, a 3D depth cue may include moving and/or transforming display elements within a virtual display layer based upon detected user gaze and/or head position. For example, in one embodiment, display elements may be compressed and virtual display layers spread

apart if the device determines the user is viewing the display from an angle, the degree of transformation varying with estimated viewing angle. In another embodiment, display elements located on different virtual display layers may be slide around within their respective layers as the user changes their angle of viewing, allowing them to "look around a corner" to see display elements that would be obscured when viewed head on.

[00501] In one embodiment, a 3D depth cue may include moving and/or transforming display elements within a virtual display layer based upon changes in device orientation detected through one or more hardware interfaces (i.e. accelerometer, tilt sensor, compass, etc.).

[00502] In one embodiment of a 3D layered user interface, the 3D cues may be implemented such that the user interface has an apparent depth equal to the thickness of the device. In another embodiment, the 3D cues may be implemented such that the user interface has an apparent depth equal to the distance between a front display and a backtouch interface.

[00503] In various embodiments, a user may interact with the layers separately. For example, in one embodiment, a front interaction surface may be used to interact with display elements in a foreground display layer, and a back interaction surface may be used to interact with display elements in a background display layer. See, for example, Figure 22.

[00504] User interface 2200 is being implemented in a device having front and back touch-sensitive interaction surfaces. As shown, a user may manipulate display element 2206, located in front layer 2202, through a gesture 2210 performed on the front interaction surface. At the same time, a user may manipulated display element 2208, located in back layer 2204, through a gesture 2212 performed on the back interaction surface. In one embodiment, the manipulation of one of these display elements may be done completely independent of the other display element.

[00505] In one embodiment of a 3D layered user interface, a front input interface may be used to move display elements on a virtual foreground display layer. In another embodiment of a 3D layered user interface, a rear input interface may be used to move display elements on a virtual background display layer.

[00506] In various embodiments, there may be display layers with which a user may not interact. For example, in one embodiment, there may be an emphasis display layer situated in front of all other display layers. In the context of the present description, an emphasis display layer refers to a display layer (virtual or physical) which is used to provide visual emphasis to one or more display elements without providing independent means of user interaction. In other words, when a user interacts with a display element located in an emphasis display layer, they might also interact with one or more other layers. For example, in one embodiment, an emphasis display layer may be used

to indicate results of a text search within a document (i.e. target words appear to float above the document, etc.). Although located on a different display layer, any text selection made by the user may incorporate text from both the emphasis display layer and the display layer housing the document. In another embodiment, an emphasis display layer may cause hyperlinks within a webpage to appear to float above the rest of the page, though still able to be selected along with non-hyperlink text.

[00507] In another embodiment, an emphasis display layer may be used to display user avatars floating above the text of a chat session; the user may not interact with the avatars. Other examples of the use of an emphasis display layer may include, but are not limited to, a status bar floating at the top of a display, pop-up volume indicators which appear when the volume is changed, icons within the status bar, and/or any other circumstance where visual emphasis is desired.

[00508] Another example of a display layer with which a user may not interact is an ambiance display layer. In the context of the present description, an ambiance display layer refers to a display layer (virtual or physical) which is used to display decorative display elements with which a user may not directly interact with. For example, in one embodiment, one or more ambiance display layers may be used to create the appearance of three-dimensional structure within the 3D layered user interface (i.e. walls, shelves, backdrop, etc.). In another embodiment, an ambiance display layer may be used to display a wallpaper or some other backdrop which is present behind the elements and controls of the user interface. In yet another embodiment, a user may customize one or more ambiance display layers through a separate user interface, but not through direct interaction.

[00509] In one embodiment of a 3D layered user interface, a rear touch input may be used to control display elements located on a virtual display layer. In another embodiment, a rear touch input may be used together with a front touch input to control one or more display elements on one or more virtual display layers.

[00510] In other embodiments of a 3D layered user interface, a user may interact with one of a plurality of layers through a back interaction surface, the layer being selected using a pressure-sensitive front interface. For example, in one embodiment, a user may select one of a plurality of display layers by applying a predefined level of contact pressure on the front interaction surface, and interact with the selected layer using a back interaction surface. As an option, 3D depth cues may be used to indicate "moving" through the display layers as the contact pressure is changed (i.e. magnifying and fading display layers as they are passed by, sharpening previously blurry display layers as they grow closer, etc.).

[00511] In one embodiment, one or more display layers associated with a 3D layered user interface may only be interacted with through coordinated user input on multiple interaction surfaces. For example, in one embodiment, a touch input on the front of the device together with a touch input on the back of the device may control the overlap between two or more virtual display layers.

[00512] In one embodiment, display elements may be assigned to virtual display layers, just as they may be assigned to physical display layers in a layered display device. In another embodiment, the process of assigning display elements to virtual display layers may be the same as the process of assigning display elements to physical display layers in a layered display device. In yet another embodiment, a 3D layered user interface may be designed such that it may take advantage of physical display layers, if present, or use virtual display layers if only single layer displays are available. It should be understood that all functionality and embodiments described with respect to virtual display layers may also be implemented in a layered display device.

[00513] In various embodiments, a 3D layered user interface for augmented reality may use 3D depth cues to visually differentiate augmenting display elements associated with physical locations near the user from those associate with distant physical locations. In one embodiment, 3D depth cues may be used to give augmenting display elements an apparent distance from the user roughly equal to the physical location with which they are associated. In another embodiment, 3D depth cues may be used to augment the video signal such that it has a three dimensional appearance.

[00514] Figure 23 shows exemplary pattern-based gestures 2300, in accordance with one embodiment. As an option, the gesture 2300 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the gesture 2300 may be carried out in any desired environment. It should also be noted that the aforementioned definitions may apply during the present description.

[00515] In the context of the present description, a pattern-based gesture refers to a gesture defined, at least in part, by a path through a phase space of one or more dimensions. See, for example, the pattern-based gestures 2300.

[00516] In some embodiments, pattern-based gestures may be based upon paths through a phase space whose dimensions do not include any measure of location on an interaction surface. In other words, in these embodiments, pattern-based gestures may not depend upon the location or movement of user interaction across an interaction surface. In one embodiment, these gestures may act as gesture components, which may be combined with other gesture components to form generalized

gestures which may or may not be based upon location on or movement across an interaction surface.

[00517] See, for example, the pattern-based gesture 2302, described by a phase space path which represents the time evolution of the touch state associated with a contact point located on a front interaction surface. The location of the contact point upon the interaction surface is of no importance.

[00518] Pattern-based gesture 2302 is based upon three touch state transitions. At time t1, the contact point changes from touch state s0 to s1. Similar changes of state occur at t2 and t3. In various embodiments, these touch state transitions may be represented by ordered 2-tuples. For example, the first transition may be represented as (s1, t1). The pattern-based gesture itself may be represented as an ordered sequence of state transitions. For example, pattern-based gesture 2302 may be represented as {(s1,t1),(s2,t2),(s0,t3)}.

[00519] In other embodiments, pattern-based gestures may be based upon paths through a phase space that may include one or more measures of physical location upon an interaction surface. In other words, there may exist paths through the phase space that describe motion across an interaction surface.

[00520] In various embodiments, a pattern-based gesture may be based upon paths through a phase space which does not include time as a dimension. For example, in one embodiment, a pattern-based gesture may be defined by a series of transitions between touch states, where it does not matter how long the individual touch states are maintained.

[00521] In other embodiments, a pattern-based gesture may depend upon time to the extent that the entire path through phase space may be completed within a predefined amount of time (though still independent of how much time is spent at each state along the path). In still other embodiments, the gesture may be defined, in part, by the time spent on each leg of the path through phase space.

[00522] In one embodiment, a time-independent pattern-based gesture may be combined with a dynamic touch gesture (i.e. a one finger swipe, etc.) to form a generalized gesture.

[00523] In various embodiments, a touch state may be associated with a specific contact point upon a pressure-sensitive interaction surface. In other embodiments, the device may not be able to resolve the specific source of pressure exerted upon an interaction surface; in such cases, the pressure may be represented by surface touch states. In the context of the present description, a surface touch state is a partitioning of the range of measurable pressures exerted upon a surface (similar to touch states associated with contact points, but not contact point specific).

[00524] In various embodiments, there may exist a subset of generalized gestures referred to as pattern-based generalized gestures. In the context of the present description, a pattern-based generalized gesture refers to a pattern-based gesture which includes input from multiple sources. For example, see pattern-based gesture 2306, which is represented by a path through a two-dimensional phase space.

[00525] As shown, gesture 2306 is a pattern-based generalized gesture based upon the evolution of a touch state on a front interaction surface and a back interaction surface of a device, in accordance with one embodiment. The pattern-based gesture components are 2302 and 2304.

[00526] As depicted, gesture 2306 is represented by a state transition matrix of touch states, with transitions between touch states marked by directional arrows, in accordance with one embodiment. In the context of the present description, a state transition matrix refers to an iconic depiction of a path through a phase space.

[00527] As shown, 2306 represents the phase space made up of all nine possible combinations of the three possible front and back touch states. In one embodiment, these nine combinations may be referred to as touch state points. In another embodiment, the representation may also be shown as three-dimensional, with time as the third dimension.

[00528] It should be noted that the use of descriptors such as "front" and "back" in this example are for the sake of simplicity. In various embodiments, gesture 2306 may be performed using any two surfaces on a device, even if the device does not have distinct front and back surfaces. Additionally, in other embodiments, pattern-based generalized gestures such as 2306 may include any number of additional dimensions, each describing a form of user input and/or time.

[00529] In various embodiments, a pattern-based generalized gesture may be represented as an ordered sequence of n-tuples. For example, in one embodiment, the gesture 2306 may be represented as a sequence of 2-tuples, (front touch state, back touch state). Specifically, gesture 2306 may be represented as {(s1,s0), (s2,s2),(s0,s1)}. In another embodiment, gesture 2306 may be represented as a sequence of 3-tuples, of the form (front touch state, back touch state, time).

[00530] While exemplary gesture 2306 is based on a path through a touch state phase space, pattern-based gestures may also be based upon types and sources of user input which are not broken into discrete states (i.e. contact pressure level, etc.). Additionally, in some embodiments, pattern-based gestures may be defined in terms of the relative states of input, rather than exact. For example, in one embodiment, a pattern-based gesture may be defined in terms of relative pressure. In other words, rather than require that a fixed pressure be achieved, a user may simply cause a

particular change in pressure to occur. In one embodiment, such a pattern-based gesture may be defined in terms of gesture attributes, including derived input such as pressure velocity.

[00531] In various embodiments, the use of pattern-based gestures based upon relative states may be used to trigger some form of user assistance. These patterns are well suited to trigger some form of user assistance, as they may be performed and recognized in the middle of performing a different gesture. For example, in one embodiment, a pattern-based gesture defined as a rapid 20% decrease and increase of contact pressure of any contact, done three times, may present to the user an interface providing help specific to what the user was doing at the time. Possible contexts include, but are not limited to, providing a list of possible gestures when help is requested during performance of a gesture, application help or manual depending on what application is active, a detailed explanation of a user interface control which was being selected when help was requested, and/or any other scenario where a user is operating the device.

[00532] In some embodiments, pattern-based gestures may be recognized in the form of an ordered sequence of tuples using a decision tree. The use of a decision tree, or similar form of logic, has the advantage of being computationally inexpensive. This method may be more appropriate for pattern-based gestures which are represented by paths through an easily enumerated phase space. For example, this method of gesture recognition may be more appropriate for a gesture like 2306 than a similar gesture based upon contact pressure levels, rather than touch states.

[00533] In other embodiments, the pattern-based gestures may be recognized using pattern recognition or pattern matching. For example, in one embodiment, pattern-based gestures may be recognized using the methods, or similar methods, as those used to determine a gesture shape in a gesture component. In various embodiments, the pattern-matching algorithms and methods may search for a match within a predefined margin of error.

[00534] In one embodiment, pattern recognition or pattern matching to identify pattern-based gestures may be performed by the device. As an option, this functionality may be part of the operating system. In another embodiment, the pattern recognition or pattern matching may be performed using compute resources other than those of the device. Alternative compute resources include, but are not limited to, a similar device, computing resources on a local network, cloud computing resources, and/or any other computing resource. In yet another embodiment, the pattern recognition or pattern matching may be performed using device and/or alternative computing resources combined with help from the user.

[00535] In one embodiment, pattern recognition algorithms and methods may search for a match between input and predefined patterns, within a certain probability. In another embodiment, the

pattern recognition algorithms may be probabilistic and use statistical inference to find the best pattern match for a given set of input.

[00536] In one embodiment, probabilistic pattern recognition algorithms may output a probability that the input being described by a given pattern. In one embodiment, this probability may be reported to the user, either specifically (i.e. displayed as a number or percentage, etc.) or in summary (i.e. a label, a color coded border, an icon, etc.). In another embodiment, this probability may be used to alter or modify a selection. In yet another embodiment, this probability may be used to alter or modify one or more display properties.

[00537] In various embodiments, probabilistic pattern recognition algorithms may also determine the n best matches for the given input. In one embodiment, a user may specify the value of n. In another embodiment, these best matches may be reported to the user as a list of gesture names and/or iconic representations of the gestures. As an option, the associated probabilities may be reported as well.

[00538] In another embodiment, this list of probable gestures may be displayed to the user in response to a user input, such as a gesture associated with user assistance. In yet another embodiment, this list of probable gestures may be displayed to the user if the recognition algorithms were not able to recognize a gesture with a probability above a predefined threshold. The user may be able to select the intended gesture from the list; upon selection, the associated operation may be performed. As an option, one or more aspects of the list items may depend upon the associated probability of recognition. Possible aspects may include, but are not limited to, text size, button size, color, and/or any other aspect or property that may be associated with the list.

[00539] As a specific example, in one embodiment, the user may be typing on a soft keyboard and performs a gesture. The device then determines with probability 80% the gesture corresponds to pressing the letter W, with probability 15% the gesture corresponds to pressing Q, and with probability 5% that the user intended to press E. In this situation, the device may enlarge the W key by a large amount, enlarge the W key by a smaller amount, and enlarge the Q key by a still smaller amount.

[00540] In addition to gesture recognition, various embodiments may also perform user intent prediction. In the context of the present description, gesture prediction refers to a process of estimating user intent by assigning probabilities to candidate gestures based upon historical and real time use data. For example, in one embodiment,

[00541] In various embodiments, the process of gesture recognition may include the computation of the probability of user intent. In the context of the present description, computation of the

probability of user intent refers to the process of assigning probabilities to potential user actions, inputs, and intentions, based upon historical and current use data. Examples of historical data include, but are not limited to, often misspelled words, actions consistently followed by a correction, utilization of particular gestures in different use scenarios, and/or any other data which may establish a use pattern.

[00542] The estimation of user intent may enhance the user experience by making the device more responsive to user input. In various embodiments, computation of the probability of user intent may facilitate the entry of text though an interaction surface. For example, in one embodiment, frequently made spelling mistakes may be automatically corrected. In another embodiment, the user may be prompted with the word determined to be most likely to be what the user is intending to type.

[00543] As an option, the user may be able to accept or decline proposed word completions or proposed spelling corrections through a pressure-based gesture. For example, in one embodiment, a user may accept or decline a proposed completion or correction with a series of taps on a backtouch interface (i.e. one tap for accept, two taps for decline), in addition to keyboard based methods. In another embodiment, a user may be presented with a plurality of possible words to be used for auto completion. As an option, these words may be ordered depending upon a probability based upon historical usage. The words may be presented to the user in a line, with one word highlighted as a selection. In another embodiment, a user may cycle through proposed words with a backtouch gesture, such as a single finger swipe in the direction the words should be cycled in. Of course, these actions may be associated with any other type of gesture, including pattern-based gestures.

[00544] In various embodiments, gesture recognition may be enhanced by computation of the probability of user intent. For example, in one embodiment, probabilities may be assigned to potential gestures based upon historical gesture usage with similar context (i.e. application, selection mode, etc.). In another embodiment, estimated user intent may give weight to certain gestures during the recognition process. In this way, the gesture recognition process may be performed more efficiently, by considering the most likely gestures early in the process.

[00545] In various embodiments, the computation of the probability of user intent may affect the user interface. In various embodiments, the user interface may adapt in response to the user's intended form of interaction. For example, in one embodiment, upon determining that the probability that the user is performing a virtual control knob gesture has exceeded a predefined probability, and certain context requirements have been satisfied, a virtual control knob may appear for the user to interact with. In this way, the user is given visual feedback that their input is being received in the manner they intended. Examples of context requirements may include, but are not

limited to, the user performing the gesture in the vicinity of a user interface object which may be controlled via a virtual control knob (i.e. slider, date, time, etc.), the virtual control knob gesture has not been reassigned to a different function by the active application, and/or any other requirement to ensure that a virtual control knob only appears when the user so intends.

[00546] Pattern-based gestures may be simple to perform and easy for a user to remember. For this reason, they are well suited to a number of applications. One of the most basic pattern-based gestures is the finger press. In various embodiments, a pattern-based gesture made up of one or more fluctuations of contact pressure between a low level and a higher level at a single contact point may be associated with often used operations. For example, in one embodiment, a double press (i.e. increase then decrease contact pressure twice) may activate an interface to switch between active applications in a multitasking environment. In another embodiment, a triple press may activate a pop-up menu populated with iconic representations of the user's preferred actions, contacts, applications, and scripts. In one embodiment, these gestures may be surface agnostic. For example, the application switching interface may be activated no matter which interaction surface received the double press. In another embodiment, these gestures may be surface specific, allowing other system processes and applications to assign operations to these simple gestures without colliding with a system-wide gesture. For example, a triple press on a side surface may activate a pop-up favorites menu, while a triple press on a back surface may activate an application-specific contextual menu.

[00547] Another simple pattern-based gesture is the pinch gesture. In various embodiments, this gesture is performed by making simultaneous contact with two different interaction surfaces such a line connecting the two contact points is roughly parallel to the force vectors being applied at said points. An example is pinching a device between a finger and a thumb, the finger and thumb contacting different interaction surfaces. In another embodiment, this gesture may be pressure based. Variations on this gesture may incorporate multiple pinches (i.e. fluctuations of contact pressure between a low level and a higher level, similar to the finger presses previously described).

[00548] These simple gestures may be associated with often used operations, including but not limited to, activating device interfaces (i.e. backtouch interface, proximity sensitivity, pressure sensitivity, etc.), displaying a common system interface (i.e. application launcher, system settings, etc.), displaying a menu of user defined "favorites" (i.e. applications, contacts, songs, movies, web bookmarks, recently used documents, etc.), mute volume, and/or any other often used interface or operation. Of course, in other embodiments, these gestures may be associated with any operation, function, or interface.

[00549] Building off the previous gesture, a pinch slide gesture is an example of a pattern-based generalized gesture which combines a pinch with a sliding motion. In some embodiments, it may be described as a 1-6 gesture, though it is not limited to just front/back interaction. In various embodiments, this gesture may be performed by pinching the device, then sliding the pinch across the interaction surfaces while maintaining contact. In one embodiment, a contact pressure above a predefined threshold may also be required. This gesture mimics the tactile experience of pushing or pulling an object such as a lever or cord.

[00550] In one embodiment, a pinch slide gesture may be used to quickly move through an alphabetical list, similar to using tabs to quickly find a contact quickly in a paper address book. In another embodiment, this operation may be adopted to moving quickly through other sorted lists of items, including but not limited to song lists, application lists, eBooks, and/or any other collection of organized data. As an option, the display may invite the use of this gesture by displaying virtual tabs (i.e. the alphabet, numbers, etc.) along a side of the display where the gesture would be performed.

[00551] In another embodiment, a pinch slide gesture may be used to quickly select text. For example, in one embodiment, a selection may be initiated by pinching at the desired location. The selection may be expanded by sliding the pinch to the desired selection end. In another embodiment, this method of selection may be adapted to selecting a portion of an image or graphic (i.e. pinch at one corner of desired selection bounding box and sliding to opposite corner, etc.).

[00552] In another embodiment, a pinch slide may be used to move quickly through a large document (i.e. word processing document, web page, image, etc.). For example, in one embodiment, the user may slide a pinch up and down the device, changing the displayed portion of the document relative to the position of the pinch (i.e. the top of the device represents the start of the document, the bottom of the device represents the end, and the relative location of the pinch becomes the portion of the document displayed. In another embodiment, the pinch slide may have to be initiated at a particular location to activate this document navigation functionality. For example, a web browser may have an icon near the top of the display that activates pinch slide navigation when the gesture is initiated on the icon. This functionality may be adapted to two dimensional navigation in a large image, displaying the portion of the image represented by the relative location of the pinch.

[00553] In yet another embodiment, a pinch slide gesture may be used to display menus of common operations or applications. For example, in one embodiment, a pinch slide gesture which begins near an edge of a display and then moves inward may cause a menu or window to slide in from that edge of the display. As an option, the menu or window may remain visible until a

selection is made. In another embodiment, there may be different menus or windows associated with each edge of a display. In still another embodiment, a window may be closed (i.e. slid back out of view) by using a pinch slide to pull it out a bit farther, then releasing it, similar to rolling up a window shade.

[00554] The pinch slide gesture is well adapted for providing input where one of a plurality of values may be chosen; it is also easily combined with a pinch gesture. For example, in one embodiment, a user may activate a system and/or ringer volume slider with a double press pinch gesture, and then select a volume by sliding the pinch up and down the device. In another embodiment, a similar operation may be performed for backlight brightness. In yet another embodiment, a user may cycle between system volume, ringer volume, and system brightness sliders with a pinch gesture, and be able to interact with said sliders using a pinch slide. In still another embodiment, the selection of system/ringer volume or brightness may be determined by where on the device the pinch slide is being performed (i.e. left, middle, right, etc.).

[00555] A subset of pinch gestures are the side pinch gestures. In various embodiments, the side pinch gesture is performed by applying contact pressure beyond a threshold value to opposite sides of the device, the sides being those other than the front and back. As an option, the user may choose the predefined threshold value. In one embodiment, the pressure may be applied at contact points located on the sides such that a line connecting the contact points is roughly normal to the sides. In another embodiment, the side pinch gesture may also incorporate "presses" similar to the pinch and finger press gestures.

[00556] The side pinch gesture is a simple gesture well adapted for use with often used operations. For example, in one embodiment, a side pinch gesture may toggle the device mute, or activate an application launcher.

[00557] A variation on the side pinch gesture is the squeeze gesture. In various embodiments, a squeeze gesture is performed by applying contact pressure beyond a predefined threshold to one or more contact points located on opposite sides of the device. For example, in one embodiment, the gesture may be performed by holding the device in one hand, in a natural grip, and applying pressure to two opposite sides by squeezing. As an option, the squeeze gesture may incorporate "presses", similar to the finger press and pinch gestures.

[00558] The squeeze gesture is one of the easiest gestures to perform, and may be reserved for operations which are to be available system wide, independent of what application is running. In various embodiments, the squeeze gesture may be associated with commonly used operations. For example, in one embodiment, a double press squeeze gesture may be used to answer a phone call. In

another embodiment, a double press squeeze gesture may be used to indicate an affirmative response to any on screen query (i.e. accept proposed auto correction, accept proposed auto completion, activate "ok" button in dialog boxes, etc.). As an option, a complementary negative response gesture may be defined as well, a gesture such as the combination of a single or double tap on the top side while squeezing the left and right sides.

[00559] In another embodiment, applying a squeeze gesture for a predefined amount of time may be associated with a delete operation, to be performed upon any selected or active object. As an option, the delete operation may be accompanied by a "crumpling paper" animation routine, as well as a prompt for user confirmation. In one embodiment, a user may not use a squeeze gesture to confirm an operation triggered by a squeeze operation (i.e. to prevent accidental implementation, etc.).

[00560] Another class of pattern-based gestures are the "no contact" pressure-based gestures. In some embodiments, the touch sensitive interaction surfaces require an implement of interaction which has a certain degree of conductivity in order to register contact. This class of gestures may be implemented in such devices, which are also pressure-sensitive. In various embodiments, the "no contact" pressure-based gestures may be used to interact with the device in situations where direct contact is not possible (i.e. device is in case, device is in pocket, device is in purse, etc.).

[00561] In various embodiments, the "no contact" pressure-based gestures may include variations of the finger press, pinch, and squeeze gestures, in addition to others. In some embodiments, "no contact" pressure-based gestures may require that the pressures being exerted do not create a contact point (i.e. pressure is exerted, but touch contact is not registered). These gestures are well adapted to situations where contact is not feasible. For example, in one embodiment, a user may silence a ringing phone by performing a rapid, one-finger double press on an interaction surface while the device is in the user's pocket, purse, or any other flexible or semi-flexible vessel. In another embodiment, a user may perform a predefined pattern-based gesture to cause the most recently received communication (i.e. voice mail, email, SMS message, etc.) to be reported to the user through a Bluetooth audio device.

[00562] In various embodiments, gestures may be used to trigger a variety of activities.

[00563] Figure 24 shows a user interface 2400 for defining custom gestures, in accordance with one embodiment. As an option, the user interface 2400 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the user interface 2400 may be implemented in any desired environment. The aforementioned definitions may apply during the present description.

[00564] In various embodiments, gestures may be programmed by the user. In other embodiments, gestures may be learned by the device.

[00565] As shown, the user interface 2400 may be utilized to define a custom gesture. For example, in one embodiment, the user interface may include a gesture name and/or an iconic representation of the gesture. In another embodiment, the iconic representation may be automatically chosen by the system, depending upon defined gesture parameters. In yet another embodiment, the user interface may contain a plurality of buttons 2402 which allow a user to save, load, copy, and/or delete custom gestures. The user interface may also contain a list 2404 of all defined custom gestures. As an option, the custom gestures may be grouped by context within the list.

[00566] In various embodiments, the user interface 2400 may contain a button 2406 to allow the user to define a custom gesture. In one embodiment, selecting button 2406 may initiate a gesture recording session. In the context of the present description, a gesture recording session refers to a period of time wherein the device monitors and records all observable user and system input. In another embodiment, selecting button 2406 may present to the user an interface with instructions before initiating a gesture recording session. Instructions may include, but are not limited to, how to record the gesture, a list of all forms of input upon which a gesture may depend, how to end the recording, and/or any other information which may assist the user. In yet another embodiment, the user may be presented with a short countdown before the gesture recording session is initiated, to give the user time to prepare for the recording. As an option, the device may give some form of visual or auditory feedback to the user to indicate that the recording session has begun.

[00567] In various embodiments, a gesture recording session may be terminated by user input. For example, in one embodiment, a gesture recording session may be terminated by the user through a vocal command, recognized by the system. In another embodiment, a gesture recording session may be terminated by the user through an sound which exceeds a predefined volume. In yet another embodiment, a gesture recording session may be terminated by the user by performing a gesture. As an option, the termination gesture may be a reserved gesture.

[00568] In the context of the present description, a reserved gesture refers to a gesture which may not be reassigned by a user, application, or process. For example, in one embodiment, there may be a set of gestures, chosen for their simplicity, which are reserved for operations fundamental to the user experience (i.e. a gesture to cycle through active applications running in a multitasking environment, etc.).

[00569] In still another embodiment, a gesture recording session may be terminated automatically after a predefined amount of time has elapsed. As an option, in one embodiment the user may specify the amount of time before the recording session begins.

[00570] In one embodiment, after the termination of a gesture recording session, the user may be prompted to repeat the gesture one or more times. As an option, the user may not have to indicate when the gesture is complete after the first recording session. In another embodiment, the repeated performance of the gesture may be used to better define the gesture parameters. For example, in one embodiment, gesture aspects which do not appear in every performance of the gesture may be indicated to the user as potentially irrelevant. In another embodiment, the system may use each iteration to improve the recorded description of the gesture. For example, the system may calculate the probability of correct recognition, using methods previously discussed, after each performance. As an option, the user may be prompted to repeat the gesture until the calculated probability of correct recognition has exceeded a predefined threshold.

[00571] In various embodiments, the user interface 2400 may include a button 2408 to allow a user to view a depiction of the performance of the custom gesture as currently defined. For example, in one embodiment, selecting button 2408 may display an animated recreation of the gesture in the context of a wireframe model of the device. In another embodiment, different forms of user input may be represented by different colors (i.e. pressure is red, touch is blue, proximity is green, etc.). As an option, changes in contact pressure level may be represented by changes in the color representing pressure. In another embodiment, the device surfaces may be displayed flattened into a two dimensional plane. In still another embodiment, the gesture replay may also include one or more plots which depict the time evolution of various gesture inputs, such as contact pressure or proximity associated with individual contacts or implements of interaction.

[00572] In various embodiments, the user interface 2400 may include a list 2410 displaying all components of the currently defined gesture. For example, in one embodiment, list 2410 may be a nested hierarchical list, grouped by "expected implement of interaction" and input type (i.e. contact 1, contact 2, proximity 1, etc.). In another embodiment, list 2410 may visually indicate (i.e. italicized, colored, underlined, etc.) recorded gesture aspects which were determined to be potentially irrelevant to the gesture. In yet another embodiment, list 2410 may break down the input from each "expected implement of interaction" into basic input categories. Categories may include, but are not limited to, pressure, touch, surface identity, proximity, proximity location, and/or any other aspect or type of user input.

[00573] The user interface 2400 may be utilized to specifically define or modify aspects of a custom gesture. For example, in one embodiment, the user interface 2400 may include a button 2412 to edit a gesture aspect selected in list 2410. In another embodiment, selecting button 2412 may present an interface to the user which may allow them to review and alter associated gesture aspects. This method of defining the gesture may not be as intuitive as teaching the system the gesture through repeated performance, but it does allow much greater control over the gesture aspects.

[00574] In one embodiment, the user interface 2400 may include a plurality of buttons 2414 which allow a user to copy, create, and delete gesture aspects associated with the current gesture. In another embodiment, the creation of a new gesture aspect may prompt the user to specify the input type to create, and with which "expected implement of interaction" it should be associated. As an option, a user may create a new "expected implement of interaction".

[00575] In one embodiment, the user interface 2400 may include a collection of check boxes 2416 which allow a user to specify the context in which the custom gesture may be performed. The contexts may include, but are not limited to, universal (i.e. available at all times), text (i.e. active text field, on-screen keyboard visible, etc.), application-specific, home (i.e. application chooser, etc.), selection (i.e. an active selection of an object exists), and/or any other type of context.

[00576] When defining a custom gesture, the associated action may be established. As shown, user interface 2400 may be utilized to specify and configure the action to be associated with the present gesture. For example, in one embodiment, the user interface may include a collection of checkboxes 2418 representing different actions which may be associated with the custom gesture.

[00577] In one embodiment, the collection of actions 2418 may include a checkbox 2420 to indicate that the gesture may trigger the insertion of a text snippet, as defined in a nearby text field. In another embodiment, the user interface may include a collection of buttons 2422 which may be used to format the text snippet. As an option, the text snippet may be defined as plain text, without formatting.

[00578] In another embodiment, the collection of actions 2418 may include a checkbox 2424 to indicate that the gesture may cause an application to launch. The user interface 2400 may also include a button which allows the user to specify which application should be launched when the gesture is performed.

[00579] In another embodiment, the collection of actions 2418 may include a checkbox 2426 to indicate that the gesture may set the system volume to a specified level. As an option, the user may be able to specify whether the gesture sets the system volume or a ringer volume. The user interface

2400 may also include a slider which allows the user to specify the volume to be associated with the present gesture.

[00580] In another embodiment, the collection of actions 2418 may include a checkbox 2428 to indicate that the gesture may trigger the creation of a new email message. In yet another embodiment, the user interface 2400 may include a checkbox 2430 to indicate, if the gesture is performed while an object is selected, whether the selected object should be inserted into the new email message. Possible objects may include, but are not limited to, images, text, video, files, and/or any other selectable media, file, or other kind of object. In still another embodiment, the user interface 2400 may also include a checkbox 2432 to indicate that the new email message should be addressed to a particular contact. As an option, the user may be able to choose the email address from a list of the user's contacts.

[00581] In another embodiment, the collection of actions 2418 may include a checkbox 2434 to indicate that the gesture may trigger the creation of a new SMS message. In yet another embodiment, the user interface 2400 may include checkboxes 2436 and 2438 to indicate the inclusion of a selected object and/or specific destination for the message, similar to the "new email message" action previously described. As an option, if a specific recipient is not specified, the new SMS message may be directed to the most recent SMS message sender.

[00582] In another embodiment, the collection of actions 2418 may include a checkbox 2440 to indicate that the gesture may take advantage of functionality provided by third party applications. In various embodiments, developers of third party applications may be able to provide functionality hooks that may be implemented by other applications or the operating system. For example, in one embodiment, a social networking application may allow the user to associate the custom gesture with the creation of a new posting within the social network.

[00583] In other embodiments, possible actions which may be associated with a user defined gesture may include, but are not limited to, a favorite contact (i.e. gesture displays a pop-up interface with buttons representing different methods of communicating with the contact, including but not limited to telephone, email, SMS, social networks, etc.), a predefine energy saving profile, a predefined set of application preferences, and/or any often repeated activity.

[00584] The user interface 2400 may be utilized to determine whether the custom gesture may conflict with already established gestures. For example, in various embodiments, the user interface may include a list 2442 of conflicting gestures. In one embodiment, the list of conflicts may be made up of other custom gestures, as well as system defined gestures. In another embodiment, the list may also include application specific gestures.

[00585] In yet another embodiment, items in the conflict list may be formatted to indicate their severity. For example, conflicting reserved gestures may be highlighted in red, while conflicting gestures which only exist in a single application may be slightly greyed out. In various embodiments, the conflict list may be created using pattern recognition methods previously discussed, or other methods and algorithms capable of matching patterns and/or data.

[00586] The user interface 2400 may be utilized to test a custom gesture, in accordance with one embodiment. For example, in various embodiments, the user interface may include a button 2444 which presents the user with an interface which allows them to test the custom gesture as it is currently defined. In one embodiment, the gesture testing interface may provide the user with a plurality of forms of feedback. Feedback may include, but is not limited to, current contact pressure level associated with each contact point, current touch state associated with each contact point, probability of correct gesture recognition, current gesture time, a visual representation of previous contact points, and/or any other form of user feedback.

[00587] In one embodiment, user interface 2400 may include statistics collected as a result of the gesture testing process. These statistics may include, but are not limited to, number of tests run with the current gesture configuration, average probability of correct gesture recognition, best probability of correct gesture recognition, identity of next most likely identified gesture (i.e. next closest gesture), minimum gesture performance time, maximum gesture performance time, average gesture performance time, and/or any other statistic related to the testing process.

[00588] In some embodiments, user defined gestures may be recognized in any context they were intended for. In other embodiments, a user may have to perform a predefined activation gesture before using a custom gesture.

[00589] As a specific example of how custom gestures may be utilized, in one embodiment, a user may define a gesture which is comprised of a triple finger press on a top side, followed by a singer finger swipe across a back interaction surface. The user may associate this gesture with a favorite contact. Upon performing this gesture, the user may be presented with a window showing a picture of the contact in addition to buttons linked to their telephone number and email address. In this way, communication may be established with this contact, at any time, with nothing more than a gesture and a button press.

[00590] Figure 25 shows a user interface 2500 for providing quick access to favorite operations, in accordance with one embodiment. As an option, the user interface 2500 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s).

Of course, however, the user interface 2500 may be implemented in any desired environment. The aforementioned definitions may apply during the present description.

[00591] As shown, the user interface 2500 may be utilized to provide easy, quick access to a plurality of favorite operations, applications, contacts, documents, and/or other types of objects. In various embodiments, favorites panel 2502 may be displayed in response to a gesture, the selection of a hardware or software button, voice command, accelerometer input (i.e. shaking the device, flicking the users wrist, etc.), and/or any other form of user input. In one embodiment, once favorites panel 2502 is displayed, a user may select an item using a slide pad 2504 located on the side of the device.

[00592] In one embodiment, a user may configure which items are displayed in the favorites panel. In another embodiment, the favorites panel may be automatically populated by the device, based upon factors which may include, but are not limited to, historical usage, date of last use, frequency of use, popularity information obtained from a remote system, and/or any other factors.

[00593] Figure 26 shows a method 2600 for gesture differentiation, in accordance with one embodiment. As an option, the method 2600 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the method 2600 may be carried out in any desired environment. It should also be noted that the aforementioned definitions may apply during the present description.

[00594] As shown, potentially gesture related input is gathered. See operation 2602.

[00595] In various embodiments, there may exist a tiered approach to interpreting user input. For example, in one embodiment, it may first be determined whether there is any meaningful user input.

[00596] In various embodiments, each form of user input may have an associated threshold above which user interaction may rise before it may be deemed meaningful. Examples of such thresholds may include, but are not limited to, minimum threshold pressure level, minimum threshold proximity level, maximum context determination zone, and/or any other threshold meant to prevent acting on unintentional user interactions.

[00597] In one embodiment, upon detecting meaningful user input, it is then determined whether it is related to a basic user interaction (i.e. button press, basic application interaction, etc.). If the meaningful user input is not related to a basic user interaction, then it may potentially be related to a gesture. In one embodiment, that determination may result in the initiation of method 2600. In another embodiment, system and environmental information may be gathered, in addition to the meaningful user input.

[00598] Once potential gesture input has been received, it is determined if the gesture is possibly a generalized gesture. See determination 2604.

[00599] A generalized gesture is a gesture that includes input from multiple sources, including but not limited to multiple interaction surfaces. In one embodiment, the possibility of a generalized gesture may be determined by ascertaining the number of sources provided the meaningful input gathered in operation 2602.

[00600] If it is determined that the gesture is possibly a generalized gesture (i.e. there is meaningful input from more than one source), then possible gesture identities are deduced using gesture attributes, gesture components, and gesture notation. See operation 2606.

[00601] In various embodiments, the identification of a generalized gesture may begin with the identification of the component gestures. Component gestures may be identified by evaluating associated gesture attributes, as has been previously discussed. In one embodiment, once the component gestures have been identified, gesture notation may be used to narrow the field of potential gestures.

[00602] In one embodiment, a generalized gesture may be identified by first identifying the faces involved, then further limiting the possibilities by identifying characteristic gesture attributes in common, until the number of potential generalized gestures is either one, or cannot be further reduced. In another embodiment, a decision tree may be used to identify the generalized gesture.

[00603] If it is determined that the gesture is not a generalized gesture (i.e. there is meaningful input from only one source), then possible gesture identities are deduced using gesture attributes. See operation 2608.

[00604] In various embodiments, the same methods used to identify component gestures in operation 2606 may be used in this operation.

[00605] As shown, it is determined if there is a single possible gesture being performed. See determination 2610. In one embodiment, if there are no potential gestures, the user may be provided feedback indicating a failure to recognize the gesture. Feedback may be visual, aural, or both.

[00606] If there is more than one possible gesture being performed, then the gesture subject matter context is used to identify the gesture. See operation 2612.

[00607] In the context of the present description, gesture subject matter context refers to any subject matter which may be related to a gesture. Examples may include, but are not limited to, selected objects, objects displayed at or near the location of the gesture, and/or any other items, objects, or properties which may give context to a gesture.

[00608] In some embodiments, similar gestures may require the use of gesture subject matter context to differentiate. For example, in one embodiment, a spin gesture and virtual control knob gesture may be indistinguishable until it is determined whether there is a displayed control knob at the contact points.

[00609] After using the gesture subject matter context to identify the gesture, it is determined whether there is a single possible gesture being performed. See determination 2614.

[00610] If there is still more than one possible gesture being performed, then a default response is performed. See operation 2616.

[00611] In one embodiment, the default response to the inability to identify the gesture may be to do nothing, and stop applying method 2600. In another embodiment, the default response may be to restart method 2600, in the hope that sufficient additional user input may have been gathered that may assist in gesture differentiation.

[00612] In yet another embodiment, the default response to the inability to identify the gesture may be to prompt the user to clarify their recent input. For example, in one embodiment, the user may be prompted by a pop-up interface which allows the user to select from identified potential gestures, or indicate that none of the candidates are correct. Since such user interaction could possibly interrupt the performance of the gesture, the user may have to repeat the gesture after making an appropriate selection.

[00613] If the identity of the gesture being performed has been determined, it is then determined whether the gesture is meant to trigger some sort of transformation. See determination 2618. Examples of possible transformations include, but are not limited to, move, slide, scale, rotate, and/or any other spatial or geometric transformation.

[00614] If the gesture is meant to trigger a transformation, then the gesture reference is determined. See operation 2620.

[00615] In various embodiments, gestures which cause a transformation to occur may have an associated gesture reference. For example, in one embodiment, a spin gesture may have a gesture reference (i.e. axis of rotation). In various embodiments, a gesture reference may be determined using the type or specific identity of the gesture and/or gesture attributes (i.e. gesture orientation, gesture shape, etc.).

[00616] As shown, the intermediate operations associated with the identified gesture are performed. See operation 2622.

[00617] In the context of the present description, an intermediate gesture operation refers to operations associated with a gesture which may be executed before the gesture is done. For example,

a spin gesture which rotates a displayed object may cause rotation to occur and be displayed before the user has stopped performing the gesture. In this way, a user may receive feedback on their gesture before terminating the interaction. Not all gestures have associated intermediate operations.

[00618] In one embodiment, each execution of intermediate gesture operations may cause an update of the gesture attributes before execution begins. In this way, the feedback given to the user performing the operation is responsive to their performance.

[00619] In another embodiment, each execution of intermediate gesture operations may trigger a display update (i.e. rendering, etc.). As an option, the display update may be localized to the portions of the display affected by the gesture operations, and may be more frequent than display updates for other user interface elements.

[00620] The intermediate operations are continuously performed unless it is determined that the gesture has ended. See determination 2624.

[00621] In various embodiments, a gesture may be ended by ending one or more user inputs. For example, in one embodiment, a spin gesture may be ended by breaking contact with one or two interaction surfaces. In another embodiment, a proximity-based gesture may be ended by reducing at least one proximity below a predefined threshold. In yet another embodiment, a pressure-based gesture may be ended by reducing the contact pressure level associated with one or more contact points below a predefined threshold level.

[00622] In various embodiments, a gesture may be ended by performing a different gesture. In one embodiment, the performance of a new gesture may be detected by changes observed in one or more gesture attributes. As an option, the changes may have to exceed a predefined threshold before identification of a new gesture is attempted. In some embodiments, a gesture may not necessarily be able to end all other gestures.

[00623] Once it has been determined that the gesture has ended, the final operations associated with the identified gesture are performed. See operation 2626.

[00624] In various embodiments, gestures may be associated with one or more final operations. In the context of the present description, a final operation refers to an operation which is executed when a triggering gesture has ended. For example, in one embodiment, a gesture which triggers the display of a pop-up menu and allows a user to cycle through menu items may have as a final operation the selection of the current menu item and removal of the pop-up menu.

[00625] Figure 27 shows a 3D layered user interface 2700 having a clipboard layer, in accordance with one embodiment. As an option, the user interface 2700 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course,

however, the user interface 2700 may be implemented in any desired environment. The aforementioned definitions may apply during the present description.

[00626] In the context of the present description, a clipboard layer refers to a display layer in a 3D layered user interface that is used to store one or more selectable objects upon which relocation/replication operations may be performed. Relocation/replication operations may include, but are not limited to, copying, pasting, sending to specified application, inserting into a new message (i.e. email, SMS, social network posting, etc.), and/or any other operation which may be performed on a selectable object. Selectable objects may include, but are not limited to, images, text (plain, rich, hypertext, etc.), video clips, sound clips, files, and/or any other type of object.

[00627] In various embodiments, a 3D layered user interface with a clipboard layer may insert the clipboard layer immediately after the active display layer. For example, see Figure 27.

[00628] As shown, user interface 2700 is comprised of two layers, an active layer 2702 and a clipboard layer 2704. These layers are depicted in a staggered arrangement, to illustrate the depth; it should be noted that in various embodiments, the layers would be aligned. In one embodiment, user interface 2700 may include additional layers. In another embodiment, active layer 2702 may contain one or more display elements, one or more of which either is, or contains, a selectable object.

[00629] In various embodiments, an object may be selected before it may be placed on the clipboard layer. Objects may be selected using any of the methods in the present description, or any other methods or procedures for indicating a selection. In one embodiment, a screen capture may be placed on the clipboard layer without having to be selected.

[00630] Once there is an active selection, the selected object may be moved or copied to the clipboard layer. In various embodiments, the clipboard layer may be activated before an object may be moved or copied to it. In one embodiment, the clipboard layer may be activated through selecting an icon located in the status bar, or elsewhere on the display.

[00631] In various embodiments, the clipboard layer may be activated by performing a gesture. For example, in one embodiment, the clipboard layer may be activated with a 1-6 pinch slide gesture, where the user "pulls" the clipboard layer into view from one edge of the display. In various other embodiments, the clipboard layer may only be active while a gesture is being performed, with the gesture's final operation being hiding the clipboard layer. For example, in one embodiment, the clipboard layer may be activated after a squeeze gesture (i.e. a double-press squeeze gesture, etc.) is initiated, and remains active until the contact pressures fall below a threshold level, ending the gesture.

[00632] In various embodiments, an activated clipboard layer is placed directly after the active display layer (i.e. the layer which contains the selection, etc.). In various embodiments, the activation of a clipboard layer may change one or more visual properties of the active display layer. For example, in one embodiment, the active display layer may become translucent, allowing the user to see the contents of the clipboard layer. In some embodiments, the degree of translucency may be a function of a user input. For example, in one embodiment, the active display layer may become more translucent as the user increases a contact pressure (i.e. a contact pressure associated with an activating gesture, backtouch pressure, etc.). In one embodiment, the active selection in the active display layer may be less translucent than the rest of the active display layer.

[00633] In various embodiments, once the clipboard layer is activated, objects may be copied or moved to and from the clipboard layer as a result of user input. For example, in one embodiment, an object may be cut (i.e. removed from the active display layer and placed on the clipboard layer) by performing a 1-6 pinch gesture, where the contact pressure on the front interaction surface is greater than the contact pressure on the back interaction surface. This provides the user with the sensation of pushing the selected object through the active display layer, into the clipboard layer.

[00634] In one embodiment, a selected object may be copied from the active display layer by performing a press gesture on the front interaction surface, where the user applies a contact pressure level on the selected object that exceeds a predefined threshold. See, for example, Figure 27. In another embodiment, the user may be provided with one or more visual indications that the object has been copied to the clipboard layer.

[00635] As shown in Figure 27, a user has performed a press gesture by applying sufficient contact pressure on contact area 2706, situated on selected object 2708 which is located in the active display layer 2702. The press gesture triggered a copy operation, placing a copy 2710 of the selected object to the clipboard layer 2704.

[00636] In one embodiment, a clipboard layer may only hold one object. Cutting or copying a second object may replace the first clipboard object. In another embodiment, a clipboard layer may contain multiple objects.

[00637] In one embodiment, an object may be copied from the clipboard layer and pasted into the active display layer by performing a press gesture on a back interaction surface, behind the object. This provides the user with the sensation of pushing a copy of the object up from the clipboard layer to the active display layer. As an option, the object may remain in the clipboard layer after the copy operation.

[00638] In one embodiment, an object may be cut from the clipboard layer and pasted into the active display layer by performing a 1-6 pinch gesture, where the contact pressure on the back interaction surface is greater than the contact pressure on the front interaction surface. This provides the user with the sensation of pulling the clipboard object up to the active display layer. As an option, the object may be removed from the clipboard layer after the cut operation.

[00639] In various embodiments, a clipboard layer may contain multiple objects. In one embodiment, the clipboard layer may operated as a first-in-last-out type container, such that when a user causes a new object to be placed on the clipboard layer, previous objects get incremented in order. In such an embodiment, repeated paste operations from the clipboard to the active display layer may eventually transfer all clipboard objects to the active display layer, while repeated copy operations from the clipboard to the active display layer may create multiple copies of the active clipboard object.

[00640] In the context of the present description, an active clipboard object refers to the clipboard object which is visible in an activated clipboard layer. In various embodiments, the default active clipboard object is the last object placed in the clipboard layer. In one embodiment, a user may cycle through various clipboard objects until the desired object is visible. In another embodiment, the clipboard layer may only display objects which are able to be copied or pasted into the current active display layer (i.e. a video clip may not be displayed in the clipboard layer, even though it has been copied, if the active display layer is a text-only environment).

[00641] In various embodiments, a user may remove an object from an activated clipboard layer by selecting an icon associated with deletion. See, for example, icon 2712 in Figure 27. As an option, the user may be prompted to confirm this operation before removing the object from the clipboard.

[00642] In one embodiment, the user may move all clipboard objects to the active display layer by performing a predefined gesture. In another embodiment, a user may select certain objects to always be available in the clipboard layer. Such objects may include, but are not limited to, email signatures, text snippets, emoticons, avatars, digital signatures, and/or any other often used object.

[00643] Of course, in various other embodiments, these clipboard layer actions (i.e. copy, cut, paste, etc.) may be triggered through any form of user input including, but not limited to, user interface controls, gestures, voice commands, and/or any other form of user input.

[00644] Figure 28 shows a 3D layered user interface 2800 having an operation layer, in accordance with one embodiment. As an option, the user interface 2800 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of

course, however, the user interface 2800 may be implemented in any desired environment. The aforementioned definitions may apply during the present description.

[00645] In the context of the present description, an operation layer refers to a display layer in a 3D layered user interface that may be used to apply operations on display elements located in display layers beneath the operation layer. Operations may include, but are not limited to, image manipulations, data detection, image recognition, OCR, movie filters, sound filters, display modifications, and/or any other type of operation which may be applied to one or more display elements, or portions thereof.

[00646] In various embodiments, a 3D layered user interface with an operation layer may insert the clipboard layer immediately above the active display layer. For example, see Figure 28.

[00647] As shown, user interface 2800 is comprised of two layers, an operation layer 2802 and one or more display layers 2804. These layers are depicted in a staggered arrangement, to illustrate the depth; it should be noted that in various embodiments, the layers would be aligned. In one embodiment, user interface 2800 may include additional layers. In another embodiment, display layer 2804 may contain one or more display elements, such as graphic 2806.

[00648] In various embodiments, an operation layer may be activated by performing a gesture. For example, in one embodiment, an operation layer may be activated with a 1-6 pinch slide gesture, where the user "pulls" the operation layer into view from one edge of the display. In various other embodiments, an operation layer may only be active while a gesture is being performed, with the gesture's final operation being hiding the operation layer. For example, in one embodiment, the operation layer may be activated after a squeeze gesture (i.e. a triple-press squeeze gesture, etc.) is initiated, and remains active until the contact pressures fall below a threshold level, ending the gesture.

[00649] In various embodiments, an operation layer may have an operation window which defines the boundaries within which the operation may be applied. See, for example, operation window 2808 in Figure 28.

[00650] In one embodiment, a user may resize the operation window. In another embodiment, the operation window may be automatically scaled, translated, and/or reshaped to fit a display element which is in or near the user focus. In yet another embodiment, an operation layer may include a button which enlarges the operation window to fit the entire display.

[00651] In various embodiments, an operation window may be able to perform a plurality of operations. In some embodiments, operations may be divided into subject matter categories. In one embodiment, a user may select an operation by first selecting a subject matter category, then

selecting an operation from a list. In various embodiments, once an operation has been selected by the user, it is applied to the contents of the operation window.

[00652] In various embodiments, possible subject matter categories may include, but are not limited to, image, text, video, audio, display, and/or any other category of subject matter. Possible image operations may include, but are not limited to, color operations (i.e. desaturate, replace color, saturate, etc.), changes in color space (i.e. grayscale, sepia, custom 2-tone space, etc.), processing effects (i.e. halftone, pixelate, posterize, etc.), distortions (i.e. twirl, warp, motion blur, etc.), enhancements (i.e. sharpen, blur, image repair, remove red eye, etc.), and/or any other possible image operation.

[00653] One example of a text operation may include data extractors. In the context of the present description, a data extractor refers to logic which parses text data, identifying information fragments which can trigger further action. For example, in one embodiment, a data extractor operation may highlight all email addresses in the text inside the operation window. As an option, touching or otherwise selecting a highlighted email address may create a new email message to that address. Other examples of information fragments may include, but are not limited to, phone numbers, contact names, dates, times, addresses, appointments, web addresses, and/or any other information fragment which may be used in a related action. Other examples of text operations may include, but are not limited to, foreign language translation, profanity removal, optical character recognition, and/or any other text operation.

[00654] In various embodiments, possible video operations may include, but are not limited to, color adjustment, resolution reduction, sound volume adjustment, text overlay, graphics overlay, and/or any other possible video operation. In one embodiment, image operations may also be applied to video.

[00655] In various embodiments, possible audio operations may include, but are not limited to, volume normalization (i.e. softening loud portions, amplifying soft portions), application of equalizer settings, audio effects (i.e. echo, envelope, reverberation, etc.), and/or any other possible audio operation. In one embodiment, audio operations may also be applied to video.

[00656] In the context of the present description, a display operation refers to an operation which affects one or more display properties for the display region delineated by the operation window. For example, in one embodiment, a display operation may include adjustment of backlight intensity within the operation window. Other possible display operations may include, but are not limited to, application of power saving backlight profiles (i.e. highlighting only areas of interest, etc.),

activation/deactivation of display layer types (i.e. only using e-ink within operation window, etc.), modifying 3D depth cues within operation window, and/or any other possible display operation.

[00657] As a specific example of an operation layer in use, see Figure 28. As shown, a user has selected the "Image" subject matter category from a plurality of categories 2810, and the "Invert" operation from a plurality of operations 2812. As a result, an "Invert" operation has been applied to the contents of operation window 2808.

[00658] In one embodiment, a user may apply multiple operations within a single operation window. As an option, the operations may come from different subject matter categories. In another embodiment, certain operations may only be available if certain conditions are satisfied, such as the operation window spanning entire display.

[00659] In various embodiments, once the user has selected one or more operations, and has adjusted the operation window to their liking, they may choose to apply the operation. In one embodiment, application of the operation may be elected by selecting a button. See, for example, button 2814.

[00660] Upon application, in one embodiment, the operation may modify all the content within the operation window. In another embodiment, application of the operations may create a modified copy of the content within the operation window. In still other embodiments, the user may be prompted to choose between modifying the original and creating a copy. In one embodiment, certain operations perform non-destructive modifications, such as backlighting modifications. In another embodiment, some operations may not make permanent changes, but rather are only useful within the operation layer (i.e. certain text operations, etc.).

[00661] In one embodiment, the selected operation(s) may be cancelled and the operation layer hidden by selecting a button. See, for example, button 2816.

[00662] In various embodiments, operations may be provided by the operating system. In another embodiment, operations may also be provided by third party developers through applications. As an option, these applications may run in the background of a multitasking environment.

[00663] The various embodiments set forth herein may be implemented in a variety of devices including, but not limited to, consumer devices, phones, cell phones, internet phones, music players, video players, cameras, social interaction devices, radios, TVs, watches, personal communication devices, electronic wallets, smart jewelry, personal computers, tablets, laptop computers, embedded systems, electronic glasses, and/or any other device that includes one or more sensors or inputs. Possible inputs may include, but are not limited to, keyboard, mouse, touchscreen(s), touchpad(s), interaction surfaces, a joystick, touchwheel, touchknob, touchbutton, touchball, trackball, scroll

wheel, thumb-mouse, switch, button, wheel, knob, ball, pedal, voice recognition, audio command, audio prompt, gaze control, eye tracking, head position sensing, facial and/or gestural and/or postural expression recognition, and/or other inputs and combinations of these. Possible sensors may include, but are not limited to, range sensors, scanners, magnetometers, GPS receivers, accelerometers, cameras, depth sensors, light-field cameras, ambient light sensors, pressure sensors, infra-red (IR) sensors, UV sensors, touch and/or proximity sensor(s), grasp sensors, material sensors, chemical sensors, physical sensors, electrical sensors, biological sensors, weight sensors, force sensors, mass sensors, gas sensors, vapor sensors, particle sensors, wireless sensors, RF and other electromagnetic sensors, and/or other sensors and combinations of these.

[00664] In various embodiments, the device may include one or more different forms of displays and/or other outputs including, but not limited to, physical or other actuators, motors, tactile feedback or other tactile output, weight or mass feedback, force feedback or other force outputs, mechanical outputs, audio outputs, alarms, horns, bells, indicators, dials, meters, barcodes and/or other display patterns, vibrations, ultrasonic outputs, wireless and RF outputs, optical and light outputs, avatars, visual outputs, multiscreen displays, multilayer displays, 3D displays, holographic projections and outputs, laser displays and other laser outputs, projection systems, heads-up displays, and/or other outputs or combinations of these.

[00665] In various embodiments, the device may support one or more types of applications including, but not limited to, search applications, contacts and/or friends applications, messaging applications, telephone applications, video conferencing applications, e-mail applications, communications applications, voice recognition applications, instant messaging (IM) applications, blog and/or blogging applications, photographic applications, shopping applications, payment applications, digital camera applications, digital video camera applications, web browsing and browser applications, digital music player applications, digital video player applications, cloud applications, office productivity applications, and/or other types of applications or combinations or multiple instances of these.

[00666] In other embodiments, different applications on the device may use one or more interface devices that may be physical interface devices or virtual interface devices including, but not limited to, touchscreens, touchpads, soft inputs, hard inputs, keyboards, buttons, knobs, sliders, switches, and/or any other kind of interface device.

[00667] In various embodiments, the device may have a common physical architecture (i.e. display, touchscreen, etc.) such that the device may be used with different applications with one or

more common user interfaces with one or more common properties (i.e. easy to use, simple, intuitive, transparent, etc.).

[00668] In various embodiments, user interfaces may include one or more physical interface devices (i.e. keyboard, joysticks, buttons, sliders, switches, knobs, other hard inputs, etc.) and/or one or more virtual or soft interface devices (i.e. soft keyboard, programmable buttons, UI sliders, UI knobs, check boxes, text fields, other soft inputs, etc.).

[00669] In various embodiments, the device may implement one or more types of keyboard (i.e. soft keyboard, physical keyboard, virtual keyboard, keypad, etc.). In one embodiment, the keyboard(s) may include standard keyboard arrangements (i.e. QWERTY configurations, etc.), and/or non-standard arrangements and/or symbols on the keys (i.e. soft keys, buttons, pixels, displayed icons etc.). In another embodiment, the keyboard(s) may include a reduced number of symbols (i.e. letters, icons, soft keys, etc.) compared to the number of keys on a conventional physical keyboard. In yet another embodiment, one or more alternative keyboards may make it easier for users to select one or more symbols in the keyboard, and thus, one or more corresponding representations (i.e. letter, number, special symbol, graphics, emoticon, abbreviation, slang, acronym, etc.). In still another embodiment, one or more keyboards and their associated contents and/or layouts may be modified. For example, in one embodiment, one or more displayed symbols on the keyboard may be modified in accordance with application, application state, device state, settings (i.e. language, etc.), and/or user actions.

[00670] In various embodiments, one or more keyboards may be customized to one or more applications and/or users. For example, in one embodiment, one or more keyboard embodiments may be customized to one or more users based on factors including, but not limited to, application states, stored application history, web cookies, a word usage history (i.e. lexicography, slang, individual usage, etc.), language, country, and/or any other factor. In another embodiment, one or more keyboards may be modified to reduce the probability of user error when selecting one or more keys when using the soft keyboards.

[00671] In various embodiments, the device may have multiple functions or roles including, but not limited to, telephone, video conferencing, e-mail, instant messaging, blogging, digital photography, digital video, web browsing, digital music playing, social interaction, shopping, searching, and/or any other function or role. As an option, instructions for performing the device functions may be included in a computer readable storage medium, or as a computer program product configured for execution by one or more processors.

[00672] In various optional embodiments, the features, capabilities, and/or technology, etc. of the tablets, mobile devices, computing devices, networks, hardware, and/or software, etc. disclosed in the following patents/applications may or may not be incorporated into any of the embodiments disclosed herein: US7479949; US7748634; US20060017692; US20100188268; US20110145692; US7954101; US20070103454; US20100210329; US20070091825; US20060013219; US7916166; US20090213205; US20070296805; US20100205148; US20100188473; US7441196; US7894641; US7966578; US7479949; US Provisional Application NO. 61/470,336, filed 03-31-2011, titled "SYSTEM, METHOD, AND COMPUTER PROGRAM PRODUCT FOR UTILIZING IMAGE RECOGNITION TO PERFORM AN ACTION"; US Provisional Application NO. 61/470,391, filed 03-31-2011, titled "SYSTEM, METHOD, AND COMPUTER PROGRAM PRODUCT FOR ENABLING A PERIPHERAL DEVICE TO UTILIZE FUNCTIONALITY ASSOCIATED WITH A MOBILE DEVICE"; and US Provisional Application NO. 61/569,213, filed 12-09-2011, titled "SYSTEM, METHOD, AND COMPUTER PROGRAM PRODUCT FOR MODIFYING CONTENT." Each of the foregoing patents/applications are hereby incorporated by reference in their entirety for all purposes.

[00673] (1) U.S. patent application Ser. No. 10/188,182 (US 2003-0076306 A1), "Touch Pad For Handheld Device," filed Jul. 1, 2002; (2) U.S. patent application Ser. No. 10/722,948 (US 2005-0110768 A1), "Touch Pad For Handheld Device," filed Nov. 25, 2003; (3) U.S. patent application Ser. No. 10/643,256 (US 2005-0052425 A1), "Movable Touch Pad With Added Functionality," filed Aug. 18, 2003; (4) U.S. patent application Ser. No. 10/654,108, "Ambidextrous Mouse," filed Sep. 2, 2003; (5) U.S. patent application Ser. No. 10/840,862 (US 2006-0097991 A1), "Multipoint Touchscreen," filed May 6, 2004; (6) U.S. patent application Ser. No. 10/903,964 (US 2006-0026521 A1), "Gestures For Touch Sensitive Input Devices," filed Jul. 30, 2004; (7) U.S. patent application Ser. No. 11/038,590 (US 2006-0026535 A1), "Mode-Based Graphical User Interfaces For Touch Sensitive Input Devices" filed Jan. 18, 2005; (8) U.S. patent application Ser. No. 11/057,050 (US 2006-0181517 A1), "Display Actuator," filed Feb. 11, 2005; (9) U.S. Provisional Patent Application No. 60/658,777, "Multi-Functional Hand-Held Device," filed Mar. 4, 2005; (10) U.S. patent application Ser. No. 11/367,749 (US 2006-0197753 A1), "Multi-Functional Hand-Held Device," filed Mar. 3, 2006; and (11) U.S. patent application Ser. No. 29/281,695, "Icons, Graphical User Interfaces, and Animated Graphical User Interfaces For a Display Screen or Portion Thereof," filed Jun. 28, 2007. All of these applications are incorporated by reference herein in their entirety.

[00674] The soft keyboard embodiments may include standard (QWERTY) and/or non-standard configurations of symbols on the displayed icons of the keyboard, such as those described in U.S.

patent application Ser. Nos. 11/459,606 (US 2007-0152978 A1), "Keyboards For Portable Electronic Devices," filed Jul. 24, 2006, and 11/459,615 (US 2007-0152980 A1), "Touch Screen Keyboards For Portable Electronic Devices," filed Jul. 24, 2006, the contents of which are hereby incorporated by reference in their entirety.

[00675] A quick press of the push button may disengage a lock of the touch screen or begin a process that uses gestures on the touch screen to unlock the device, as described in U.S. patent application Ser. No. 11/322,549 (US 2007-0150842 A1), "Unlocking a Device by Performing Gestures on an Unlock Image," filed Dec. 23, 2005, which is hereby incorporated by reference in its entirety.

[00676] A touch-sensitive display in some embodiments of the touch screen may be analogous to the multi-touch sensitive tablets described in the following U.S. patents: U.S. Pat. Nos. 6,323,846 (Westerman et al.), 6,570,557 (Westerman et al.), and/or 6,677,932 (Westerman), and/or U.S. Patent Publication 2002/0015024A1, each of which is hereby incorporated by reference in its entirety.

[00677] A touch-sensitive display in some embodiments of the touch screen may be as described in the following applications: (1) U.S. patent application Ser. No. 11/381,313 (US 2007-0257890 A1), "Multipoint Touch Surface Controller," filed May 2, 2006; (2) U.S. patent application Ser. No. 10/840,862 (US 2006-0097991 A1), "Multipoint Touchscreen," filed May 6, 2004; (3) U.S. patent application Ser. No. 10/903,964 (US 2006-0026521 A1), "Gestures For Touch Sensitive Input Devices," filed Jul. 30, 2004; (4) U.S. patent application Ser. No. 11/048,264 (US 2006-0026536 A1), "Gestures For Touch Sensitive Input Devices," filed Jan. 31, 2005; (5) U.S. patent application Ser. No. 11/038,590 (US 2006-0026535 A1), "Mode-Based Graphical User Interfaces For Touch Sensitive Input Devices," filed Jan. 18, 2005; (6) U.S. patent application Ser. No. 11/228,758 (US 2006-0033724 A1), "Virtual Input Device Placement On A Touch Screen User Interface," filed Sep. 16, 2005; (7) U.S. patent application Ser. No. 11/228,700 (US 2006-0053387 A1), "Operation Of A Computer With A Touch Screen Interface," filed Sep. 16, 2005; (8) U.S. patent application Ser. No. 11/228,737 (US 2006-0085757 A1), "Activating Virtual Keys Of A Touch-Screen Virtual Keyboard," filed Sep. 16, 2005; and (9) U.S. patent application Ser. No. 11/367,749 (US 2006-0197753 A1), "Multi-Functional Hand-Held Device," filed Mar. 3, 2006. All of these applications are incorporated by reference herein in their entirety.

[00678] The proximity sensor may perform as described in U.S. patent application Ser. Nos. 11/241,839 (US 2006-0161871 A1), "Proximity Detector In Handheld Device"; 11/240,788 (US 2006-0161870 A1), "Proximity Detector In Handheld Device"; 11/620,702 (US 2008-0167834 A1), "Using Ambient Light Sensor To Augment Proximity Sensor Output"; 11/586,862 (US 2007-

0075965 A1), "Automated Response To And Sensing Of User Activity In Portable Devices"; and 11/638,251 (US 2008-0140868 A1), "Methods And Systems For Automatic Configuration Of Peripherals," which are hereby incorporated by reference in their entirety.

[00679] The accelerometer may perform as described in U.S. Patent Publication No. 20050190059, "Acceleration-based Theft Detection System for Portable Electronic Devices," and U.S. Patent Publication No. 20060017692, "Methods And Apparatuses For Operating A Portable Device Based On An Accelerometer," both of which are which are incorporated by reference herein in their entirety.

[00680] Additional description of the online video application can be found in U.S. Provisional Patent Application No. 60/936,562, "Portable Multifunction Device, Method, and Graphical User Interface for Playing Online Videos," filed Jun. 20, 2007, and U.S. patent application Ser. No. 11/968,067 (US 2008-0320391 A1), "Portable Multifunction Device, Method, and Graphical User Interface for Playing Online Videos," filed Dec. 31, 2007, the content of which is hereby incorporated by reference in its entirety.

[00681] Processes that use gestures on the touch screen to unlock the device are described in U.S. patent application Ser. Nos. 11/322,549 (US 2007-0150842 A1), "Unlocking A Device By Performing Gestures On An Unlock Image," filed Dec. 23, 2005, and 11/322,550 (US 2007-0150826 A1), "Indication Of Progress Towards Satisfaction Of A User Input Condition," filed Dec. 23, 2005, which are hereby incorporated by reference in their entirety.

[00682] In some embodiments, a user may rearrange the icons in UI, e.g., using processes described in U.S. patent application Ser. No. 11/459,602 (US 2007-0157089 A1), "Portable Electronic Device With Interface Reconfiguration Mode," filed Jul. 24, 2006, which is hereby incorporated by reference in its entirety.

[00683] In some embodiments, UI includes a gauge (not shown) that displays an updated account usage metric for an account associated with usage of the device (e.g., a cellular phone account), as described in U.S. patent application Ser. No. 11/322,552 (US 2007-0149252 A1), "Account Information Display For Portable Communication Device," filed Dec. 23, 2005, which is hereby incorporated by reference in its entirety.

[00684] Additional description of insertion marker positioning can be found in U.S. patent application Ser. No. 11/553,436 (US 2008-0259040 A1), "Method, System, And Graphical User Interface For Positioning An Insertion Marker In A Touch Screen Display," filed Oct. 26, 2006, and U.S. Provisional Patent Application No. 60/947,382, "Portable Multifunction Device, Method, and Graphical User Interface for Adjusting an Insertion Point Marker," filed Jun. 29, 2007, and U.S.

patent application Ser. No. 11/923,453 (US 2008-0165142 A1), "Portable Multifunction Device, Method, and Graphical User Interface for Adjusting an Insertion Point Marker," filed Oct. 24, 2007, the contents of which are hereby incorporated by reference herein in their entirety.

[00685] Additional description of instant messaging on portable electronic devices can be found in U.S. Provisional Patent Application Nos. 60/883,819, "Portable Electronic Device For Instant Messaging," filed Jan. 7, 2007, and 60/946,969, "Portable Electronic Device For Instant Messaging," filed Jun. 28, 2007, and U.S. patent application Ser. No. 11/848,208 (US 2008-0055269 A1), "Portable Electronic Device for Instant Messaging," filed Aug. 30, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00686] Additional description of deletion gestures on portable electronic devices can be found in U.S. Provisional Patent Application Nos. 60/883,814, "Deletion Gestures On A Portable Multifunction Device," filed Jan. 7, 2007 and 60/936,755, "Deletion Gestures On A Portable Multifunction Device," filed Jun. 22, 2007, and U.S. patent application Ser. No. 11/850,642 (US 2008-0094371 A1), "Deletion Gestures on a Portable Multifunction Device," filed Sep. 5, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00687] As described in U.S. patent application Ser. Nos. 11/322,547 (US 2007-0150830 A1), "Scrolling List With Floating Adjacent Index Symbols," filed Dec. 23, 2005; 11/322,551 (US 2007-0146337 A1), "Continuous Scrolling List With Acceleration," filed Dec. 23, 2005; and 11/322,553 (US 2007-0132789 A1), "List Scrolling In Response To Moving Contact Over List Of Index Symbols," filed Dec. 23, 2005, which are hereby incorporated by reference in their entirety, the user may scroll through the contact list using vertically upward and/or vertically downward gestures 814 on the touch screen.

[00688] Additional descriptions of word suggestion can be found in U.S. patent application Ser. No. 11/620,641 (US 2008-0167858 A1), "Method, System, And Graphical User Interface For Providing Word Recommendations for Text Input," filed Jan. 5, 2007) and U.S. patent application Ser. No. 11/620,642 (US 2008-0168366 A1), "Method, System, And Graphical User Interface For Providing Word Recommendations," filed Jan. 5, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00689] Additional description of image management can be found in U.S. Provisional Patent Application Nos. 60/883,785, "Portable Electronic Device For Photo Management," filed Jan. 6, 2007, and 60/947,118, "Portable Electronic Device For Photo Management," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/848,210 (US 2008-0052945 A1), "Portable Electronic Device

For Photo Management," filed Aug. 30, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00690] Additional description of a video player and manager can be found in U.S. Provisional Patent Application Nos. 60/883,784, "Video Manager For Portable Multifunction Device," filed Jan. 6, 2007, and 60/946,973, "Video Manager For Portable Multifunction Device," filed Jun. 28, 2007, and U.S. patent application Ser. No. 11/850,008 (US 2008-0055272 A1), "Video Manager For Portable Multifunction Device," filed Sep. 4, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00691] Additional description of configuring and displaying widgets can be found in U.S. Provisional Patent Application No. 60/946,975, "Portable Multifunction Device, Method, and Graphical User Interface for Configuring and Displaying Widgets," filed Jun. 28, 2007, and U.S. patent application Ser. No. 11/850,010 (US 2008-0082930 A1), "Portable Multifunction Device, Method, and Graphical User Interface for Configuring and Displaying Widgets," filed Sep. 4, 2007, the content of which is hereby incorporated by reference in its entirety.

[00692] As described in U.S. patent application Ser. No. 11/322,547 (US 2007-0150830 A1), "Scrolling List With Floating Adjacent Index Symbols," filed Dec. 23, 2005, which is hereby incorporated by reference in its entirety, the user may scroll through the contact list using vertically upward and/or vertically downward gestures 2602 on the touch screen.

[00693] Additional description of the reordering of user-configurable lists can be found in U.S. Provisional Patent Application No. 60/883,808, "System And Method For Managing Lists," filed Jan. 7, 2007, and U.S. patent application Ser. No. 11/770,725 (US 2008-0165136 A1), "System and Method for Managing Lists," filed Jun. 28, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00694] Additional description of missed call management can be found in U.S. Provisional Patent Application No. 60/883,782, "Telephone Call Management For A Portable Multifunction Device," filed Jan. 6, 2007, and U.S. patent application Ser. No. 11/769,694 (US 2008-0057926 A1), "Missed Telephone Call Management for a Portable Multifunction Device," filed Jun. 27, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00695] Additional description of location-based dialing can be found in U.S. Provisional Patent Application No. 60/883,800, "Method, Device, And Graphical User Interface For Location-Based Dialing," filed Jan. 7, 2007, and U.S. patent application Ser. No. 11/769,692 (US 2008-0167083 A1), "Method, Device, and Graphical User Interface for Location-Based Dialing," filed Jun. 27, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00696] Additional description of conference calling can be found in U.S. Provisional Patent Application No. 60/947,133, "Portable Multifunction Device, Method, and Graphical User Interface for Conference Calling," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/960,673 (US 2008-0168361 A1), "Portable Multifunction Device, Method, and Graphical User Interface for Conference Calling," filed Dec. 19, 2007, the content of which is hereby incorporated by reference in its entirety.

[00697] Additional description of application switching can be found in U.S. Provisional Patent Application No. 60/883,809, "Portable Electronic Device Supporting Application Switching," filed Jan. 7, 2007, and U.S. patent application Ser. No. 11/969,908 (US 2008-0168379 A1) , "Portable Electronic Device Supporting Application Switching," filed Jan. 6, 2008, the content of which is hereby incorporated by reference in its entirety.

[00698] Additional description of user interfaces for handling incoming calls can be found in U.S. Provisional Patent Application No. 60/883,783, "Incoming Telephone Call Management For A Portable Multifunction Device," filed Jan. 6, 2007, and U.S. patent application Ser. No. 11/769,695 (US 2008-0055263 A1), "Incoming Telephone Call Management For A Portable Multifunction Device," filed Jun. 27, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00699] Additional description of the voicemail system can be found in U.S. Provisional Patent Application No. 60/883,799, "Voicemail Manager For Portable Multifunction Device," filed Jan. 7, 2007; U.S. patent application Ser. No. 11/770,720 (US 2008-0055264 A1), "Voicemail Manager for Portable Multifunction Device," filed Jun. 28, 2007; and 60/947,348, "Voicemail Set-Up on a Portable Multifunction Device," filed Jun. 29, 2007; and U.S. patent application Ser. No. 11/961,716 (US 2008-0168353 A1), "Voicemail Set-Up on a Portable Multifunction Device," filed Dec. 20, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00700] Edit icon that when activated (e.g., by a finger tap on the icon) initiates display of a user interface for deleting emails (e.g., as described in U.S. Provisional Patent Application Nos. 60/883,814, "Deletion Gestures On A Portable Multifunction Device," filed Jan. 7, 2007, and 60/936,755, "Deletion Gestures On A Portable Multifunction Device," filed Jun. 22, 2007, and U.S. patent application Ser. No. 11/850,642 (US 2008-0094371 A1), "Deletion Gestures On A Portable Multifunction Device," filed Sep. 5, 2007, the contents of which are hereby incorporated by reference in their entirety).

[00701] In some embodiments, in response to detecting a horizontal swipe gesture on a particular email message in a the list of emails messages, a process for deleting the particular email message is

initiated (e.g., as described in U.S. Provisional Patent Application Nos. 60/883,814, "Deletion Gestures On A Portable Multifunction Device," filed Jan. 7, 2007, and 60/936,755, "Deletion Gestures On A Portable Multifunction Device," filed Jun. 22, 2007, and U.S. patent application Ser. No. 11/850,642 (US 2008-0094371 A1), "Deletion Gestures On A Portable Multifunction Device," filed Sep. 5, 2007, the contents of which are hereby incorporated by reference in their entirety).

[00702] Additional description of an email client can be found in U.S. Provisional Patent Application No. 60/883,807, "Email Client For A Portable Multifunction Device," filed Jan. 7, 2007, and U.S. patent application Ser. No. 11/850,630 (US 2008-0094369 A1), "Email Client For A Portable Multifunction Device," filed Sep. 5, 2007, the content of which is hereby incorporated by reference in its entirety.

[00703] Methods for efficiently fetching email messages can be found in U.S. Provisional Patent Application No. 60/947,395, "Email Fetching System and Method in a Portable Electronic Device," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/968,070 (US 2009-0006570 A1), "Email Fetching System and Method in a Portable Electronic Device," filed Dec. 31, 2007, the content of which is hereby incorporated by reference in its entirety.

[00704] Methods for automatically selecting email ports and email security can be found in U.S. Provisional Patent Application No. 60/947,396, "Port Discovery and Message Delivery in a Portable Electronic Device," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/968,076 (US 2009-0006644 A1), "Port Discovery and Message Delivery in a Portable Electronic Device," filed Dec. 31, 2007, the content of which is hereby incorporated by reference in its entirety.

[00705] Additional description of displaying structured electronic documents (e.g., web pages) can be found in U.S. Provisional Patent Application No. 60/946,715, "Portable Electronic Device, Method, and Graphical User Interface for Displaying Structured Electronic Documents," filed Jun. 27, 2007, and U.S. patent application Ser. No. 11/850,013 (US 2008-0094368 A1), "Portable Electronic Device, Method, and Graphical User Interface for Displaying Structured Electronic Documents," filed Sep. 4, 2007, the content of which is hereby incorporated by reference in its entirety.

[00706] Additional description of adding windows to an application can be found in U.S. patent application Ser. No. 11/620,647 (US 2008-0168401 A1), "Method, System, And Graphical User Interface For Viewing Multiple Application Windows," filed Jan. 5, 2007, the content of which is hereby incorporated by reference in its entirety.

[00707] Additional description of displaying inline multimedia content can be found in U.S. Provisional Patent Application No. 60/947,155, "Portable Electronic Device, Method, and Graphical

User Interface for Displaying Inline Multimedia Content," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/961,773 (US 2008-0165148 A1), "Portable Electronic Device, Method, and Graphical User Interface for Displaying Inline Multimedia Content," filed Dec. 20, 2007, the content of which is hereby incorporated by reference in its entirety.

[00708] Additional description of interacting with user input elements can be found in U.S. Provisional Patent Application No. 60/947,127, "Portable Multifunction Device, Method, and Graphical User Interface for Interacting with User Input Elements in Displayed Content," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/960,394 (US 2008-0165143 A1), "Portable Multifunction Device, Method, and Graphical User Interface for Interacting with User Input Elements in Displayed Content," filed Dec. 19, 2007, the content of which is hereby incorporated by reference in its entirety.

[00709] Additional description of displaying and activating hyperlinks using interfaces can be found in U.S. patent application Ser. No. 11/620,644 (US 2008-0165133 A1), "Method, System, And Graphical User Interface For Displaying Hyperlink Information," filed Jan. 5, 2007, and in U.S. patent application Ser. No. 11/620,646 (US 2008-0259041 A1), "Method, System, And Graphical User Interface For Activating Hyperlinks," filed Jan. 5, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00710] Additional description of translating displayed content can be found in U.S. Provisional Patent Application No. 60/946,976, "Portable Multifunction Device, Method, and Graphical User Interface for Translating Displayed Content," filed Jun. 28, 2007, and U.S. patent application Ser. No. 11/960,675 (US 2008-0168405 A1), "Portable Multifunction Device, Method, and Graphical User Interface for Translating Displayed Content," filed Dec. 19, 2007, the content of which is hereby incorporated by reference in its entirety.

[00711] Additional description of "rubber band-like" scrolling and translation behavior can be found in U.S. Provisional Patent Application Nos. 60/883,801, "List Scrolling And Document Translation On A Touch-Screen Display," filed Jan. 7, 2007; 60/945,858, "List Scrolling and Document Translation on a Touch-Screen Display," filed Jun. 22, 2007, and 60/946,971, "List Scrolling and Document Translation on a Touch-Screen Display," filed Jun. 28, 2007, and U.S. patent application Ser. No. 11/956,969 (US 2008-0168404 A1), "List Scrolling and Document Translation, Scaling, and Rotation on a Touch-Screen Display," filed Dec. 14, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00712] Additional description of scrolling is described in U.S. patent application Ser. Nos. 11/322,547 (US 2007-0150830 A1), "Scrolling List With Floating Adjacent Index Symbols," filed

Dec. 23, 2005; 11/322,551 (US 2007-0146337 A1), "Continuous Scrolling List With Acceleration," filed Dec. 23, 2005; and 11/322,553 (US 2007-0132789 A1), "List Scrolling In Response To Moving Contact Over List Of Index Symbols," filed Dec. 23, 2005, which are hereby incorporated by reference in their entirety.

[00713] Additional description of user interface object reconfiguration can be found in U.S. Provisional Patent Application No. 60/937,990, "Portable Multifunction Device, Method, and Graphical User Interface Supporting User Navigations of Graphical Objects on a Touch Screen Display," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/969,809 (US 2008-0165153 A1), "Portable Multifunction Device, Method, and Graphical User Interface Supporting User Navigations of Graphical Objects on a Touch Screen Display," filed Jan. 4, 2008, the content of which is hereby incorporated by reference in its entirety.

[00714] U.S. Provisional Patent Application No. 60/936,562, "Portable Multifunction Device, Method, and Graphical User Interface for Playing Online Videos," filed Jun. 20, 2007, and U.S. patent application Ser. No. 11/968,067 (US 2008-0320391 A1), "Portable Multifunction Device, Method, and Graphical User Interface for Playing Online Videos," filed Dec. 31, 2007, the content of which is hereby incorporated by reference in its entirety, describes a way that major online video content categories can be rearranged by a user to correspond to the user's preferred (favorite) categories. The teachings in that application are also applicable here to rearranging major music and/or video categories.

[00715] Cover flow mode and other image modes are described in U.S. Provisional Patent Application No. 60/843,832, "Techniques And Systems For Browsing Media Content," filed Sep. 11, 2006; U.S. patent application Ser. No. 11/519,460 (US 2008-0066016 A1), "Media Manager With Integrated Browsers," filed Sep. 11, 2006; and U.S. Provisional Patent Application No. 60/878,746 "Electronic Device With Image Based Browsing," filed Jan. 5, 2007, which are hereby incorporated by reference in their entirety.

[00716] Additional description of mode changes based on device orientation can be found in U.S. Provisional Patent Application No. 60/947,300, "Modal Change Based on Orientation of a Portable Multifunction Device," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/969,800 (US 2008-0165152 A1), "Modal Change Based on Orientation of a Portable Multifunction Device," filed Jan. 4, 2008, the content of which is hereby incorporated by reference in its entirety.

[00717] Additional description of portrait-landscape rotation heuristics can be found in U.S. Provisional Patent Application No. 60/947,132, "Portrait-Landscape Rotation Heuristics for a Portable Multifunction Device," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/960,671

(US 2008-0165144 A1), "Portrait-Landscape Rotation Heuristics for a Portable Multifunction Device," filed Dec. 19, 2007, the content of which is hereby incorporated by reference in its entirety.

[00718] Additional description of adaptive user interface displays can be found in U.S. Provisional Patent Application No. 60/937,992, "Portable Multifunction Device, Method, and Graphical User Interface for Displaying User Interface Objects Adaptively," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/961,760 (US 2008-0165147 A1), "Portable Multifunction Device, Method, and Graphical User Interface for Displaying User Interface Objects Adaptively," filed Dec. 20, 2007, the content of which is hereby incorporated by reference in its entirety.

[00719] Additional description of artwork can be found in U.S. Provisional Patent Application No. 60/883,818, "Creating Digital Artwork Based On Content File Metadata," filed Jan. 7, 2007, and U.S. patent application Ser. No. 11/960,674 (US 2008-0168365 A1), "Creating Digital Artwork Based On Content File Metadata," filed Dec. 19, 2007, the content of which is hereby incorporated by reference in its entirety.

[00720] Additional description of positioning a slider icon can be found in U.S. Provisional Patent Application No. 60/947,304, "Positioning a Slider Icon on a Portable Multifunction Device," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/968,064 (US 2008-0168395 A1), "Positioning a Slider Icon on a Portable Multifunction Device," filed Dec. 31, 2007, the content of which is hereby incorporated by reference in its entirety.

[00721] Additional description of word suggestion can be found in U.S. patent application Ser. No. 11/620,641 (US 2008-0167858 A1), "Method And System For Providing Word Recommendations For Text Input," filed Jan. 5, 2007, and U.S. patent application Ser. No. 11/620,642 (US 2008-0168366 A1), "Method, System, And Graphical User Interface For Providing Word Recommendations," filed Jan. 5, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00722] Additional description of calendars can be found in U.S. Provisional Patent Application No. 60/883,820, "System And Method For Viewing And Managing Calendar Entries," filed Jan. 7, 2007, and U.S. patent application Ser. No. 11/969,786 (US 2008-0165151 A1), "System and Method for Viewing And Managing Calendar Entries," filed Jan. 4, 2008, the content of which is hereby incorporated by reference in its entirety.

[00723] Additional description of inputting date and time information can be found in U.S. Provisional Patent Application No. 60/947,146, "System, Method, and Graphical User Interface for Inputting Date and Time Information on a Portable Multifunction Device," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/968,051 (US 2008-0165149 A1), "System, Method, and

Graphical User Interface for Inputting Date and Time Information on a Portable Multifunction Device," filed Dec. 31, 2007, the content of which is hereby incorporated by reference in its entirety.

[00724] Additional description of user created widgets can be found in U.S. Provisional Patent Application Nos. 60/883,805, "Web Clip Widgets On A Portable Multifunction Device," filed Jan. 7, 2007, and 60/946,712, "Web Clip Widgets on a Portable Multifunction Device," filed Jun. 27, 2007, and U.S. patent application Ser. No. 11/850,011 (US 2008-0055273 A1), "Web Clip Widgets On a Portable Multifunction Device," filed Sep. 4, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00725] Additional description of providing maps and directions can be found in U.S. Provisional Patent Application No. 60/936,725, "Portable Multifunction Device, Method, and Graphical User Interface for Providing Maps and Directions," filed Jun. 22, 2007, and U.S. patent application Ser. No. 11/969,211 (US 2008-0168396 A1), "Portable Multifunction Device, Method, and Graphical User Interface for Providing Maps and Directions," filed Jan. 3, 2008, the content of which is hereby incorporated by reference in its entirety.

[00726] Additional description of displaying notification information for missed communications can be found in U.S. Provisional Patent Application No. 60/883,804, "System And Method For Displaying Communication Notifications," filed Jan. 7, 2007 and U.S. patent application Ser. No. 11/770,718 (US 2008-0220752 A1), "Portable Multifunction Device, Method, and Graphical User Interface for Managing Communications Received While in a Locked State," filed Jun. 28, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00727] Additional description of methods for silencing a portable device can be found in U.S. Provisional Patent Application No. 60/883,802, "Portable Electronic Device With Alert Silencing," filed Jan. 7, 2007 and U.S. patent application Ser. No. 11/770,727 (US 2008-0165022 A1), "Portable Electronic Device with Alert Silencing," filed Jun. 28, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00728] Additional description of methods for turning off a portable device can be found in U.S. Provisional Patent Application No. 60/883,786, "Power-Off Methods For Portable Electronic Devices," filed Jan. 6, 2007, and U.S. patent application Ser. No. 11/770,722 (US 2008-0168290 A1), "Power-Off Methods For Portable Electronic Devices," filed Jun. 28, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00729] Additional description of determining a cursor position from a finger contact can be found in U.S. Provisional Patent Application No. 60/946,716, "Methods for Determining a Cursor Position from a Finger Contact with a Touch Screen Display," filed Jun. 27, 2007, and U.S. patent

application Ser. No. 11/850,015 (US 2008-0094356 A1), "Methods for Determining a Cursor Position from a Finger Contact with a Touch Screen Display," filed Sep. 4, 2007, the content of which is hereby incorporated by reference in its entirety.

[00730] Additional description of the horizontal and vertical bars can be found in U.S. Provisional Patent Application No. 60/947,386, "Portable Electronic Device, Method, and Graphical User Interface for Displaying Electronic Documents and Lists," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/968,059 (US 2008-0168349 A1), "Portable Electronic Device, Method, and Graphical User Interface for Displaying Electronic Documents and Lists," filed Dec. 31, 2007, the content of which is hereby incorporated by reference in its entirety.

[00731] Additional description of gestures can be found in U.S. Provisional Patent Application Nos. 60/883,817, "Portable Electronic Device Performing Similar Operations For Different Gestures," filed Jan. 7, 2007, and 60/946,970, "Screen Rotation Gestures on a Portable Multifunction Device," filed Jun. 28, 2007, and U.S. patent application Ser. Nos. 11/850,638 (US 2008-0094370 A1), "Portable Electronic Device Performing Similar Operations For Different Gestures," filed Sep. 5, 2007, and 11/960,667 (US 2008-0211778 A1), "Screen Rotation Gestures on a Portable Multifunction Device," filed Dec. 19, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00732] Additional description of interpreting a finger gesture can be found in U.S. Provisional Patent Application No. 60/946,977, "Portable Multifunction Device, Method, and Graphical User Interface for Interpreting a Finger Gesture on a Touch Screen Display," filed Jun. 28, 2007, and U.S. patent application Ser. No. 11/969,796 (US 2008-0165160 A1), "Portable Multifunction Device, Method, and Graphical User Interface for Interpreting a Finger Gesture on a Touch Screen Display," filed Jan. 4, 2008, the content of which is hereby incorporated by reference in its entirety.

[00733] Additional description of interpreting a finger swipe gesture can be found in U.S. Provisional Patent Application No. 60/947,140, "Portable Multifunction Device, Method, and Graphical User Interface for Interpreting a Finger Swipe Gesture," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/961,700 (US 2008-0165145 A1), "Portable Multifunction Device, Method, and Graphical User Interface for Interpreting a Finger Swipe Gesture," filed Dec. 20, 2007, the content of which is hereby incorporated by reference in its entirety.

[00734] Additional description of heuristics can be found in U.S. Provisional Patent Application No. 60/937,991, "Touch Screen Device, Method, and Graphical User Interface for Determining Commands by Applying Heuristics," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/850,635 (US 2008-0122796 A1), "Touch Screen Device, Method, and Graphical User Interface

for Determining Commands by Applying Heuristics," filed Sep. 5, 2007, the content of which is hereby incorporated by reference in its entirety.

[00735] Additional description of soft keyboards can be found in U.S. Provisional Patent Application No. 60/946,714, "Portable Multifunction Device with Soft Keyboards," filed Jun. 27, 2007, and U.S. patent application Ser. No. 11/961,663 (US 2008-0098331 A1), "Portable Multifunction Device with Soft Keyboards," filed Dec. 20, 2007, the content of which is hereby incorporated by reference in its entirety.

[00736] Additional description of keyboards can be found in U.S. Provisional Patent Application No. 60/883,806, "Soft Keyboard Display For A Portable Multifunction Device," filed Jan. 7, 2007, and U.S. patent application Ser. No. 11/850,641 (US 2008-0082934 A1), "Soft Keyboard Display For A Portable Multifunction Device," filed Sep. 5, 2007, the content of which is hereby incorporated by reference in its entirety.

[00737] Additional description of airplane mode indicators can be found in U.S. Provisional Patent Application No. 60/947,315, "Airplane Mode Indicator on a Portable Multifunction Device," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/961,743 (US 2008-0165146 A1), "Airplane Mode Indicator on a Portable Multifunction Device," filed Dec. 20, 2007, the content of which is hereby incorporated by reference in its entirety.

[00738] Additional description of dimming techniques can be found in U.S. Provisional Patent Application No. 60/883,821, "Portable Electronic Device With Auto-Dim Timers," filed Jan. 7, 2007, and U.S. patent application Ser. No. 11/960,677 (US 2008-0218535 A1), "Portable Electronic Device With Auto-Dim Timers," filed Dec. 19, 2007, the content of which is hereby incorporated by reference in its entirety.

[00739] Additional description of settings-related techniques can be found in U.S. Provisional Patent Application No. 60/883,812, "Portable Electronic Device With A Global Setting User Interface," filed Jan. 7, 2007, and U.S. patent application Ser. No. 11/960,669 (US 2008-0222545 A1), "Portable Electronic Device With A Global Setting User Interface," filed Dec. 19, 2007, the content of which is hereby incorporated by reference in its entirety.

[00740] In accordance with various embodiments, a toolbox window is contemplated to have the functionality similar to that set forth in U.S. Pat. No. 7,600,193 to Gunderson entitled "A METHOD OF TRACKING DUAL MODE DATA OBJECTS USING RELATED THUMBNAILS AND TOOL ICONS IN A PALETTE WINDOW," the disclosure of which is wholly incorporated by reference herein.

[00741] U.S. Patent Application titled "Video Conferencing System Transcoder", Ser. No. 11/252,238 (US 2006-0087553 A1), which was filed Oct. 17, 2005, whose inventors are Michael L. Kenoyer and Michael V. Jenkins, is hereby incorporated by reference in its entirety as though fully and completely set forth herein.

[00742] Similarly, the conference may be a videoconference, and the videoconference may be established according to any of a variety of methods, e.g., the one described in patent application Ser. No. 11/252,238 (US 2006-0087553 A1), which was incorporated by reference above.

[00743] A proximity sensor may perform as described in U.S. patent application Ser. No. 11/241,839 (US 2006-0161871 A1), "Proximity Detector In Handheld Device," filed Sep. 30, 2005; Ser. No. 11/240,788 (US 2006-0161870 A1), "Proximity Detector In Handheld Device," filed Sep. 30, 2005; Ser. No. 11/620,702 (US 2008-0167834 A1), "Using Ambient Light Sensor To Augment Proximity Sensor Output"; Ser. No. 11/586,862 (US 2007-0075965 A1), "Automated Response To And Sensing Of User Activity In Portable Devices," filed Oct. 24, 2006; and Ser. No. 11/638,251 (US 2008-0140868 A1), "Methods And Systems For Automatic Configuration Of Peripherals," which are hereby incorporated by reference in their entirety.

[00744] In some embodiments, a user may rearrange the icons in UI, e.g., using processes described in U.S. patent application Ser. No. 11/459,602 (US 2007-0157089 A1), "Portable Electronic Device With Interface Reconfiguration Mode," filed Jul. 24, 2006, which is hereby incorporated by reference in its entirety. For example, a user may move application icons in and out of tray 408 using finger gestures.

[00745] While various embodiments have been described above, it should be understood that they have been presented by way of example only, and not limitation. Thus, the breadth and scope of a preferred embodiment should not be limited by any of the above-described exemplary embodiments, but should be defined only in accordance with the following claims and their equivalents.

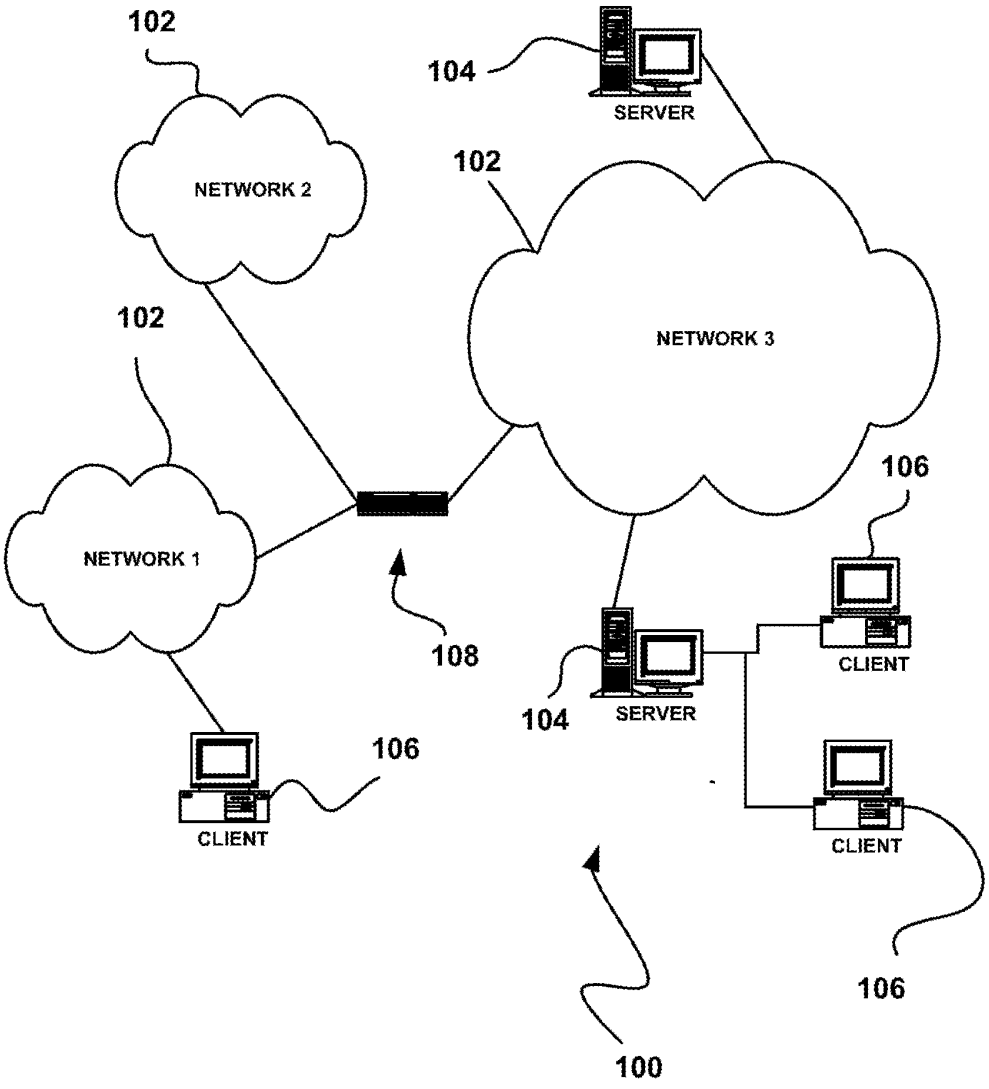

102
104
SERVER
NETWORK 2
102
NETWORK 3
102
106
NETWORK 1
108
104
SERVER
CLIENT
106
CLIENT
CLIENT
106
100

FIGURE 1

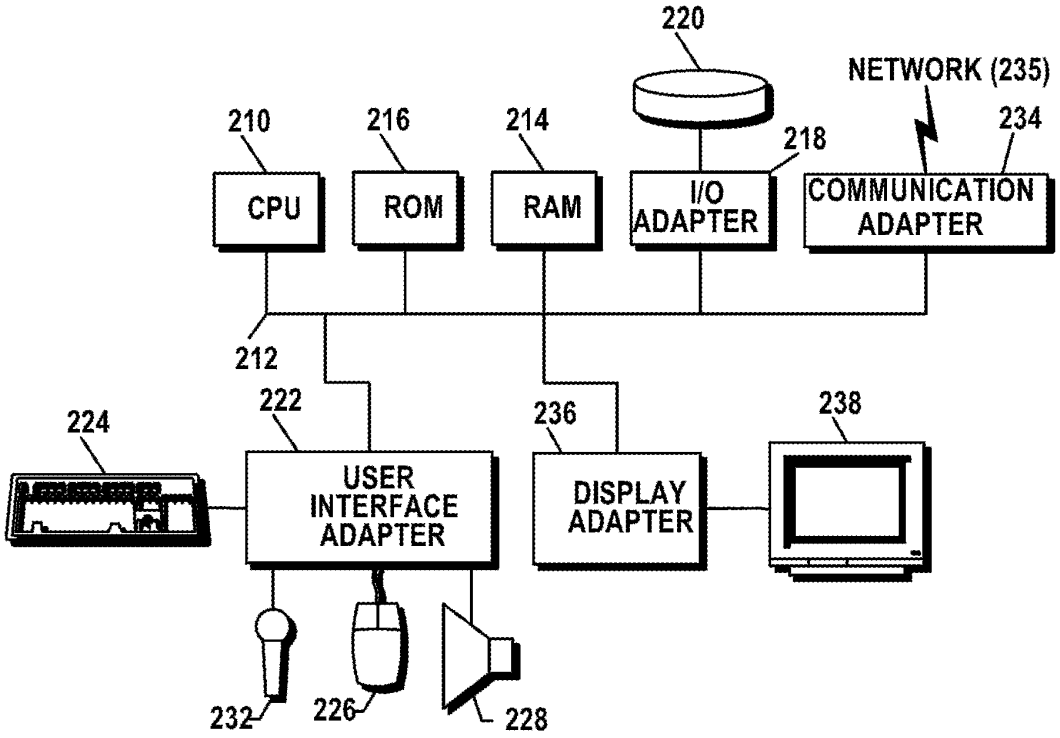

220
NETWORK (235)
210
216
214
218
234
CPU
ROM
RAM
I/O ADAPTER
COMMUNICATION ADAPTER
212
222
236
238
224
USER INTERFACE ADAPTER
DISPLAY ADAPTER
232
226
228

FIGURE 2

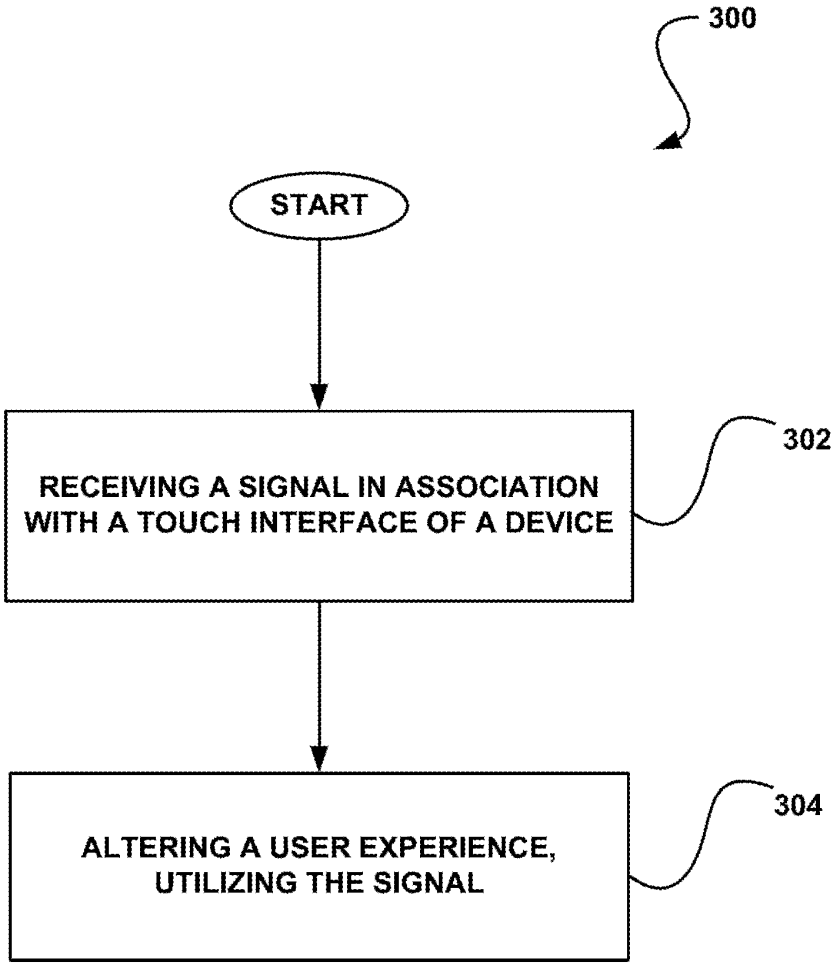

300
START
RECEIVING A SIGNAL IN ASSOCIATION WITH A TOUCH INTERFACE OF A DEVICE
302
ALTERING A USER EXPERIENCE, UTILIZING THE SIGNAL
304

FIGURE 3

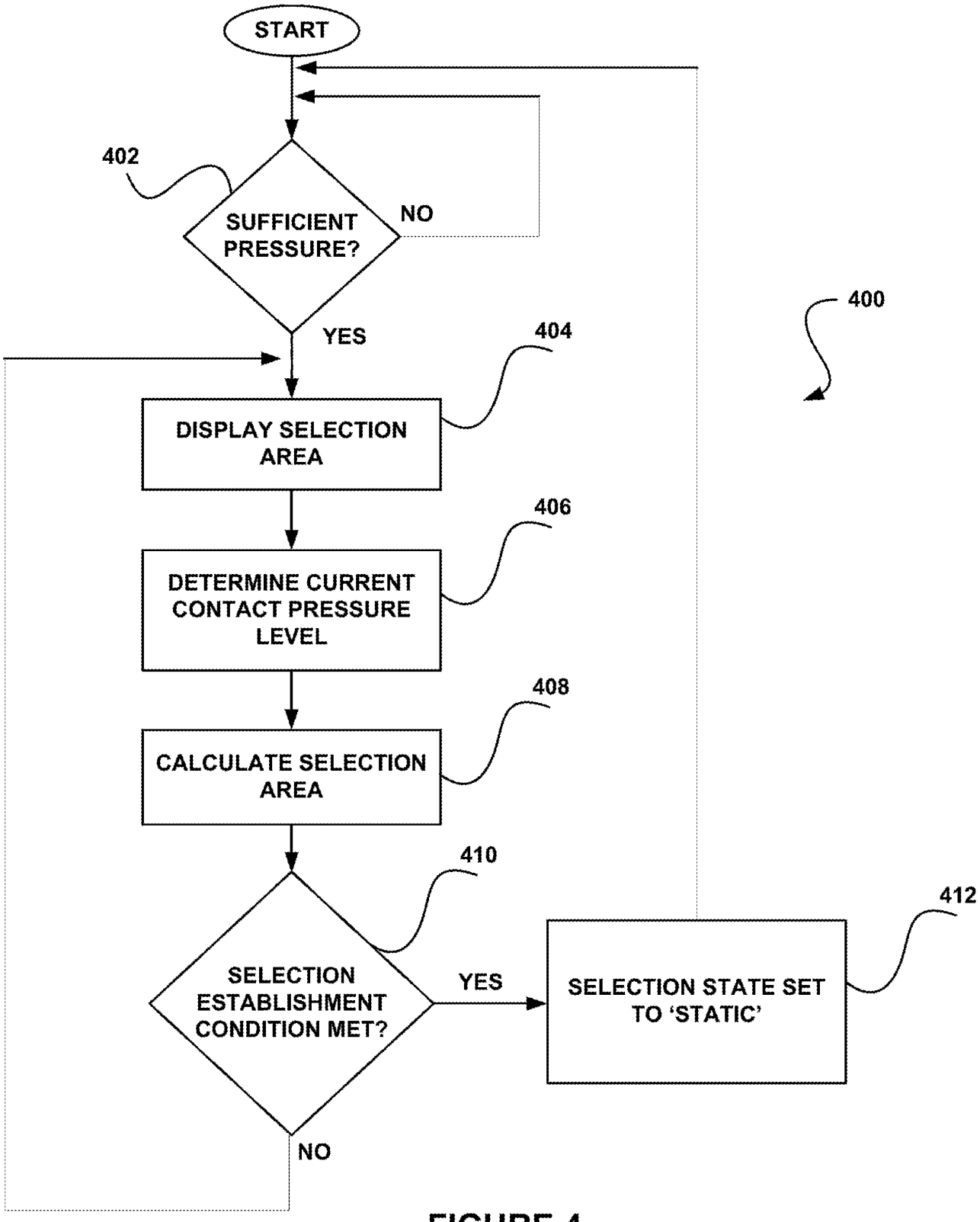

START
402
SUFFICIENT PRESSURE?
NO
YES
400
404
DISPLAY SELECTION AREA
406
DETERMINE CURRENT CONTACT PRESSURE LEVEL
408
CALCULATE SELECTION AREA
410
SELECTION ESTABLISHMENT CONDITION MET?
YES
412
SELECTION STATE SET TO 'STATIC'
NO

FIGURE 4

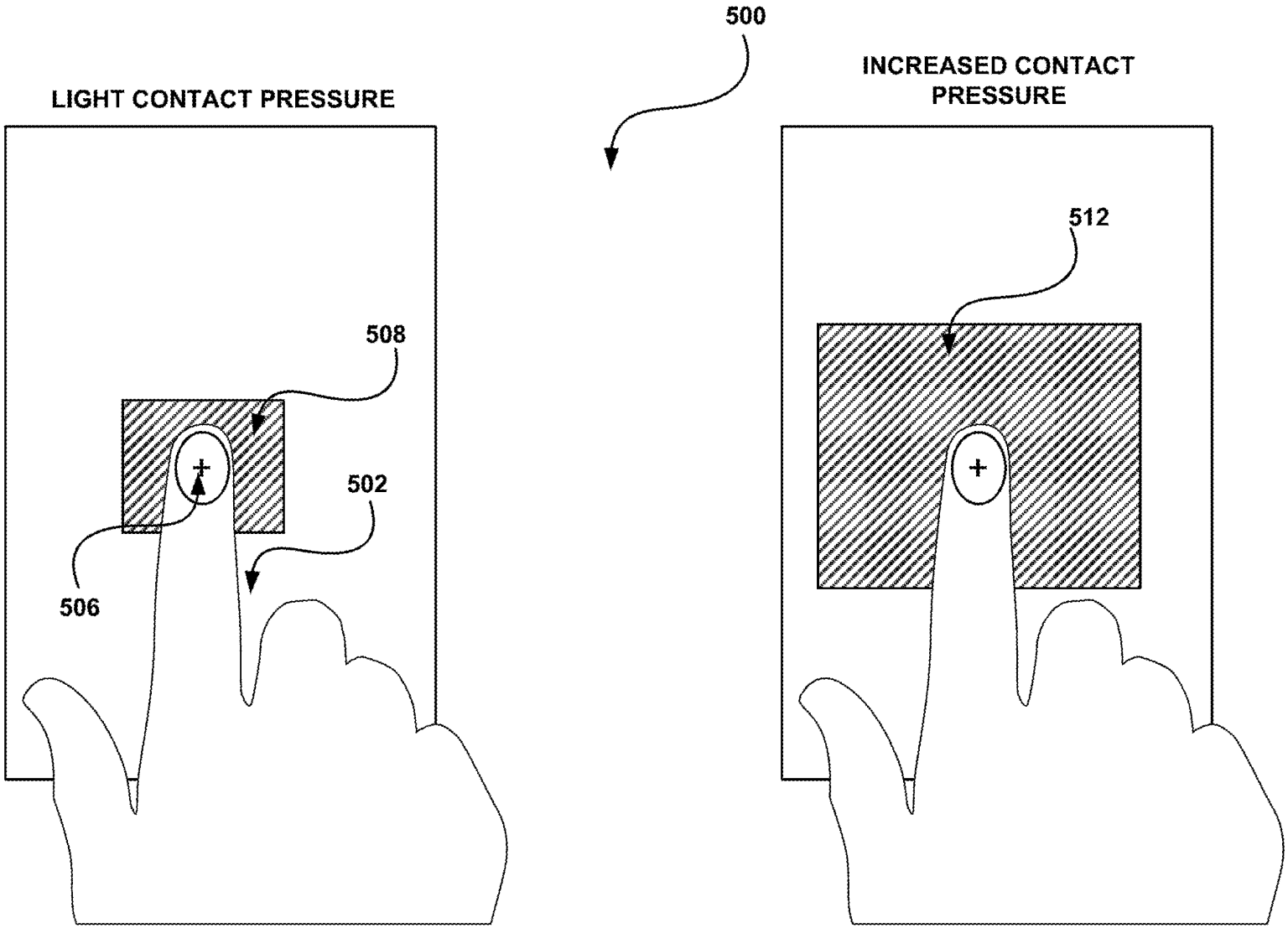

500
LIGHT CONTACT PRESSURE
INCREASED CONTACT PRESSURE
508
502
506
512

FIGURE 5

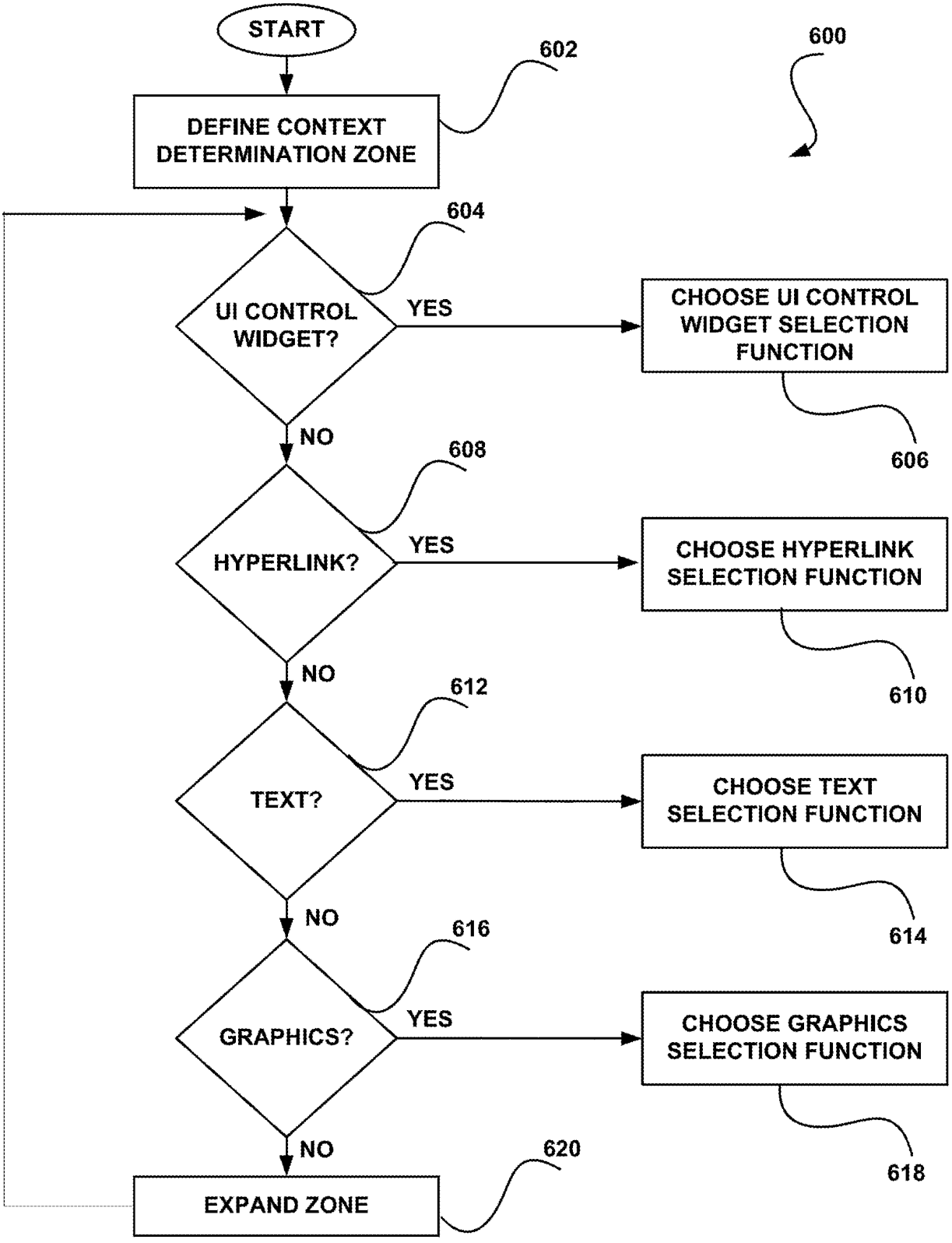

START
600
602
DEFINE CONTEXT DETERMINATION ZONE
604
UI CONTROL WIDGET?
YES
CHOOSE UI CONTROL WIDGET SELECTION FUNCTION
606
NO
608
HYPERLINK?
YES
CHOOSE HYPERLINK SELECTION FUNCTION
610
NO
612
TEXT?
YES
CHOOSE TEXT SELECTION FUNCTION
614
NO
616
GRAPHICS?
YES
CHOOSE GRAPHICS SELECTION FUNCTION
618
NO
620
EXPAND ZONE

FIGURE 6

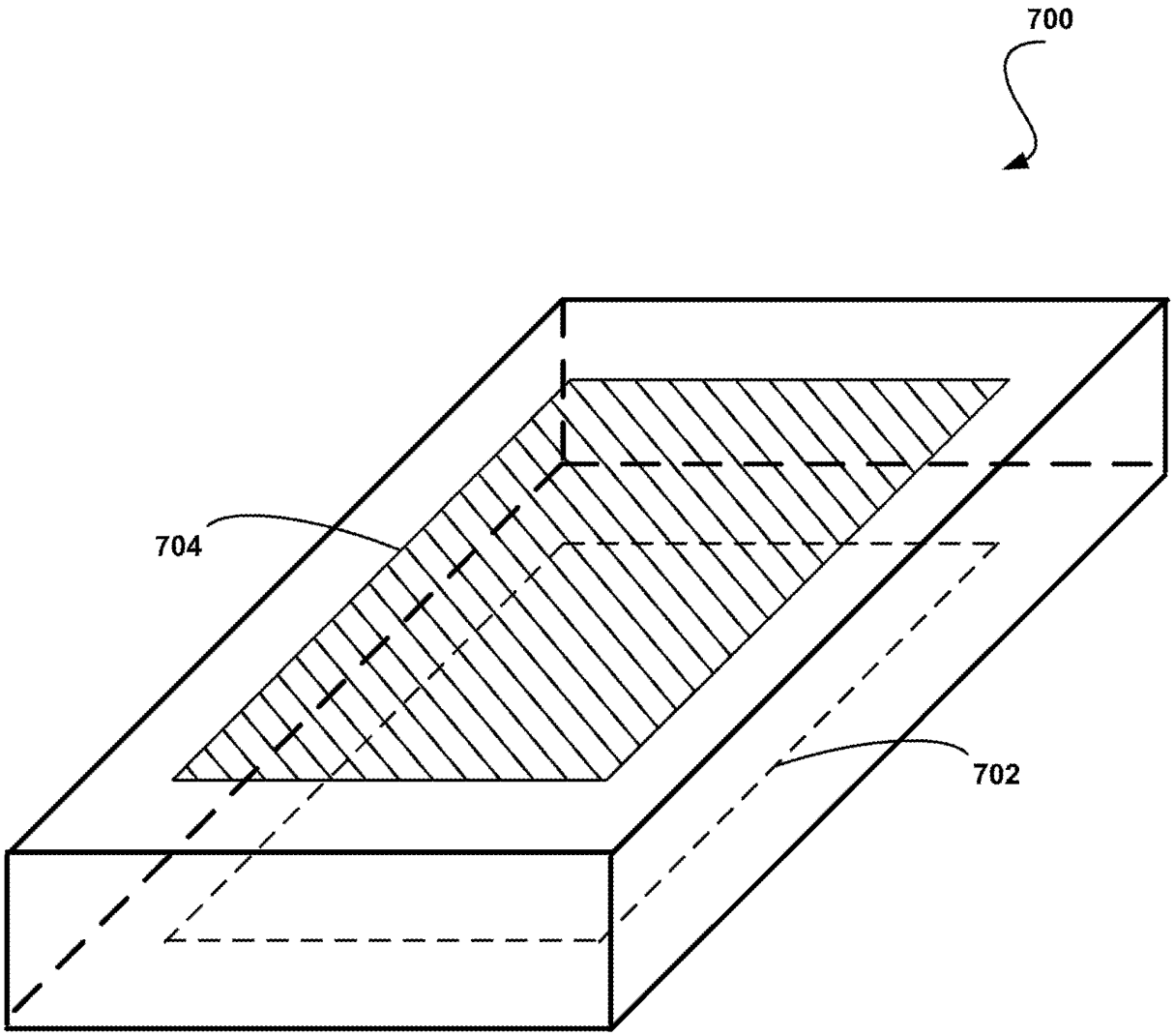


FIGURE 7

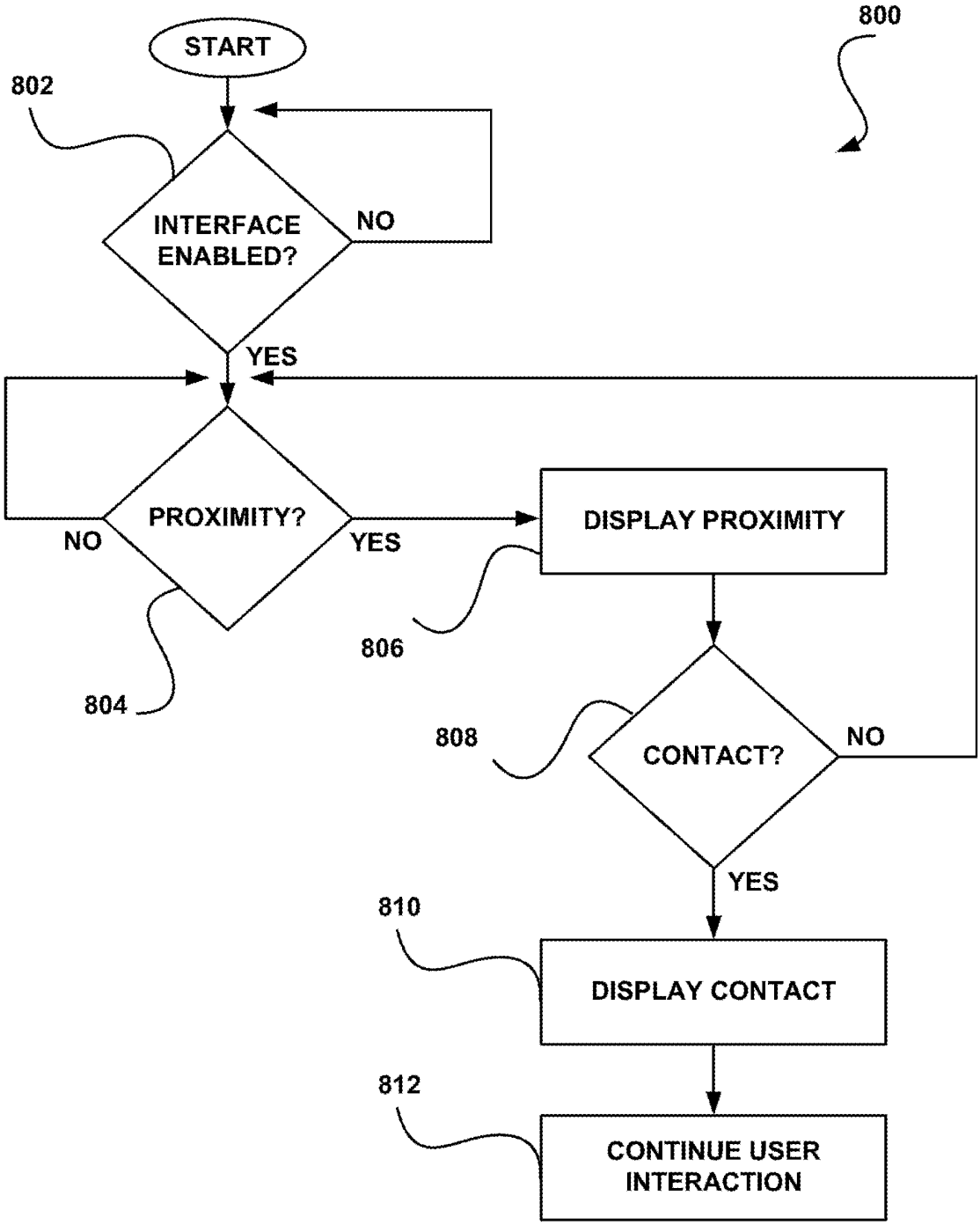

800
START
802
INTERFACE ENABLED?
NO
YES
PROXIMITY?
NO
YES
804
DISPLAY PROXIMITY
806
808
CONTACT?
NO
YES
810
DISPLAY CONTACT
812
CONTINUE USER INTERACTION

FIGURE 8

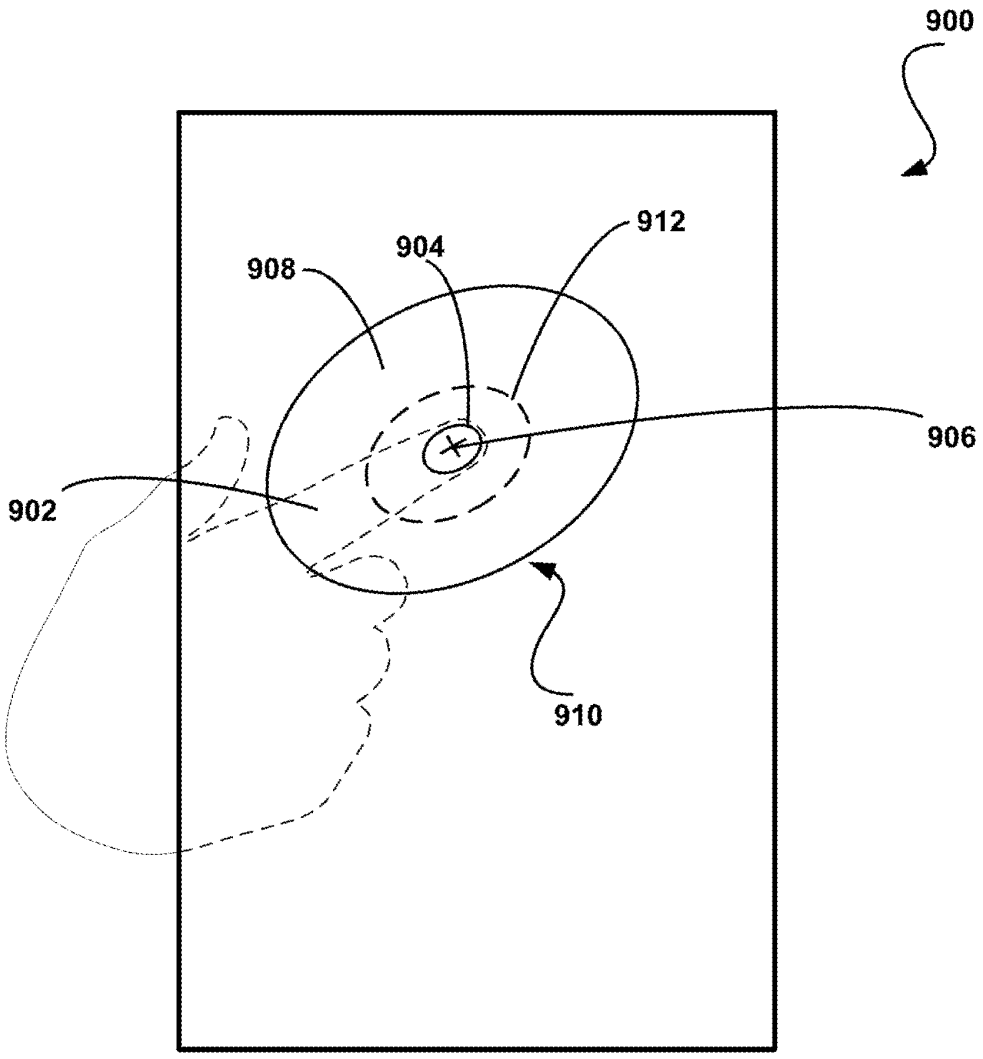


FIGURE 9

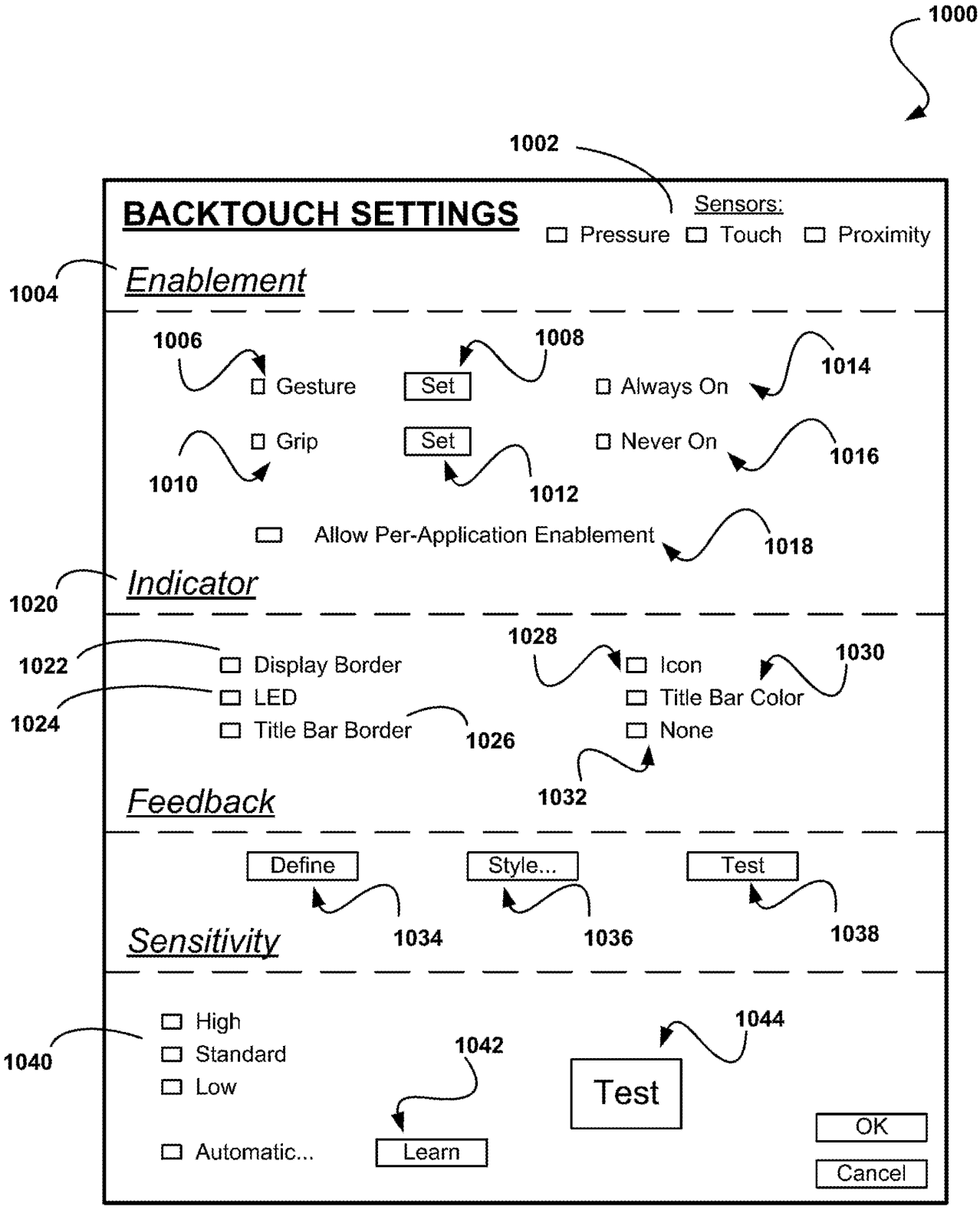

1000
1002
BACKTOUCH SETTINGS
Sensors:
Pressure
Touch
Proximity
1004
Enablement
1006
Gesture
Set
1008
Always On
1014
Grip
Set
Never On
1016
1010
1012
Allow Per-Application Enablement
1018
1020
Indicator
1022
Display Border
1028
Icon
1030
LED
Title Bar Color
1024
Title Bar Border
1026
None
1032
Feedback
Define
Style...
Test
Sensitivity
1034
1036
1038
1040
High
Standard
Low
1042
1044
Test
Automatic...
Learn
OK
Cancel

FIGURE 10

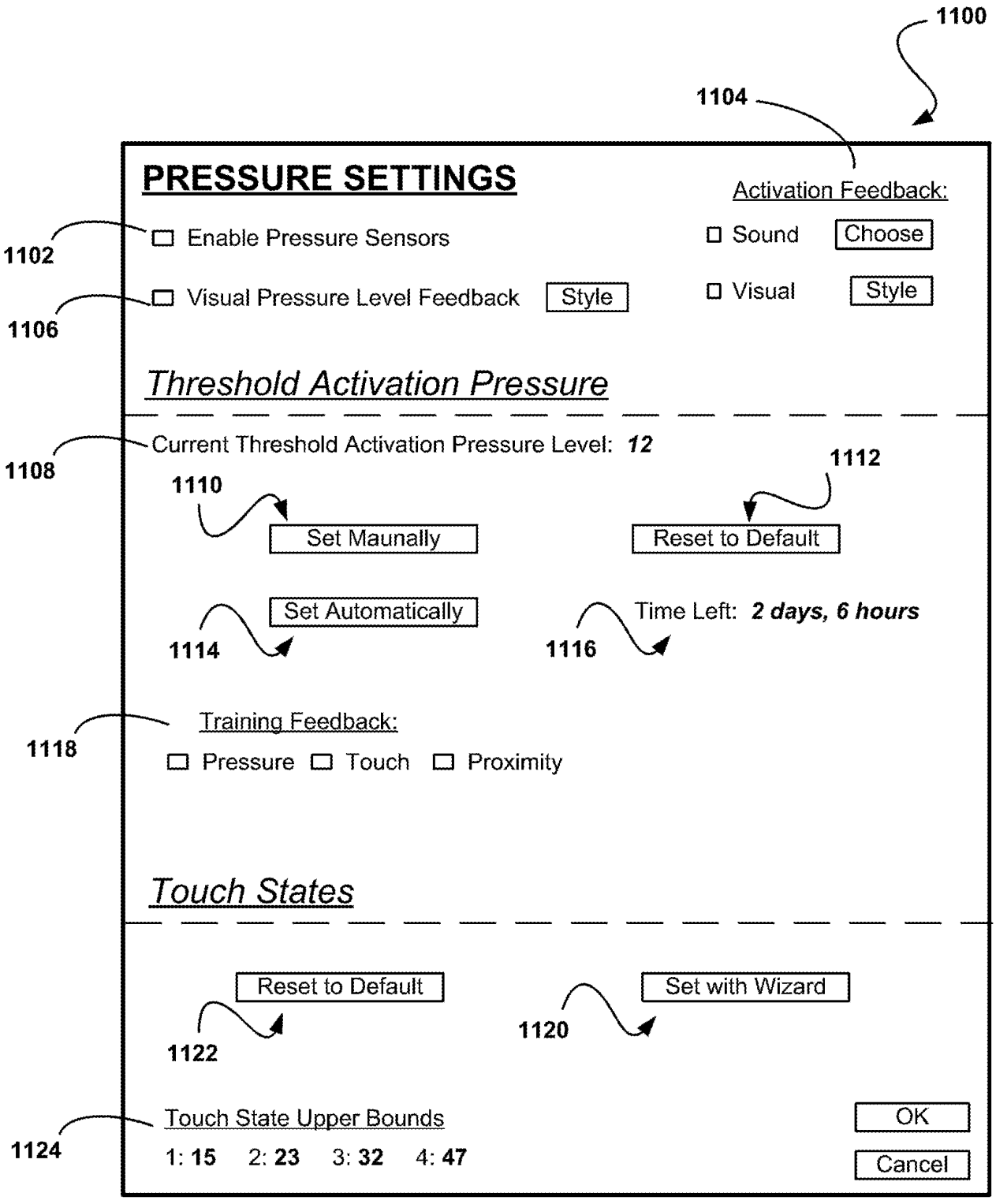

1100
1104
PRESSURE SETTINGS
Activation Feedback:
1102
Enable Pressure Sensors
Sound
Choose
1106
Visual Pressure Level Feedback
Style
Visual
Style
Threshold Activation Pressure
1108
Current Threshold Activation Pressure Level: 12
1110
1112
Set Maunally
Reset to Default
Set Automatically
1114
1116
Time Left: 2 days, 6 hours
1118
Training Feedback:
Pressure
Touch
Proximity
Touch States
Reset to Default
Set with Wizard
1122
1120
1124
Touch State Upper Bounds
1: 15 2: 23 3: 32 4: 47
OK
Cancel

FIGURE 11

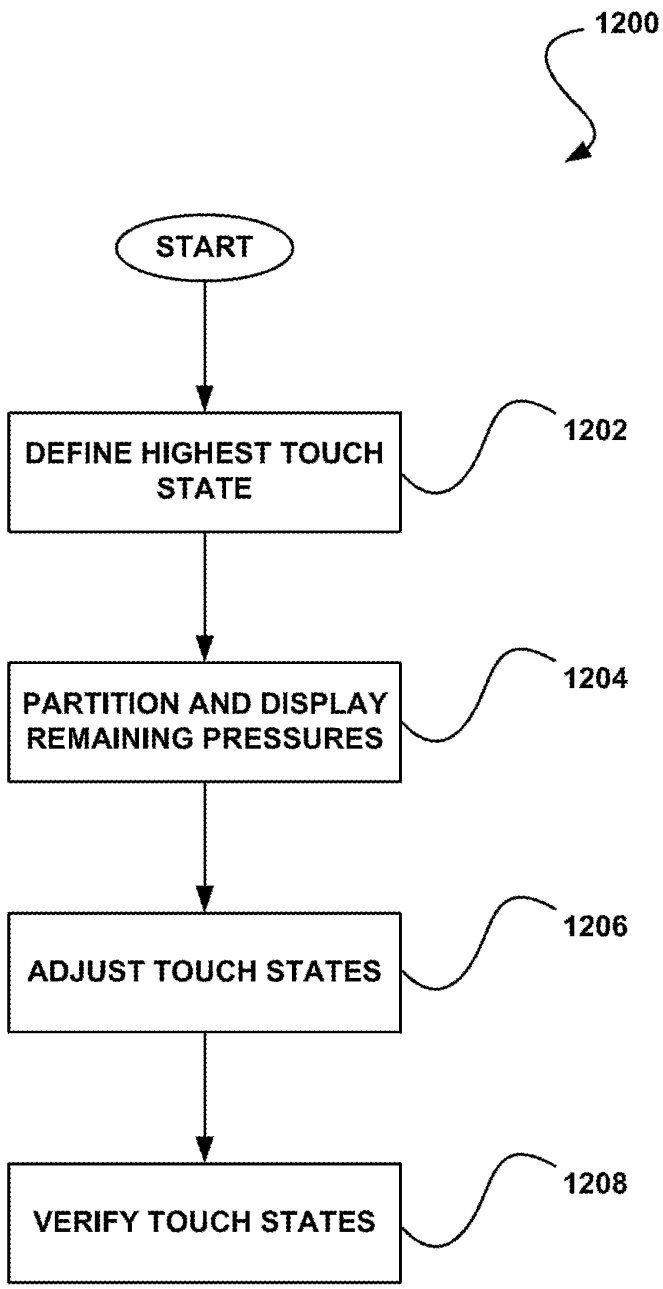

1200
START
DEFINE HIGHEST TOUCH STATE
1202
PARTITION AND DISPLAY REMAINING PRESSURES
1204
ADJUST TOUCH STATES
1206
VERIFY TOUCH STATES
1208

FIGURE 12

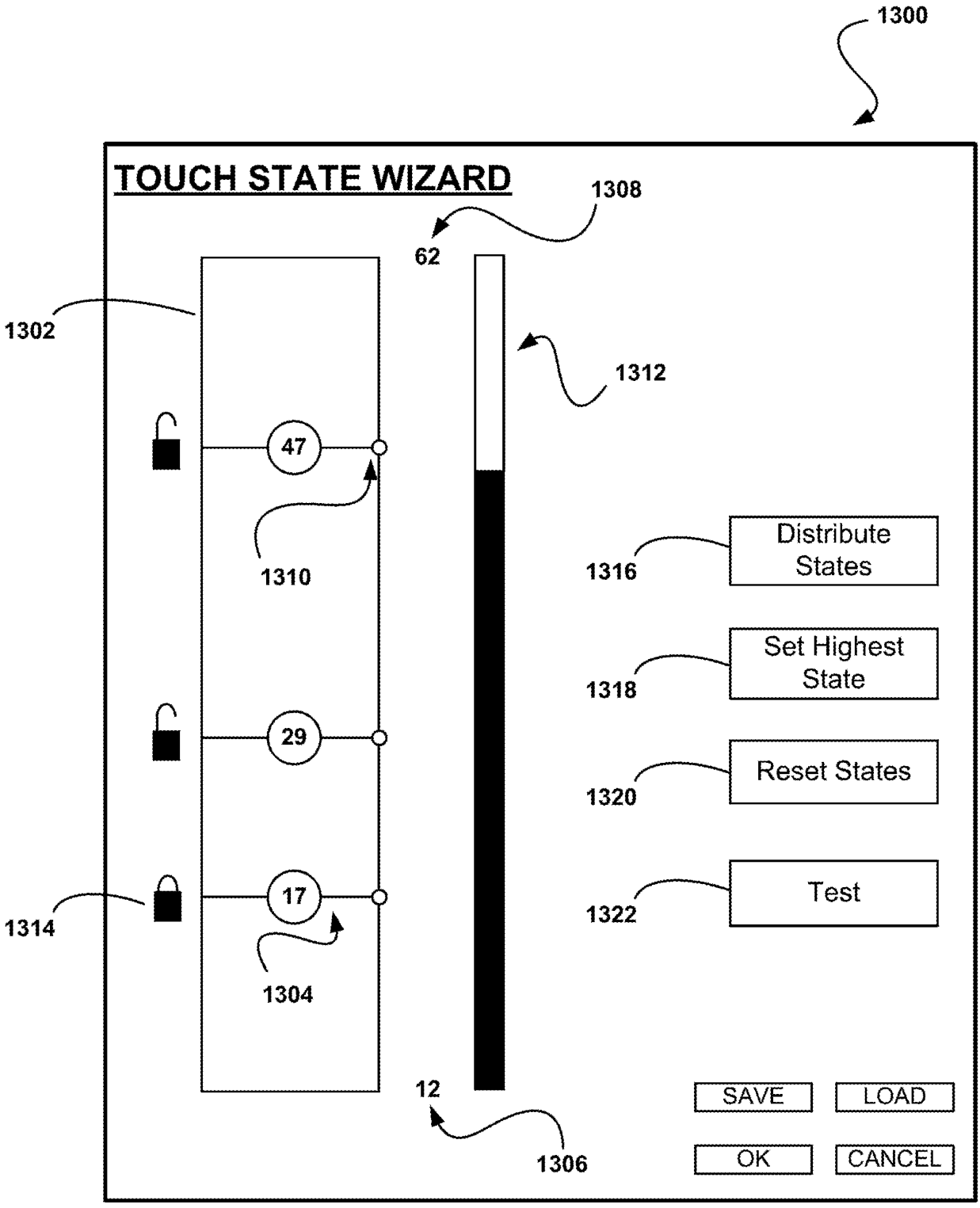

1300
TOUCH STATE WIZARD
1308
62
1302
1312
47
1310
1316
Distribute States
1318
Set Highest State
29
1320
Reset States
1322
Test
1314
17
1304
12
1306
SAVE
LOAD
OK
CANCEL

FIGURE 13

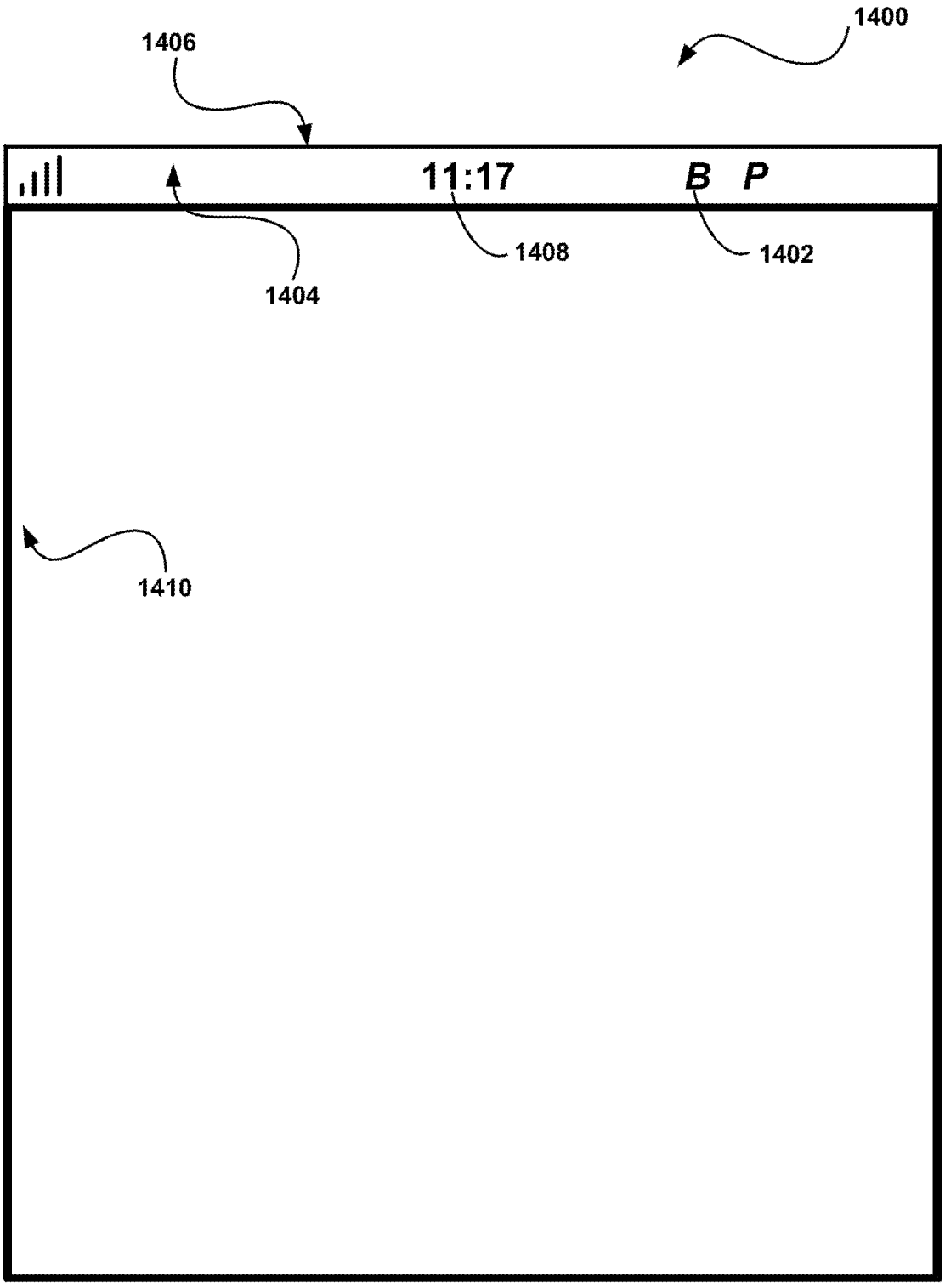


FIGURE 14

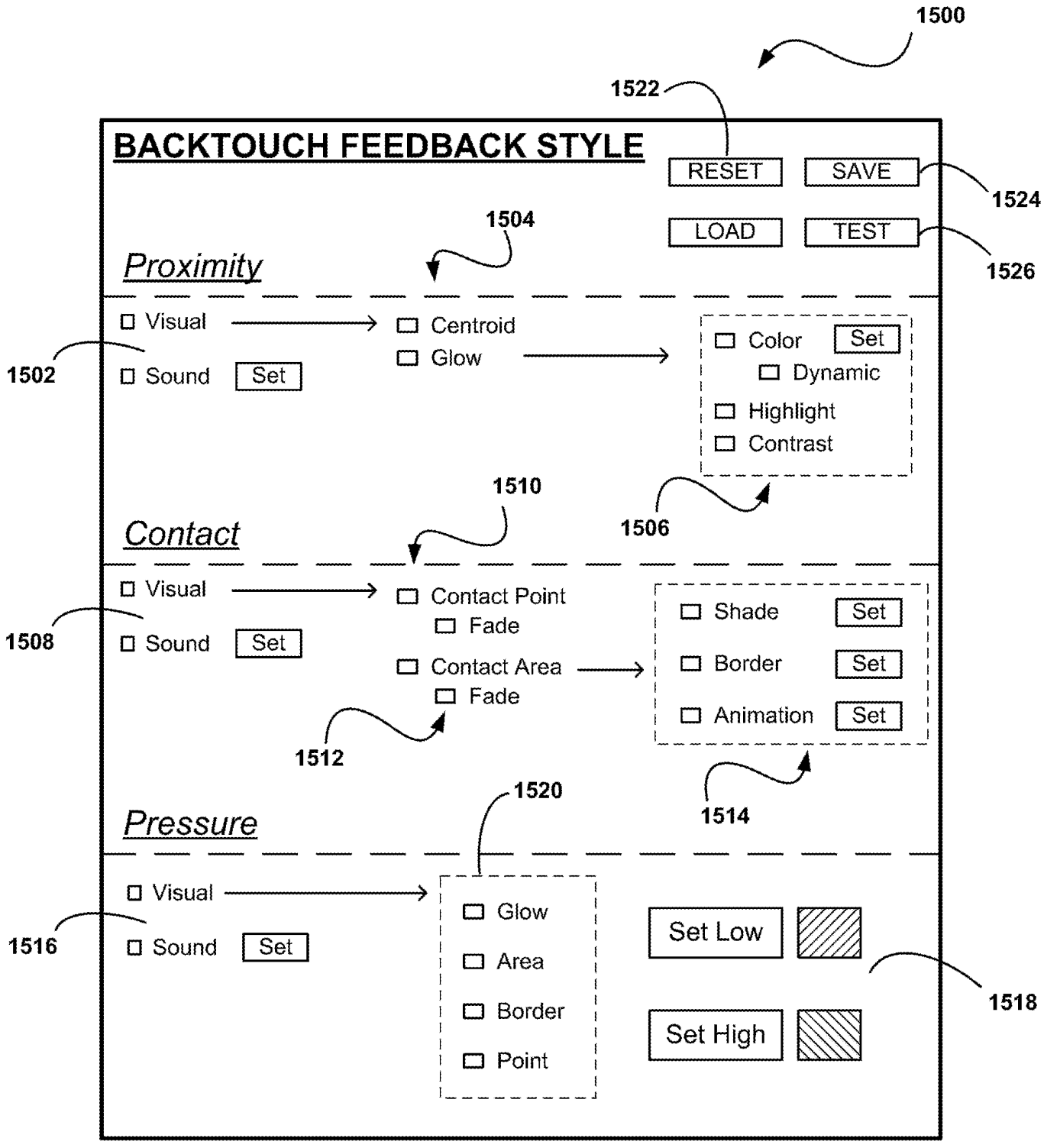

1500
1522
BACKTOUCH FEEDBACK STYLE
RESET
SAVE
1524
LOAD
TEST
1526
1504
Proximity
Visual
Centroid
Glow
Color
Set
Dynamic
Highlight
Contrast
1502
Sound
Set
1506
1510
Contact
Visual
Contact Point
Fade
Contact Area
Fade
Shade
Set
Border
Set
Animation
Set
1508
Sound
Set
1512
1514
1520
Pressure
Visual
Glow
Area
Border
Point
Set Low
Set High
1516
Sound
Set
1518

FIGURE 15

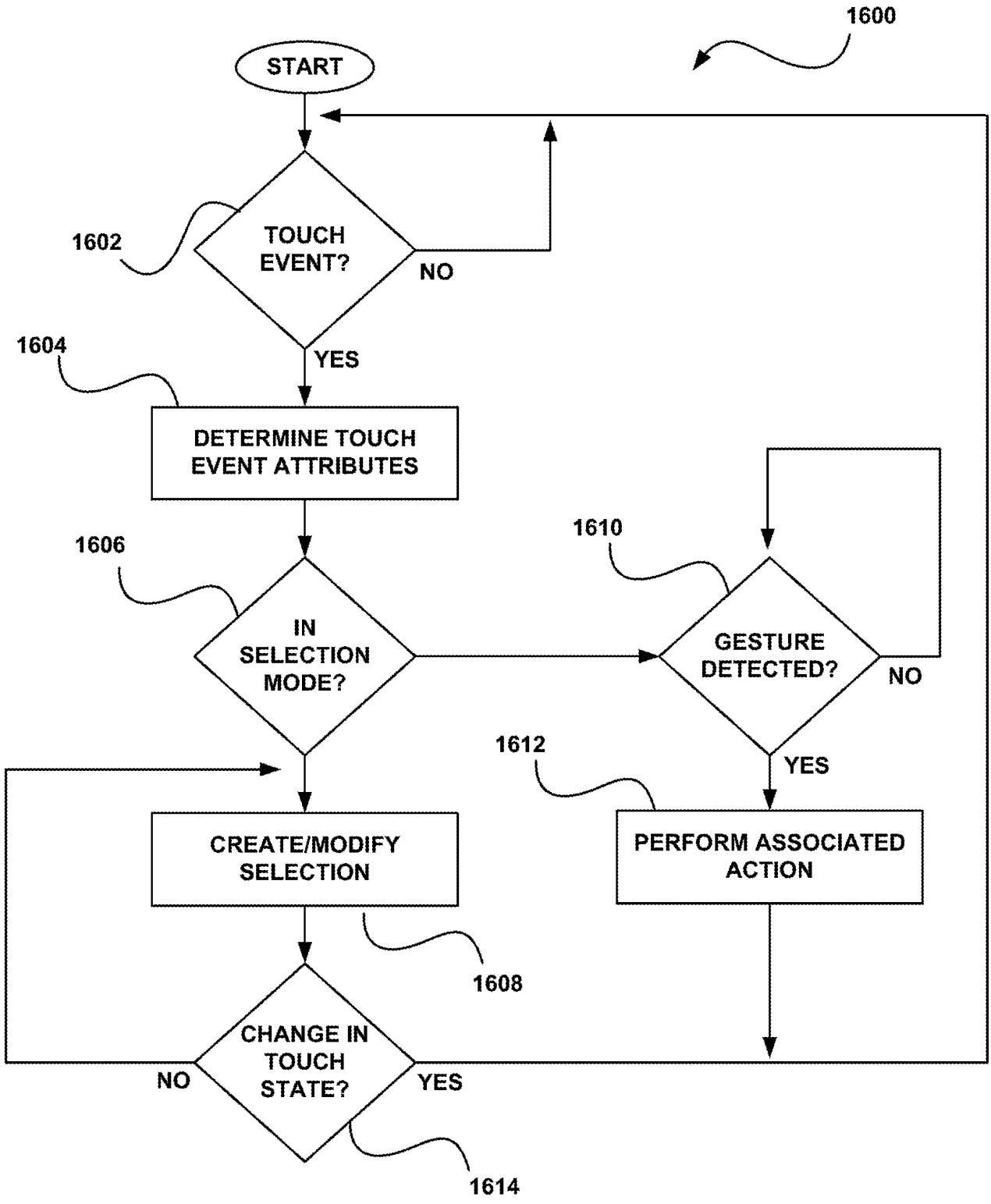

1600
START
TOUCH EVENT?
1602
NO
YES
1604
DETERMINE TOUCH EVENT ATTRIBUTES
1606
IN SELECTION MODE?
1610
GESTURE DETECTED?
NO
YES
1612
CREATE/MODIFY SELECTION
PERFORM ASSOCIATED ACTION
1608
CHANGE IN TOUCH STATE?
NO
YES
1614

FIGURE 16

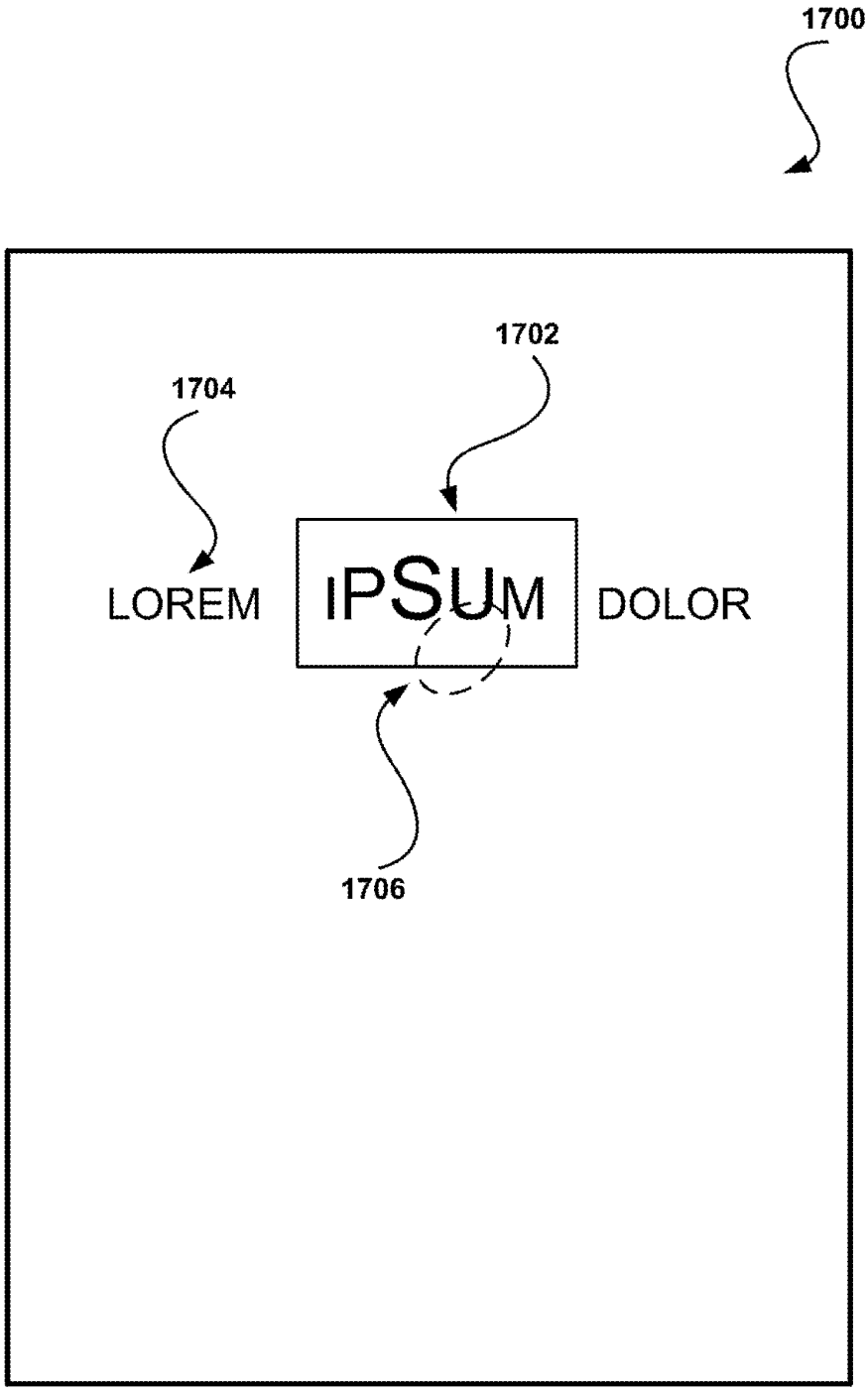


FIGURE 17

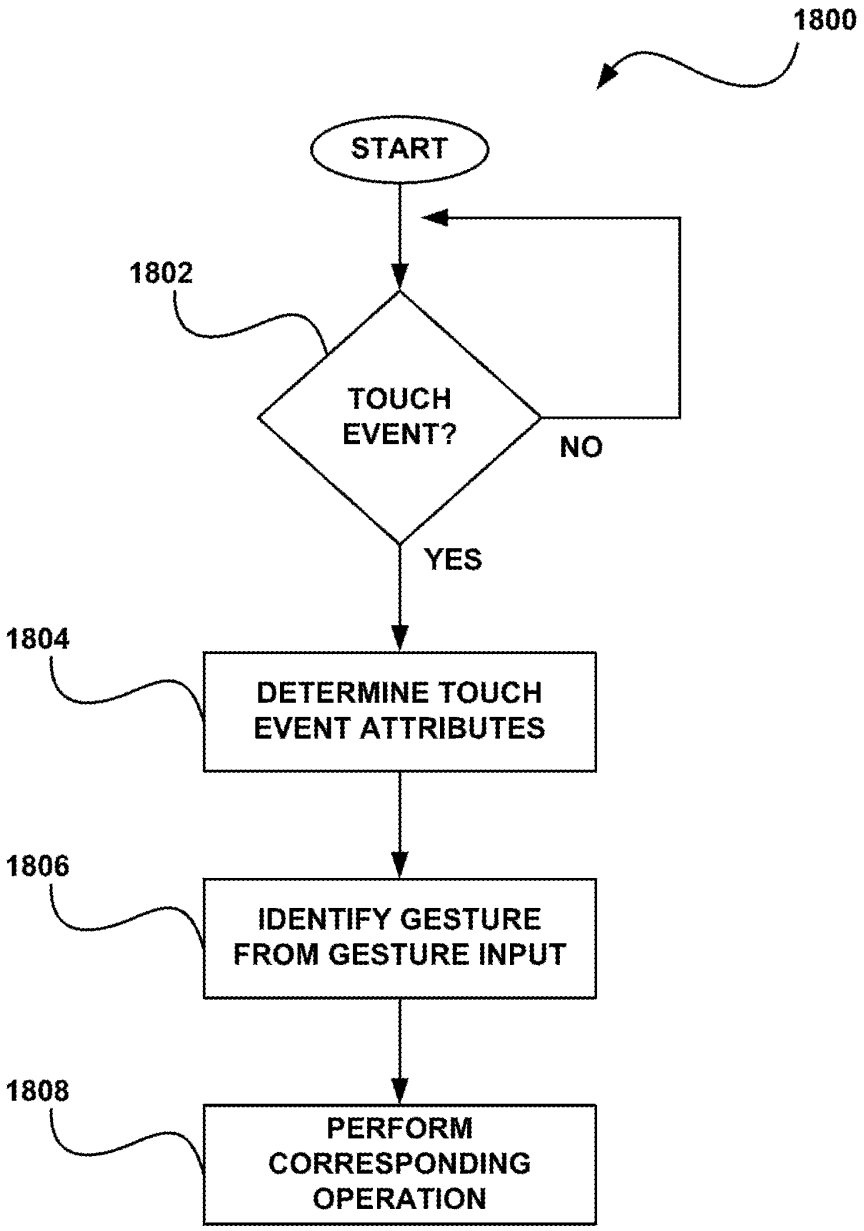

1800
START
1802
TOUCH EVENT?
NO
YES
1804
DETERMINE TOUCH EVENT ATTRIBUTES
1806
IDENTIFY GESTURE FROM GESTURE INPUT
1808
PERFORM CORRESPONDING OPERATION

FIGURE 18

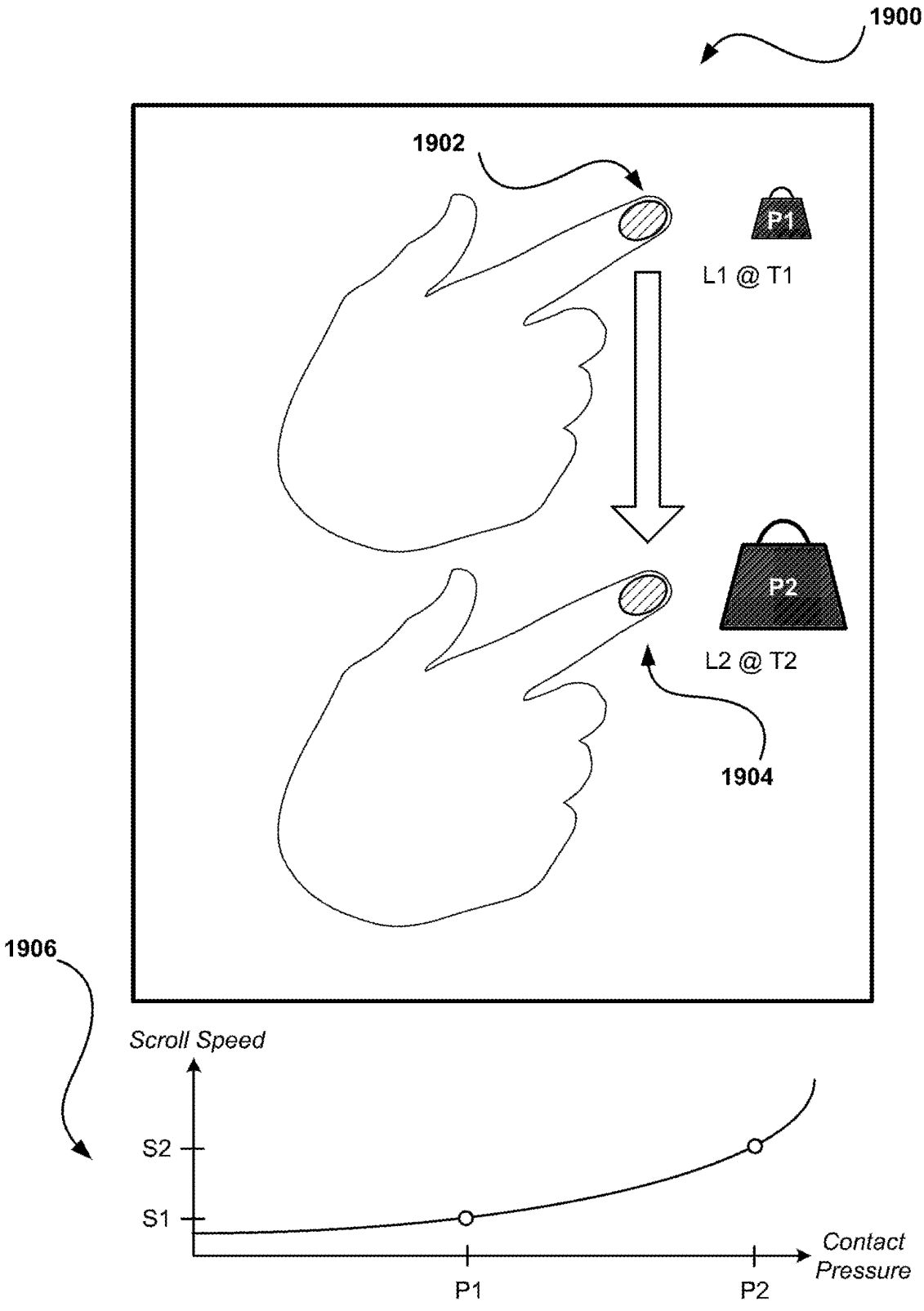

1900
1902
P1
L1 @ T1
P2
L2 @ T2
1904
1906
Scroll Speed
S2
S1
P1
P2
Contact Pressure

FIGURE 19

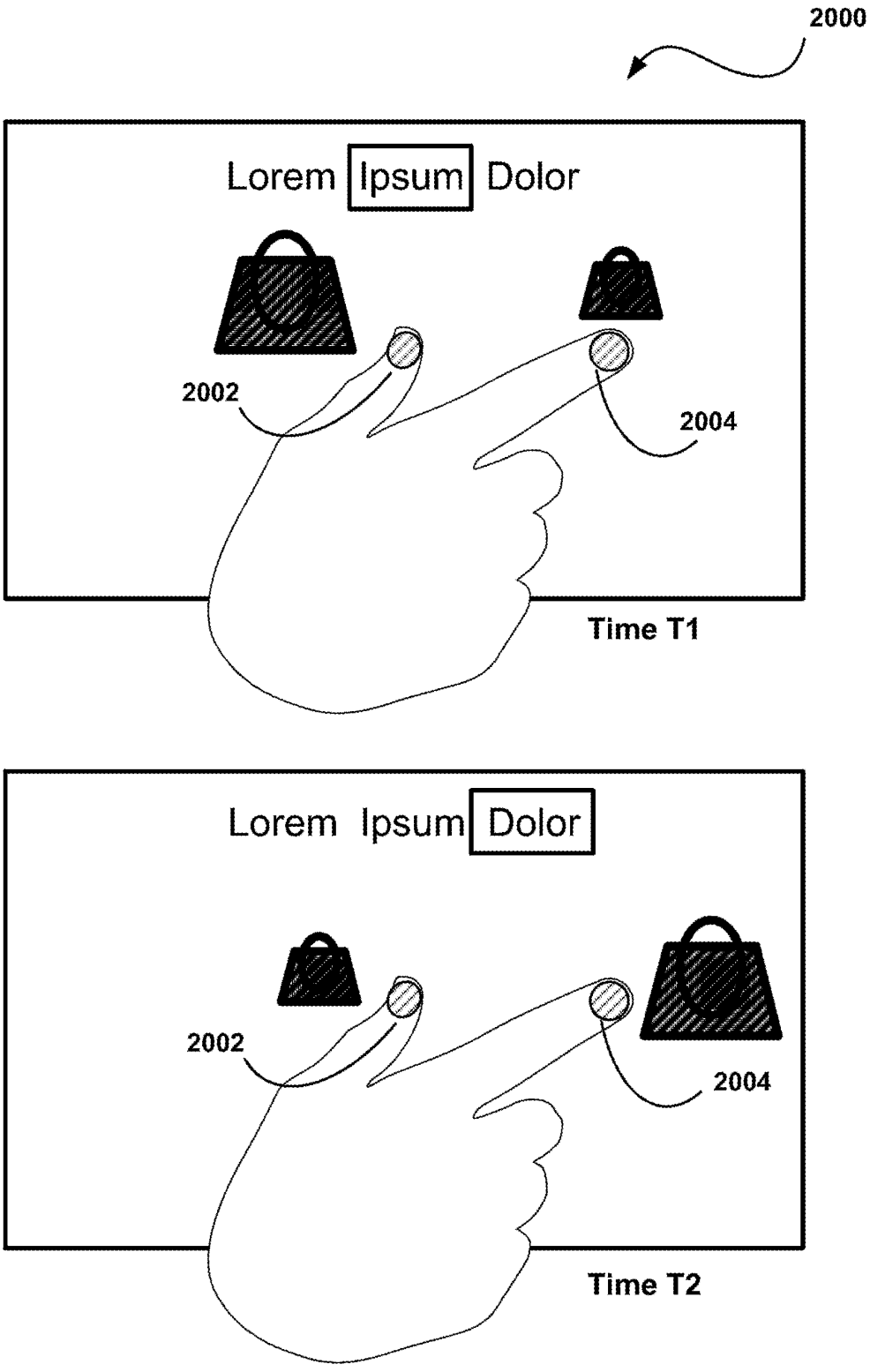

2000
Lorem Ipsum Dolor
2002
2004
Time T1
Lorem Ipsum Dolor
2002
2004
Time T2

FIGURE 20

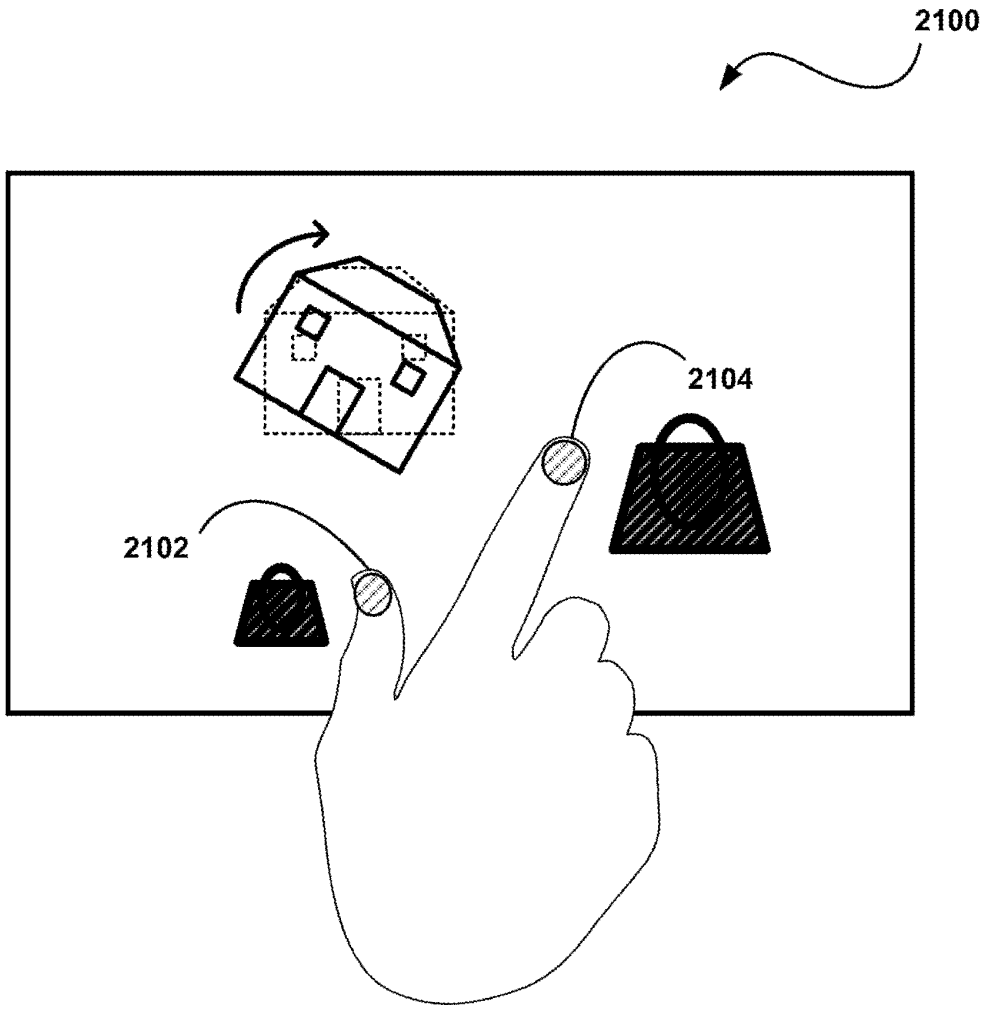


FIGURE 21

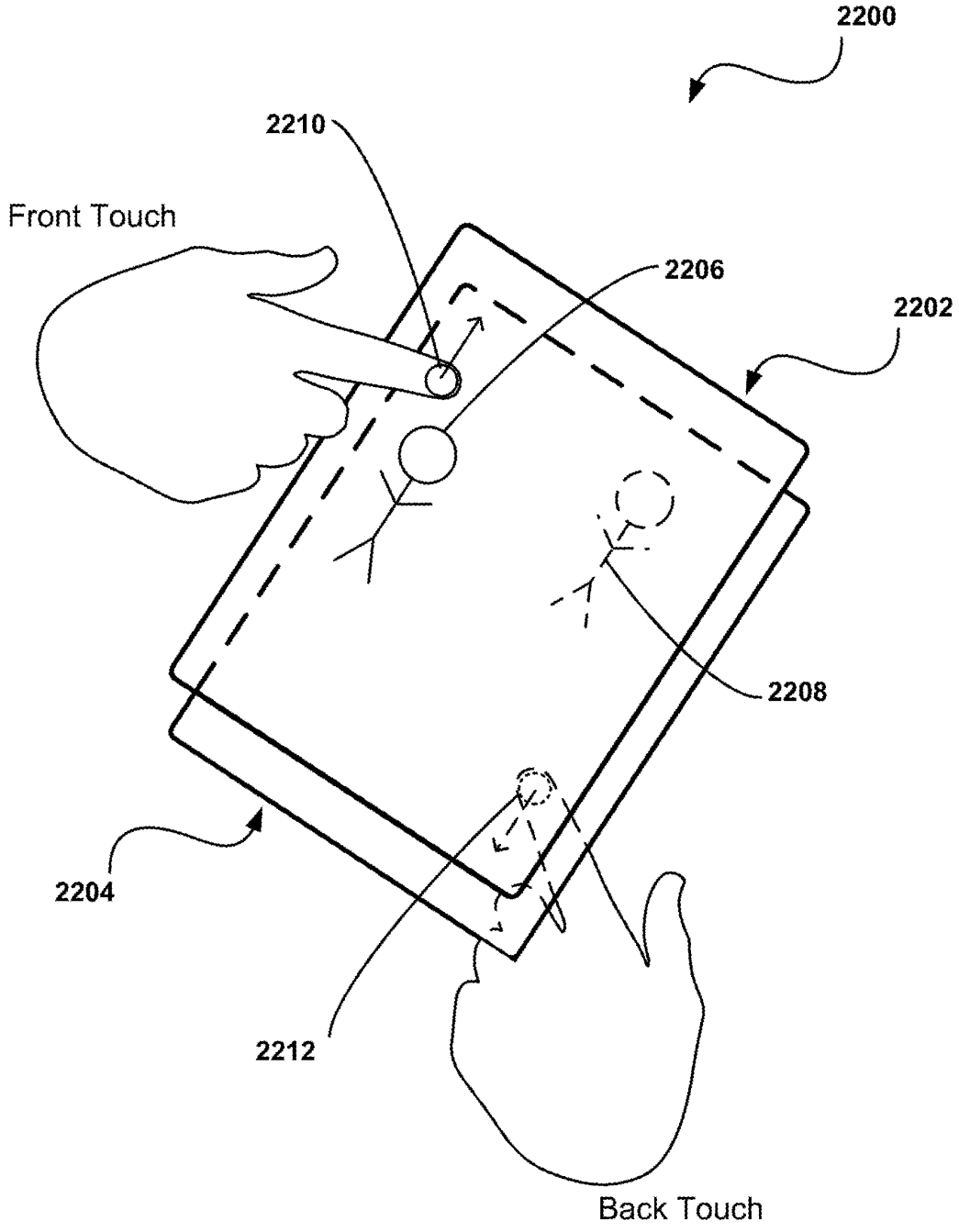


FIGURE 22

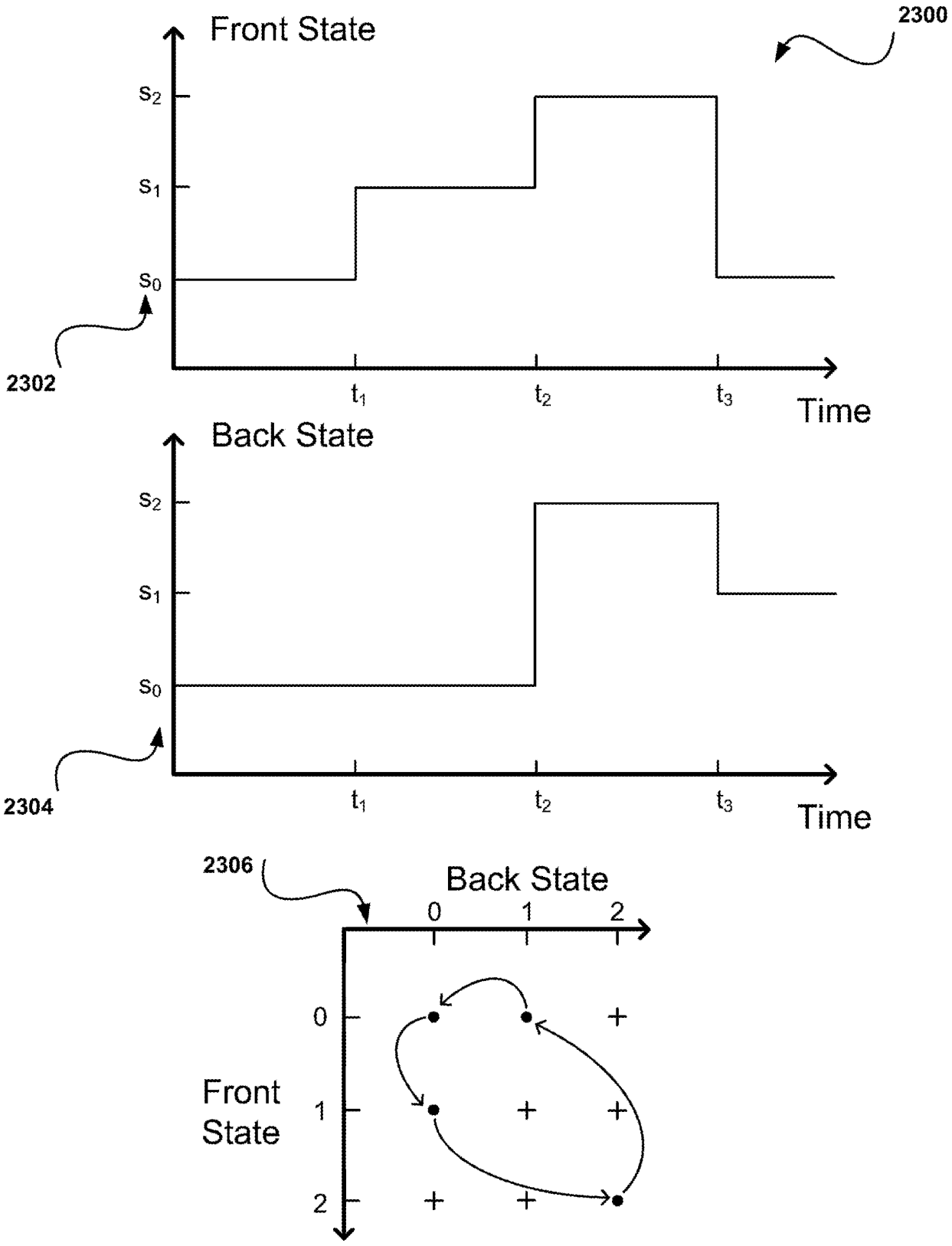

2300
Front State
s_2
s_1
s_0
2302
t_1
t_2
t_3
Time
Back State
s_2
s_1
s_0
2304
t_1
t_2
t_3
Time
2306
Back State
0
1
2
0
1
2
Front State
+

FIGURE 23

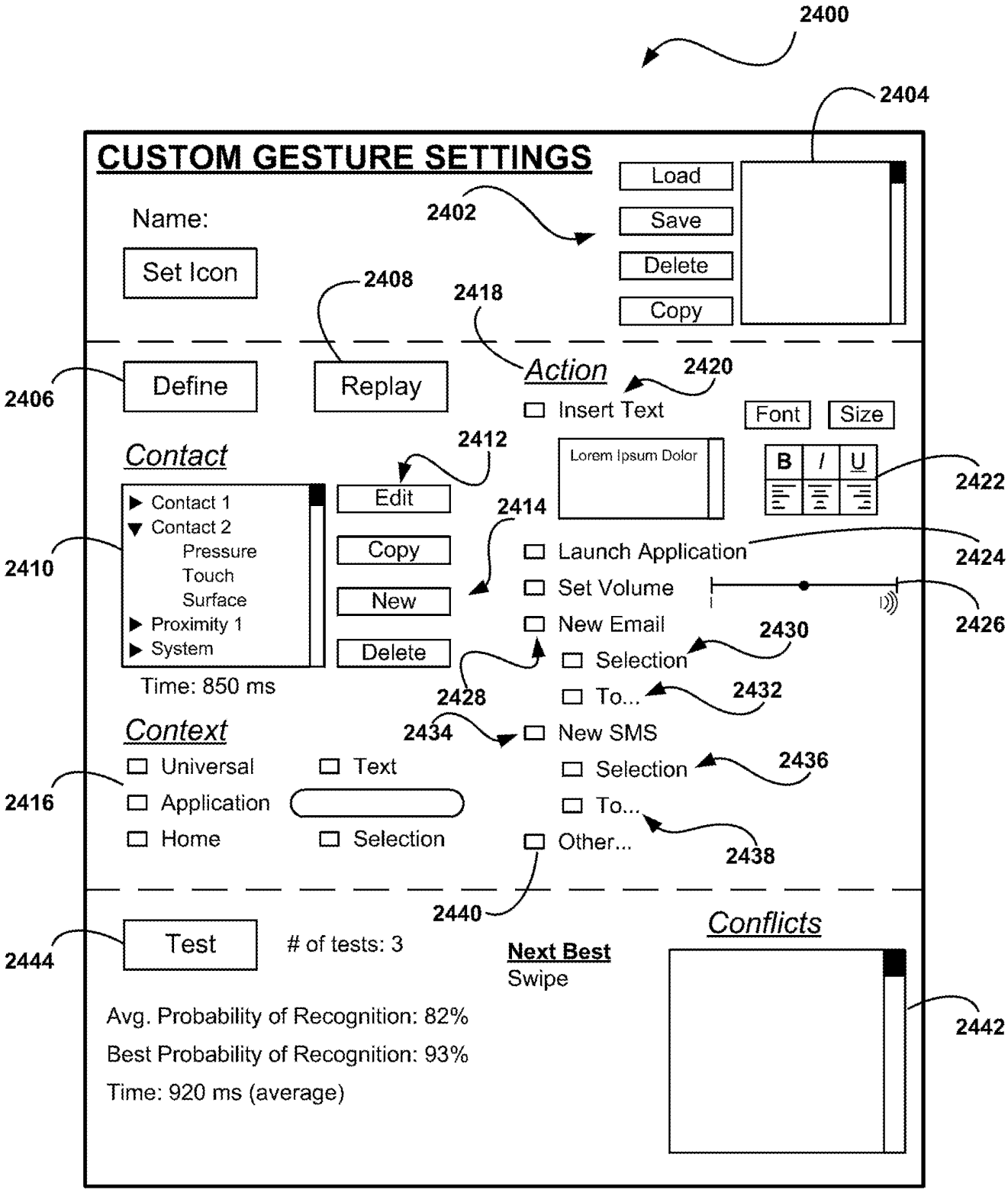

2400
2404
CUSTOM GESTURE SETTINGS
Load
Save
Delete
Copy
Name:
2402
Set Icon
2408
2418
2406
Define
Replay
Action
2420
Insert Text
Font
Size
Contact
2412
Lorem Ipsum Dolor
B
I
U
2422
Edit
2414
Contact 1
Contact 2
Pressure
Touch
Surface
Proximity 1
System
2410
Copy
New
Delete
Launch Application
2424
Set Volume
New Email
2426
2430
Selection
To...
2432
Time: 850 ms
2428
2434
Context
New SMS
Universal
Text
Selection
2436
2416
Application
To...
Home
Selection
Other...
2438
2440
Conflicts
2444
Test
of tests: 3
Next Best
Swipe
2442
Avg. Probability of Recognition: 82%
Best Probability of Recognition: 93%
Time: 920 ms (average)

FIGURE 24

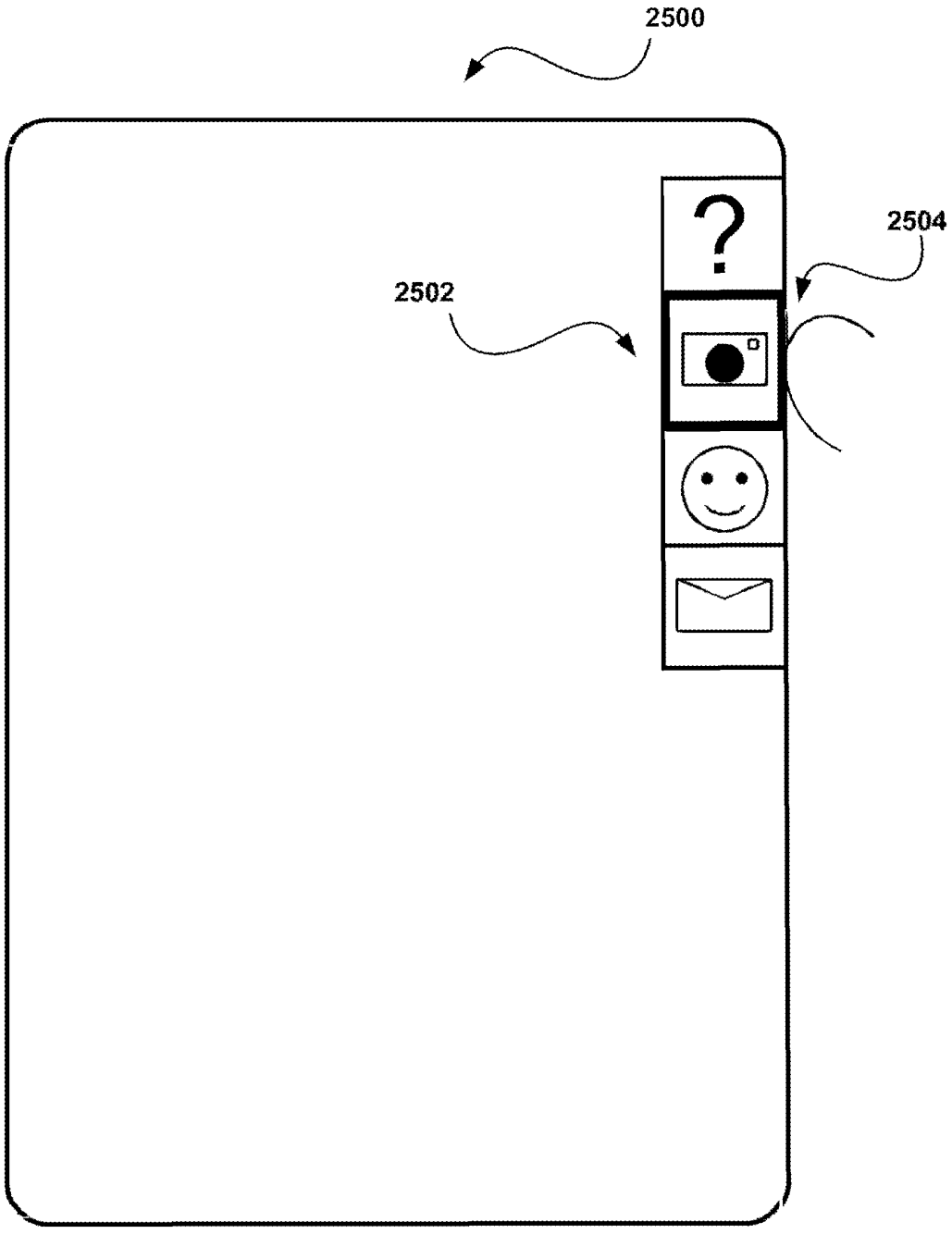


FIGURE 25

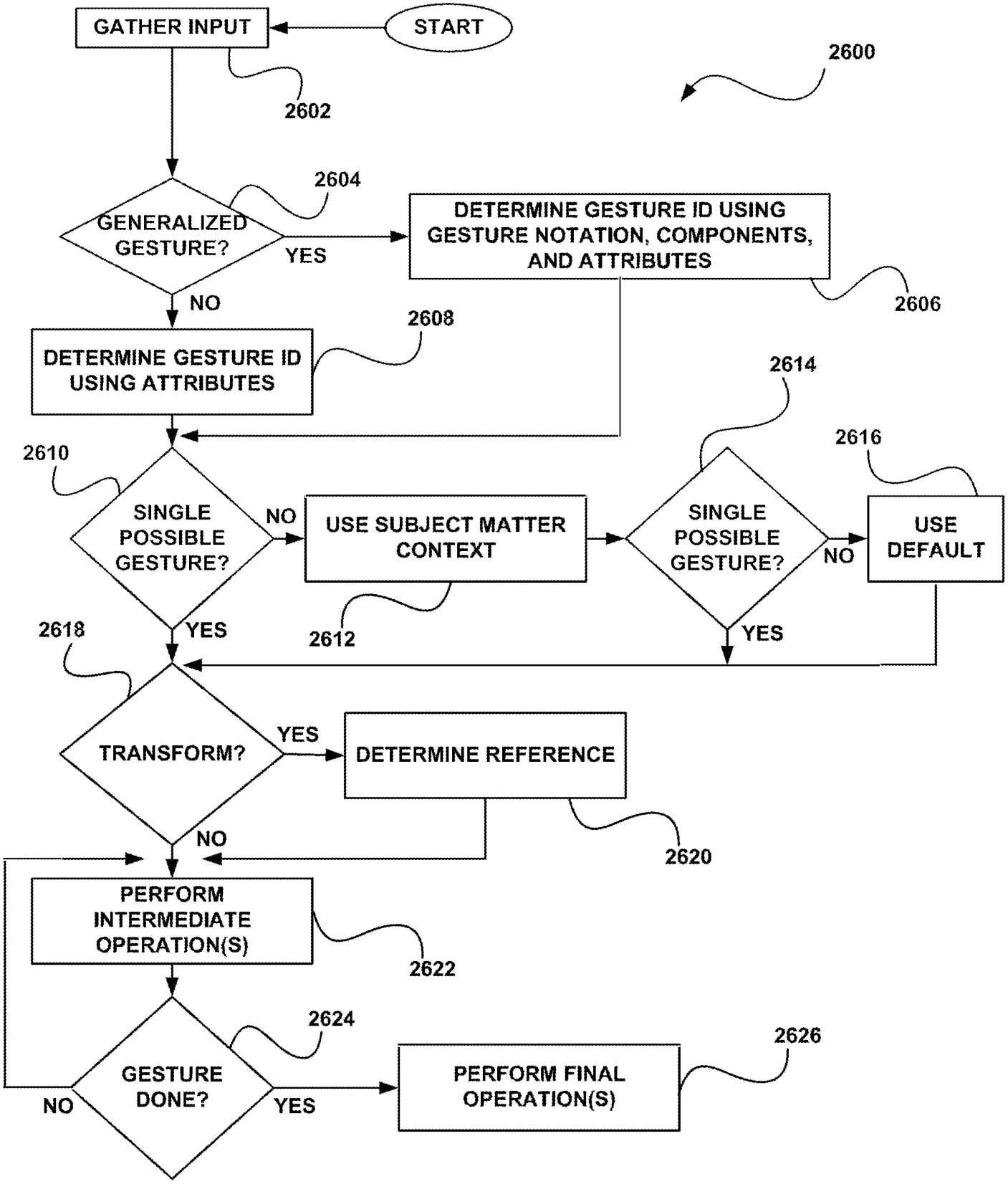

START
GATHER INPUT
2602
2600
2604
GENERALIZED GESTURE?
YES
NO
DETERMINE GESTURE ID USING GESTURE NOTATION, COMPONENTS, AND ATTRIBUTES
2606
DETERMINE GESTURE ID USING ATTRIBUTES
2608
2610
SINGLE POSSIBLE GESTURE?
NO
YES
USE SUBJECT MATTER CONTEXT
2612
2614
SINGLE POSSIBLE GESTURE?
NO
YES
2616
USE DEFAULT
2618
TRANSFORM?
YES
NO
DETERMINE REFERENCE
2620
PERFORM INTERMEDIATE OPERATION(S)
2622
2624
GESTURE DONE?
NO
YES
2626
PERFORM FINAL OPERATION(S)

FIGURE 26

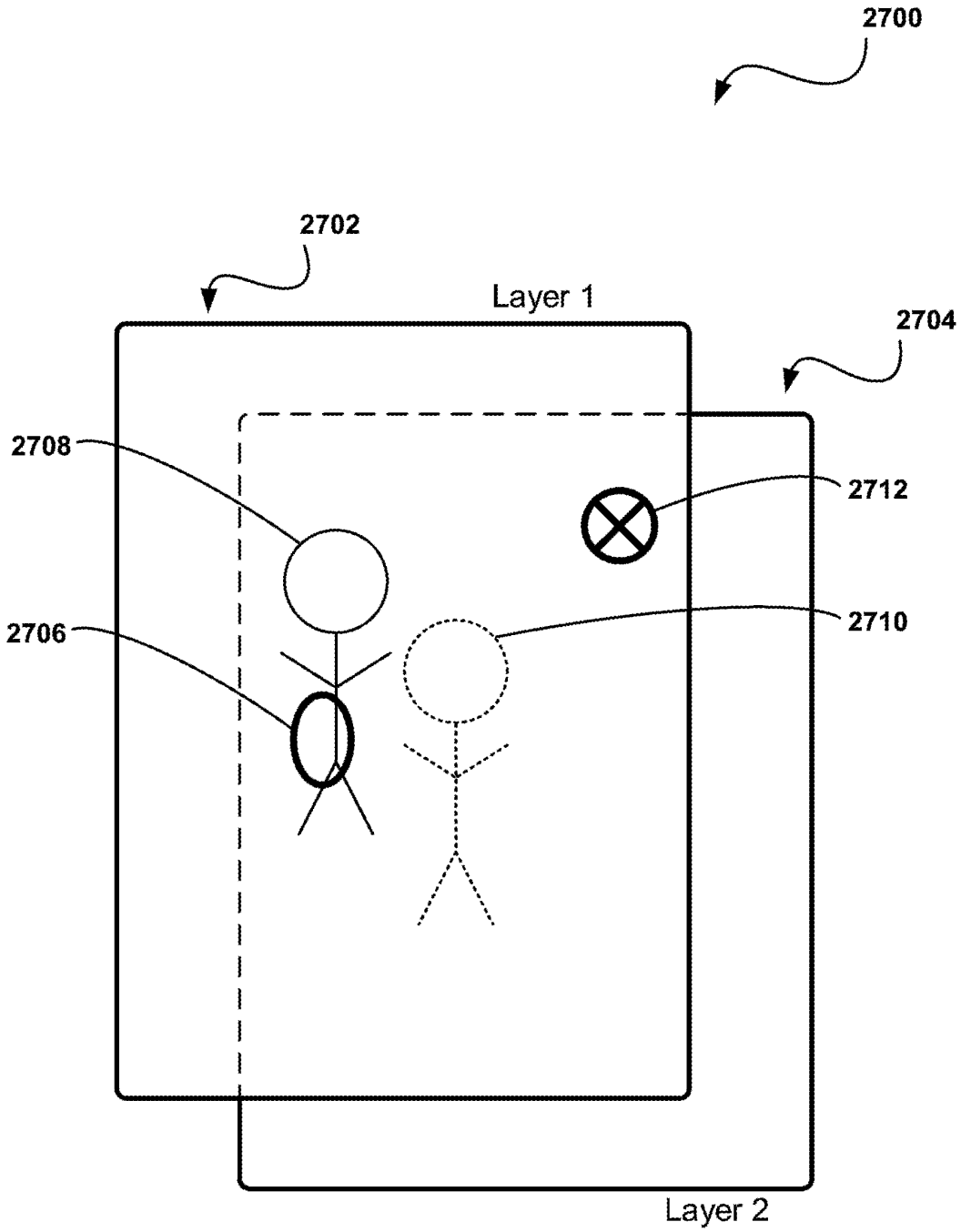


FIGURE 27

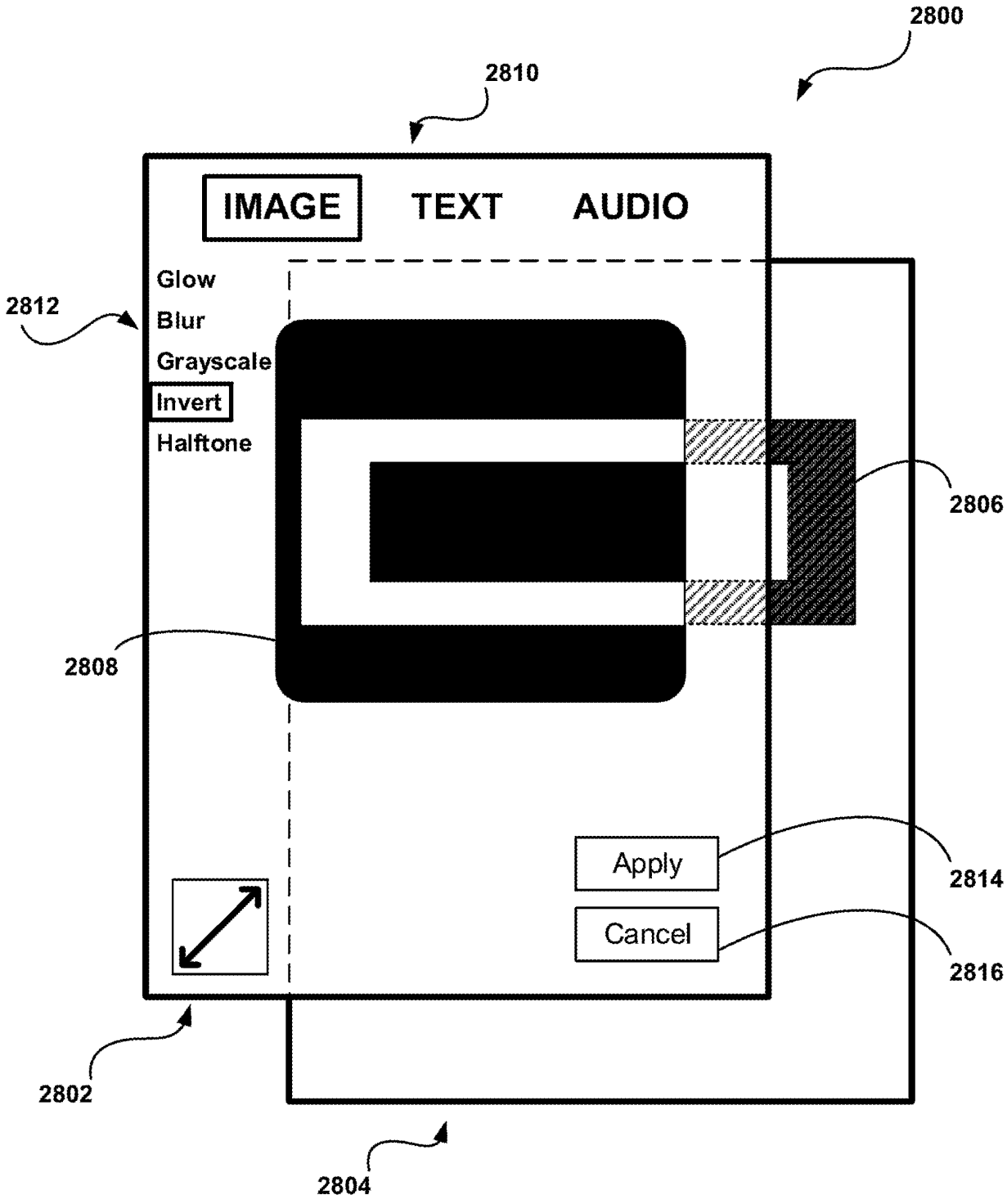

2800
2810
IMAGE
TEXT
AUDIO
2812
Glow
Blur
Grayscale
Invert
Halftone
2806
2808
Apply
2814
Cancel
2816
2802
2804

FIGURE 28

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	
	Filing Date	
	First Named Inventor	Michael S Smith
	Art Unit	
	Examiner Name	
	Attorney Docket Number	SMITH070AY

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Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

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See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

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A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Patrick Caldwell/	Date (YYYY-MM-DD)	2019-11-18
Name/Print	Patrick Caldwell	Registration Number	44580

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☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

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The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature	/Michael S Smith/	Date (Optional)	
Name	Michael S. Smith		
Title	Member & Manager - P4TENTS1, LLC		

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	53	8188982	B2	2012-05-29	You et al.	
	54	8189328	B2	2012-05-29	Kanapathippillai et al.	
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	64	8248255	B2	2012-08-21	Tzidon et al.	
	65	8253699	B2	2012-08-28	Son	
	66	8261041	B2	2012-09-04	Kunimatsu	
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	76	8286102	B1	2012-10-09	Wilensky	
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	78	8291341	B2	2012-10-16	Tseng et al.	
	79	8291344	B2	2012-10-16	Chaudhri	Entire Document
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	85	8319743	B2	2012-11-27	NO et al.	

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CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Patrick Caldwell/	Date (YYYY-MM-DD)	2019-11-18
Name/Print	Patrick Caldwell	Registration Number	44580

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U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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	43	20090224822	A1	2009-09-10	Alzheimer et al.	
	44	20090225053	A1	2009-09-10	HU	
	45	20090237970	A1	2009-09-24	Chung	
	46	20090255705	A1	2009-10-15	Pratt	
	47	20090256807	A1	2009-10-15	Nurmi	
	48	20090259806	A1	2009-10-15	Kilzer et al.	
	49	20090261457	A1	2009-10-22	Pratt	

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	50	20090271731	A1	2009-10-29	Lin et al.	
	51	20090285031	A1	2009-11-19	Rajan et al.	
	52	20090289912	A1	2009-11-26	Chen et al.	
	53	20090295747	A1	2009-12-03	Hsieh et al.	
	54	20090296341	A1	2009-12-03	ELDERSHAW	
	55	20090300314	A1	2009-12-03	LaBerge et al.	
	56	20090300444	A1	2009-12-03	Jeddeloh	
	57	20090302484	A1	2009-12-10	Lee et al.	
	58	20090309142	A1	2009-12-17	Akram	
	59	20090315741	A1	2009-12-24	Kim	
	60	20090319703	A1	2009-12-24	Chung	

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	61	20090321861	A1	2009-12-31	Oliver et al.	
	62	20090321947	A1	2009-12-31	Pratt	
	63	20090323206	A1	2009-12-31	Oliver et al.	
	64	20090327979	A1	2009-12-31	Haverinen et al.	
	65	2009036176	A1	2009-02-05	Ure	
	66	2009046110	A1	2009-02-19	Sadler et al.	
	67	2009051659	A1	2009-02-26	Mickelborough	
	68	2009058829	A1	2009-03-05	Kim et al.	
	69	2009066660	A1	2009-03-12	Ure	
	70	2009073138	A1	2009-03-19	Lee et al.	
	71	2009083665	A1	2009-03-26	Anttila et al.	

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	72	2009085881	A1	2009-04-02	Keam	
	73	2009086420	A1	2009-04-02	Stockham et al.	
	74	2009091536	A1	2009-04-09	Callaghan	
	75	2009143652	A1	2009-06-04	Warburton et al.	
	76	2009158152	A1	2009-06-18	Kodimer et al.	
	77	2009160781	A1	2009-06-25	Henderson et al.	
	78	2009213066	A1	2009-08-27	Hardacker et al.	
	79	2009225053	A1	2009-09-10	Hu	
	80	2009231290	A1	2009-09-17	Chen	
	81	2009271731	A1	2009-10-29	Lin et al.	
	82	2009289912	A1	2009-11-26	Chen et al.	

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	83	2009295747	A1	2009-12-03	Hsieh et al.	
	84	20100005390	A1	2010-01-07	Bong	
	85	20100017872	A1	2010-01-21	Goertz et al.	
	86	20100020039	A1	2010-01-28	Ricks et al.	
	87	20100026640	A1	2010-02-04	Kim et al.	
	88	20100035656	A1	2010-02-11	Pan	
	89	20100039393	A1	2010-02-18	Pratt et al.	
	90	20100045612	A1	2010-02-25	Mölne	
	91	20100052880	A1	2010-03-04	Laitinen et al.	
	92	20100053103	A1	2010-03-04	NO et al.	
	93	20100053116	A1	2010-03-04	Daverman et al.	

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	94	20100053532	A1	2010-03-04	LAI	
	95	2010005390	A1	2010-01-07	Bong	
	96	20100066764	A1	2010-03-18	Refai	
	97	20100077829	A1	2010-04-01	Batista et al.	
	98	20100079398	A1	2010-04-01	Shen et al.	
	99	20100085500	A1	2010-04-08	Kim	
	100	20100090973	A1	2010-04-15	Algreatly	
	101	20100097347	A1	2010-04-22	Lin	
	102	20100110748	A1	2010-05-06	Best	
	103	20100117959	A1	2010-05-13	Hong et al.	
	104	20100134429	A1	2010-06-03	You et al.	

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	105	20100134448	A1	2010-06-03	Park et al.	
	106	20100149101	A1	2010-06-17	Guo et al.	
	107	20100149124	A1	2010-06-17	Kim et al.	
	108	20100149129	A1	2010-06-17	Homma et al.	
	109	20100156814	A1	2010-06-24	Weber et al.	
	110	20100156818	A1	2010-06-24	Burrough et al.	
	111	20100156823	A1	2010-06-24	Paleczny et al.	
	112	20100164745	A1	2010-07-01	Migos et al.	
	113	20100164884	A1	2010-07-01	Chiu et al.	
	114	20100171711	A1	2010-07-08	Mak-Fan et al.	
	115	20100177057	A1	2010-07-15	Flint et al.	

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	116	2010017872	A1	2010-01-21	Goertz et al.	
	117	20100188353	A1	2010-07-29	Yoon et al.	
	118	20100188365	A1	2010-07-29	Tamaki et al.	
	119	20100194709	A1	2010-08-05	Tamaki et al.	
	120	2010020039	A1	2010-01-28	Ricks et al.	
	121	20100201651	A1	2010-08-12	Baucom et al.	
	122	20100206560	A1	2010-08-19	Atencio	
	123	20100207900	A1	2010-08-19	Kung et al.	
	124	20100208082	A1	2010-08-19	Buchner et al.	
	125	20100214239	A1	2010-08-26	Wu	
	126	20100214499	A1	2010-08-26	Sanelle et al.	

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	127	20100220065	A1	2010-09-02	Ma	
	128	20100222735	A1	2010-09-02	Plahey et al.	
	129	20100225608	A1	2010-09-09	ZHOU et al.	
	130	20100240390	A1	2010-09-23	Russ et al.	
	131	20100241984	A1	2010-09-23	Nurmi et al.	
	132	20100245282	A1	2010-09-30	Lai	
	133	20100257304	A1	2010-10-07	Rajan et al.	
	134	20100259490	A1	2010-10-14	Lee	
	135	2010026640	A1	2010-02-04	Kim et al.	
	136	20100271888	A1	2010-10-28	Rajan et al.	
	137	20100277432	A1	2010-11-04	Tsai	

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	138	20100281280	A1	2010-11-04	Rajan et al.	
	139	20100293460	A1	2010-11-18	Budelli	
	140	20100302281	A1	2010-12-02	Kim	
	141	20100332635	A1	2010-12-30	ROGEL et al.	
	142	2010035656	A1	2010-02-11	Pan	
	143	2010045612	A1	2010-02-25	Moelne	
	144	2010045621	A1	2010-02-25	Kang et al.	
	145	2010053103	A1	2010-03-04	No et al.	
	146	2010053532	A1	2010-03-04	Lai	
	147	2010058211	A1	2010-03-04	Lee et al.	
	148	2010077829	A1	2010-04-01	Batista et al.	

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	149	2010079398	A1	2010-04-01	Shen et al.	
	150	2010085500	A1	2010-04-08	Kim	
	151	2010088654	A1	2010-04-08	Henhoeffer	
	152	2010090982	A1	2010-04-15	Oba et al.	
	153	2010097347	A1	2010-04-22	Lin	
	154	2010127983	A1	2010-05-27	Irani et al.	
	155	2010134429	A1	2010-06-03	You et al.	
	156	2010134448	A1	2010-06-03	Park et al.	
	157	2010149101	A1	2010-06-17	Guo et al.	
	158	2010149124	A1	2010-06-17	Kim et al.	
	159	2010164884	A1	2010-07-01	Chiu et al.	

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	160	2010188327	A1	2010-07-29	Frid et al.	
	161	2010188365	A1	2010-07-29	Tamaki et al.	
	162	2010194709	A1	2010-08-05	Tamaki et al.	
	163	2010201651	A1	2010-08-12	Baucom et al.	
	164	2010206560	A1	2010-08-19	Atencio	
	165	2010207900	A1	2010-08-19	Kung et al.	
	166	2010214499	A1	2010-08-26	Sanelle et al.	
	167	2010222735	A1	2010-09-02	Plahey et al.	
	168	2010225608	A1	2010-09-09	Zhou et al.	
	169	2010241989	A1	2010-09-23	Wen et al.	
	170	2010251119	A1	2010-09-30	Geppert et al.	

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	171	2010259490	A1	2010-10-14	Lee	
	172	2010277432	A1	2010-11-04	Tsai	
	173	2010328230	A1	2010-12-30	Faubert et al.	
	174	20110001706	A1	2011-01-06	Sanford et al.	
	175	20110007023	A1	2011-01-13	Abrahamsson et al.	
	176	20110012921	A1	2011-01-20	Cholewin et al.	
	177	20110016250	A1	2011-01-20	Lee et al.	
	178	2011001706	A1	2011-01-06	Sanford et al.	
	179	20110018695	A1	2011-01-27	Bells et al.	
	180	20110025969	A1	2011-02-03	Chen et al.	
	181	20110029868	A1	2011-02-03	Moran et al.	

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	182	20110035540	A1	2011-02-10	Fitzgerald et al.	
	183	20110037609	A1	2011-02-17	KIM et al.	
	184	20110037726	A1	2011-02-17	Lee	
	185	20110044064	A1	2011-02-24	Hu et al.	
	186	20110050576	A1	2011-03-03	Forutanpour et al.	Entire Document
	187	20110050588	A1	2011-03-03	Li et al.	Entire Document
	188	20110050591	A1	2011-03-03	Kim et al.	
	189	20110050592	A1	2011-03-03	Kim et al.	
	190	20110050593	A1	2011-03-03	Kim et al.	
	191	20110050594	A1	2011-03-03	Kim et al.	Entire Document
	192	20110050608	A1	2011-03-03	Homma et al.	

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	193	20110050653	A1	2011-03-03	MIYAZAWA et al.	
	194	20110051334	A1	2011-03-03	Griffith et al.	
	195	20110057613	A1	2011-03-10	Taguchi et al.	
	196	20110063248	A1	2011-03-17	YOON	
	197	20110066790	A1	2011-03-17	Mogul et al.	
	198	2011007023	A1	2011-01-13	Abrahamsson et al.	
	199	20110080417	A1	2011-04-07	Lin et al.	
	200	20110088416	A1	2011-04-21	Koethler	
	201	20110095783	A1	2011-04-28	Ferolito et al.	
	202	20110102336	A1	2011-05-05	SEOK et al.	
	203	20110102347	A1	2011-05-05	LIM et al.	

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	204	20110107212	A1	2011-05-05	JEONG	
	205	20110109573	A1	2011-05-12	Deslippe et al.	
	206	20110109829	A1	2011-05-12	Mathew et al.	
	207	20110110047	A1	2011-05-12	Pauley et al.	
	208	20110113208	A1	2011-05-12	Jouppi et al.	
	209	20110115738	A1	2011-05-19	Suzuki et al.	
	210	20110117968	A1	2011-05-19	Eromaki	
	211	20110118029	A1	2011-05-19	Lukas et al.	
	212	20110122084	A1	2011-05-26	Jeon et al.	
	213	2011012921	A1	2011-01-20	Cholewin et al.	
	214	20110141052	A1	2011-06-16	Bernstein et al.	

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	215	20110152739	A1	2011-06-23	Roncadi et al.	
	216	20110164047	A1	2011-07-07	Pance	
	217	20110169745	A1	2011-07-14	Fang et al.	
	218	20110169775	A1	2011-07-14	Liaw et al.	
	219	20110175805	A1	2011-07-21	ROTTLER et al.	
	220	20110175844	A1	2011-07-21	Berggren	
	221	20110175845	A1	2011-07-21	Honda et al.	
	222	20110175902	A1	2011-07-21	Mahowald	
	223	20110181552	A1	2011-07-28	Goertz et al.	
	224	20110205446	A1	2011-08-25	Hardacker et al.	
	225	20110210942	A1	2011-09-01	Kitamori et al.	

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	226	20110210943	A1	2011-09-01	Zaliva	
	227	20110227830	A1	2011-09-22	Chun	
	228	20110227836	A1	2011-09-22	Li et al.	
	229	20110227877	A1	2011-09-22	Chen	
	230	20110239110	A1	2011-09-29	Garrett et al.	
	231	20110248941	A1	2011-10-13	Abdo et al.	
	232	20110254793	A1	2011-10-20	Ban et al.	
	233	2011025969	A1	2011-02-03	Chen et al.	
	234	20110260994	A1	2011-10-27	Saynac et al.	
	235	20110273394	A1	2011-11-10	Young et al.	
	236	20110273396	A1	2011-11-10	CHUNG	

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	237	20110291945	A1	2011-12-01	Richard Alan Ewing et al.	
	238	20110291953	A1	2011-12-01	Cheok et al.	
	239	20110310537	A1	2011-12-22	Imamura et al.	
	240	20110314423	A1	2011-12-22	Ohmiya et al.	
	241	2011037726	A1	2011-02-17	Lee	
	242	2011044064	A1	2011-02-24	Hu et al.	
	243	2011045813	A1	2011-02-24	Choi	
	244	2011050591	A1	2011-03-03	Kim et al.	
	245	2011050592	A1	2011-03-03	Kim et al.	
	246	2011050593	A1	2011-03-03	Kim et al.	
	247	2011050594	A1	2011-03-03	Kim et al.	

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	248	2011050608	A1	2011-03-03	Homma et al.	
	249	2011051334	A1	2011-03-03	Griffith et al.	
	250	2011057889	A1	2011-03-10	Sakatsume	
	251	2011059777	A1	2011-03-10	Rao	
	252	2011061021	A1	2011-03-10	Kang et al.	
	253	2011063248	A1	2011-03-17	Yoon	
	254	2011084921	A1	2011-04-14	Kang et al.	
	255	2011088416	A1	2011-04-21	Koethler	
	256	2011102336	A1	2011-05-05	Seok et al.	
	257	2011102347	A1	2011-05-05	Lim et al.	
	258	2011109573	A1	2011-05-12	Deslippe et al.	

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	259	2011115738	A1	2011-05-19	Suzuki et al.	
	260	2011118029	A1	2011-05-19	Lukas et al.	
	261	2011122084	A1	2011-05-26	Jeon et al.	
	262	2011152739	A1	2011-06-23	Roncadi et al.	
	263	2011169775	A1	2011-07-14	Liaw et al.	
	264	2011175845	A1	2011-07-21	Honda et al.	
	265	2011181552	A1	2011-07-28	Goertz et al.	
	266	2011205446	A1	2011-08-25	Hardacker et al.	
	267	2011210942	A1	2011-09-01	Kitamori et al.	
	268	2011210943	A1	2011-09-01	Zaliva	
	269	2011227836	A1	2011-09-22	Li et al.	

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	270	2011227877	A1	2011-09-22	Chen	
	271	2011239110	A1	2011-09-29	Garrett et al.	
	272	2011248941	A1	2011-10-13	Abdo et al.	
	273	2011254793	A1	2011-10-20	Ban et al.	
	274	2011260984	A1	2011-10-27	Paleczny	
	275	2011260994	A1	2011-10-27	Saynac et al.	
	276	2011261002	A1	2011-10-27	Verthein	
	277	2011273394	A1	2011-11-10	Young et al.	
	278	2011273396	A1	2011-11-10	Chung	
	279	2011291945	A1	2011-12-01	Ewing Jr et al.	
	280	2011291953	A1	2011-12-01	Cheok et al.	

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	281	2011302493	A1	2011-12-08	Runstedler et al.	
	282	20120007821	A1	2012-01-12	Zaliva	
	283	20120008436	A1	2012-01-12	Rajan et al.	
	284	20120011310	A1	2012-01-12	Rajan et al.	
	285	20120011386	A1	2012-01-12	Rajan et al.	
	286	20120013566	A1	2012-01-19	CHUNG	
	287	20120018871	A1	2012-01-26	Lee et al.	
	288	20120019448	A1	2012-01-26	Pitkanen et al.	
	289	20120023450	A1	2012-01-26	Noto et al.	
	290	20120032876	A1	2012-02-09	Tabe	
	291	20120034954	A1	2012-02-09	Tabe	

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	292	20120037878	A1	2012-02-16	Liu	
	293	20120038045	A1	2012-02-16	Lee	
	294	20120042204	A1	2012-02-16	Smith et al.	
	295	20120044172	A1	2012-02-23	Ohki et al.	
	296	20120056846	A1	2012-03-08	Zaliva	
	297	20120059976	A1	2012-03-08	Rosenband et al.	
	298	20120059978	A1	2012-03-08	Rosenband et al.	
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Name/Print	Patrick Caldwell	Registration Number	44580

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	First Named Inventor	Michael S Smith
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Name/Print	Patrick Caldwell	Registration Number	44580

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International Application Number:	
Confirmation Number:	6079
Title of Invention:	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK
First Named Inventor/Applicant Name:	Michael S Smith
Customer Number:	92045
Filer:	Patrick Edgar Caldwell
Filer Authorized By:	
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Confirmation Number:	6079
Title of Invention:	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK
First Named Inventor/Applicant Name:	Michael S Smith
Correspondence Address:	The Caldwell Firm, LLC - PO Box 59655 Dept. SVIPGP Dallas TX 75229 US 214-734-2313 eofficeaction@appcoll.com
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23	Non Patent Literature	063-ENCODING-116-slides.pdf	2886096 08e20ff03c6d7bbae689a55494ae83e8884704c5	no	116
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Information:					
24	Non Patent Literature	064-ERICSON-Interactive-Handheld.pdf	2015280 bd7d1df29bb745341f88aff75b87f4f667bac70c	no	38
Warnings:					
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25	Non Patent Literature	065-FITZROY-DALE-Architecture-Optimization.pdf	8568682 5e2d423567229f6d607981fb89c72bfcd9799ad5	no	152
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26	Non Patent Literature	066-FOSTER-Measurements-of-Pre-Emphasis.pdf	711150 0166c85f71ab13997ba73e0c6d89b62b543f48b7	no	7
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27	Non Patent Literature	067-FUJITSU-125Gbps-Parallel.pdf	231344 880f5ca7a8bbb519c62a02f643a98b878f3c1b92	no	2
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28	Non Patent Literature	068-GALLOWAY-Using-Creative-Silicon.pdf	623685 271cdd4fbcb9490e03eaaa0571a4a9c59cab9773	no	7
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29	Non Patent Literature	069-GARLAN-Project-Aura.pdf	1512196 39b372610997c198ffe4b03d4f88878fde70bc41	no	10
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30	Non Patent Literature	070-GARLEPP-A-Portable-Digita.pdf	1183095 298f07e309114cef5c547834ab309d4d08790dfc	no	13
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31	Non Patent Literature	071-GEISLER-Physical-Limits-Acuity.pdf	827459 717f1179d57771e1254c6c0cfaebb0e4a7652a46	no	8
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32	Non Patent Literature	072-GILBERT-Pocket-ISR.pdf	1210231 dabff0bc312e55e2276268a0e30f5c3d6c161b26	no	19
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33	Non Patent Literature	073-GONDI-10Gbps-CMOS-Merged-Adaptive.pdf	211640 763d56e6485652b2e71445ff6377826e6f32d959	no	2
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34	Non Patent Literature	074-GONDI-Equalizer-for-Backplane-Applications.pdf	852953 97ef00cbe8bca6a488539d54dfa358a7a73bfe87	no	3
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35	Non Patent Literature	075-GOODACRE-Virtualization-Across-ARM.pdf	2301665 21060628e5298fa806d8a262aff1353888efe5f9	no	11
Warnings:					
Information:					

36	Non Patent Literature	076-GROZING-Sampling-Receive-Equalizer.pdf	399907 3f4aae24b2130370c3c5e86679d7e95016250cd8	no	4
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37	Non Patent Literature	077-GRUNDY-Designing-Scalable-lOG.pdf	1561447 a0c869313ff3e72abafa74731432f85d2bbb75ff	no	20
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38	Non Patent Literature	078-GUSTLIN-40-100-Gigabit.pdf	1415594 f1ce4a1fda2b125902fbfb5a1477a03adff85a63	no	15
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Information:					
39	Non Patent Literature	080-HEISER-Hypervisors-for-Consumer.pdf	712371 26790e5343dd324c8a5b574e1de295095bb7faa1	no	5
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Information:					
40	Non Patent Literature	081-HEISER-OKL4-Microvisor.pdf	510996 3490cdf604c3e05c62177a5110ed02779302e4c0	no	5
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41	Non Patent Literature	082-HERTZUM-TouchGrid.pdf	763978 d284031d5b29403fb3ec65cddd55d90b0d8fc761	no	18
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42	Non Patent Literature	083-HIRAISHI-Preferable-Improvements.pdf	2450021 ab371766641ef0497afb8bb625c7f30ac0a799e6	no	35
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43	Non Patent Literature	084-HOE-18-447-Lecture-21.pdf	388048 f6693d2fbb4a4fa9c021f70d16fd98d92b4675f7	no	11
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44	Non Patent Literature	085-HOFER-Organization-of-Human.pdf	1399866 f0e6c0594aa7941ec7c47dc8f699fed40004b374	no	11
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Information:					
45	Non Patent Literature	086-HOLLIS-CIRCUIT-MODELING.pdf	8703716 581ad977a634275a581c7a52d6f352f8042cccbe	no	225
Warnings:					
Information:					
46	Non Patent Literature	087-HOLLIS-Inter-symbol-Interference.pdf	606807 0951d3e69ef3c6e9f9d03e5feec46363913ebce7	no	7
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47	Non Patent Literature	088-HOLLIS-Mitigating-ISi.pdf	1193965 9521499dc822e3a13659a0556f2c50400f8817dc	no	12
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Information:					
48	Non Patent Literature	089-HOLLIS-Reduction-of-Duty-Cycle.pdf	308190 ef994612d819bcc89df55bb9b30f3d3aab59e247	no	4
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49	Non Patent Literature	090-HOLLIS-Self-Calibrating-Continuous.pdf	409880 5de252245ebe3fdaeb1a37a66108c6d8e8141ca4	no	4
Warnings:					
Information:					

50	Non Patent Literature	091-HONG-NANO-Flash-based-Disk.pdf	3352835 e6ff65ebfe14b5a1273a6e4000ec48e08f4ccdc1	no	25
Warnings:					
Information:					
51	Non Patent Literature	092-HOWSTUFFWORKS-How-the-iPhone-works.pdf	2603920 6449c9397c800bb68679596a47e33c01412332fc	no	4
Warnings:					
Information:					
52	Non Patent Literature	093-HUANG-Design-Implementation.pdf	1343085 7ad0ee5cf032581f575bb26ea6847067aa54f1b1	no	14
Warnings:					
Information:					
53	Non Patent Literature	094-HUNG-Varmosa-Operating-System-Kernels.pdf	1670149 78c66f5a2c54d8682207fc09d2ed9d77d4893c0c	no	56
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54	Non Patent Literature	095-HUR-Equalization-Near-End-Crosstalk.pdf	5036789 067c737baf99e7c222294f37ae26362c73f4ce4f	no	143
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55	Non Patent Literature	096-HYNIX-I-0-INTERFACE-DESIGN.pdf	4297357 a4c03e90f4f846174e3947ba41919cd6eb2f7824	no	41
Warnings:					
Information:					
56	Non Patent Literature	097-HYSER-Autonomic-Virtual-Machine.pdf	567724 ce1247b64a6b4fa0bb78c8b2ace27833d464c96f	no	11
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Information:					

57	Non Patent Literature	098-IMIS-Intimate-Memory-Interface.pdf	1767875 8ee7d3133f8c58912e3d56a55b736583092ca06f	no	33
Warnings:					
Information:					
58	Non Patent Literature	099-IMMERSION-Creating-HD-Haptic.pdf	385509 5a1cf00d8e2b509d444060bd05d1d294c4ae54e6	no	3
Warnings:					
Information:					
59	Non Patent Literature	100-Intel-Dev-Manual_Vol-1_1-of-8.pdf	4129486 a3c4510bae09efc9a740bf581cea2b9400e284e0	no	75
Warnings:					
Information:					
		Total Files Size (in bytes):	106825158		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

<u>New Applications Under 35 U.S.C. 111</u>
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
<u>National Stage of an International Application under 35 U.S.C. 371</u>
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
<u>New International Application Filed with the USPTO as a Receiving Office</u>
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82B (07-13)
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POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☑ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 92045

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

☑ The address associated with the above-mentioned Customer Number

OR

☐ The address associated with Customer Number:

OR

Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

P4TENTS1, LLC

☐ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature	/Michael S Smith/	Date (Optional)	
Name	Michael S. Smith		
Title	Member & Manager - P4TENTS1, LLC		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☑ Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Doc Code: TRACK1.REQ
Document Description: TrackOne Request

PTO/AIA/424 (04-14)

CERTIFICATION AND REQUEST FOR PRIORITIZED EXAMINATION UNDER 37 CFR 1.102(e) (Page 1 of 1)

First Named Inventor:	Michael S. Smith	Nonprovisional Application Number (if known):	
Title of Invention:	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK		

APPLICANT HEREBY CERTIFIES THE FOLLOWING AND REQUESTS PRIORITIZED EXAMINATION FOR THE ABOVE-IDENTIFIED APPLICATION.

1. The processing fee set forth in 37 CFR 1.17(i)(1) and the prioritized examination fee set forth in 37 CFR 1.17(c) have been filed with the request. The publication fee requirement is met because that fee, set forth in 37 CFR 1.18(d), is currently $0. The basic filing fee, search fee, and examination fee are filed with the request or have been already been paid. I understand that any required excess claims fees or application size fee must be paid for the application.

2. I understand that the application may not contain, or be amended to contain, more than four independent claims, more than thirty total claims, or any multiple dependent claims, and that any request for an extension of time will cause an outstanding Track I request to be dismissed.

3. The applicable box is checked below:

I. ☑ Original Application (Track One) - Prioritized Examination under § 1.102(e)(1)

i. (a) The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a). This certification and request is being filed with the utility application via EFS-Web.

---OR---

(b) The application is an original nonprovisional plant application filed under 35 U.S.C. 111(a). This certification and request is being filed with the plant application in paper.

ii. An executed inventor's oath or declaration under 37 CFR 1.63 or 37 CFR 1.64 for each inventor, **or** the application data sheet meeting the conditions specified in 37 CFR 1.53(f)(3)(i) is filed with the application.

II. ☐ Request for Continued Examination - Prioritized Examination under § 1.102(e)(2)

i. A request for continued examination has been filed with, or prior to, this form.
ii. If the application is a utility application, this certification and request is being filed via EFS-Web.
iii. The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a), or is a national stage entry under 35 U.S.C. 371.
iv. This certification and request is being filed prior to the mailing of a first Office action responsive to the request for continued examination.
v. No prior request for continued examination has been granted prioritized examination status under 37 CFR 1.102(e)(2).

Signature /Patrick Caldwell/	Date 18 Nov 2019
Name (Print/Typed) Patrick Caldwell	Practitioner Registration Number 44580

Note: *This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required.**

☑ *Total of 1 forms are submitted.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/AIA/01 (06-12)
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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	GESTURE-EQUIPPED TOUCH SCREEN SYSTEM, METHOD, AND COMPUTER PROGRAM PRODUCT

As the below named inventor, I hereby declare that:

This declaration is directed to:

- [■] The attached application, or
- [ ] United States application or PCT international application number _____

filed on _____.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Michael Smith Date (Optional): _____

Signature: /Michael Smith/

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK
First Named Inventor/Applicant Name:	Michael S. Smith
Filer:	Patrick Edgar Caldwell
Attorney Docket Number:	SMITH070AY

Filed as Small Entity

Filing Fees for Track I Prioritized Examination - Nonprovisional Application under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	75	75
UTILITY SEARCH FEE	2111	1	330	330
UTILITY EXAMINATION FEE	2311	1	380	380
REQUEST FOR PRIORITIZED EXAMINATION	2817	1	2000	2000
Pages:				
UTILITY APPL SIZE FEE PER 50 SHEETS >100	2081	1	200	200
Claims:				
Miscellaneous-Filing:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
NON-ENGLISH TRANSLATION	2053	1	70	70
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**3055**

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	SMITH070AY
	Application Number	
Title of Invention	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Michael	S	Smith	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Palo Alto	State/Province	CA	Country of Residence	US

Mailing Address of Inventor:

Address 1	P4TENTS1, LLC		
Address 2	PO BOX 999		
City	Los Altos	State/Province	CA
Postal Code	94023-0999	Country i	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	92045		
Email Address	pcaldwell@thecaldwellfirm.com	Add Email	Remove Email

Application Information:

Title of the Invention	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK		
Attorney Docket Number	SMITH070AY	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)		Suggested Figure for Publication (if any)	

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	SMITH070AY
	Application Number	
Title of Invention	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☒ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	92045		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Continuation of	16377142	2019-04-05

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	SMITH070AY
	Application Number	
Title of Invention	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK	

Prior Application Status	Patented			Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16377142	Continuation of	16153763	2018-10-06	10275086	2019-04-30
Prior Application Status	Patented			Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16153763	Continuation of	15072354	2016-03-16	10133397	2018-11-20
Prior Application Status	Patented			Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15072354	Continuation of	13567004	2012-08-03	9417754	2016-08-16
Prior Application Status	Expired			Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
13567004	Claims benefit of provisional	61581918	2011-12-30		
Prior Application Status	Expired			Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
13567004	Claims benefit of provisional	61569213	2011-12-09		
Prior Application Status	Expired			Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
13567004	Claims benefit of provisional	61566577	2011-12-02		
Prior Application Status	Expired			Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
13567004	Claims benefit of provisional	61515835	2011-08-05		

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Foreign Priority Information:

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	SMITH070AY
	Application Number	
Title of Invention	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK	

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

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Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)

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Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	SMITH070AY
	Application Number	
Title of Invention	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

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B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

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☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	SMITH070AY
	Application Number	
Title of Invention	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

◉ Assignee	○ Legal Representative under 35 U.S.C. 117	○ Joint Inventor
○ Person to whom the inventor is obligated to assign.	○ Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

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Country	US	Postal Code	19899
Phone Number		Fax Number	
Email Address			

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Assignee Information including Non-Applicant Assignee Information:

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	SMITH070AY
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Title of Invention	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK	

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

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See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Patrick Caldwell/			Date (YYYY-MM-DD)	2019-11-18
First Name	Patrick	Last Name	Caldwell	Registration Number	44580

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	SMITH070AY
	Application Number	
Title of Invention	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application is a continuation of and claims priority to U.S. Patent Application No. 16/377,142 filed 04/05/2019 which, in turn, is a continuation of and claims priority to U.S. Patent Application No. 16/153,763 filed 10/06/2018, now U.S. Pat. No. 10,275,086, which, in turn, is a continuation of and claims priority to U.S. Patent Application No. 15/072,354, filed 03/16/2016, now U.S. Pat. No. 10,133,397; which, in turn, is a continuation of and claims priority to U.S. Patent Application No. 13/567,004, filed 08/03/2012, now U.S. Pat. No.: 9,417,754; which, in turn, claims priority to U.S. Provisional Application No. 61/515,835, filed August 5, 2011, U.S. Provisional Application No. 61/566,577, filed December 2, 2011, U.S. Provisional Application No.61/569,213, filed December 9, 2011, and U.S. Provisional Application No. 61/581,918, filed December 30, 2011, the entire contents of all of which are incorporated herein by reference.

[0002] If any definitions (e.g., figure reference signs, specialized terms, examples, data, information, etc.) from any related material (e.g., parent application, other related application, material incorporated by reference, material cited, extrinsic reference, etc.) conflict with this application (e.g., abstract, description, summary, claims, etc.) for any purpose (e.g., prosecution, claim support, claim interpretation, claim construction, etc.), then the definitions in this application shall apply.

BACKGROUND AND FIELD OF INVENTION

[0003] Embodiments of the present invention generally relate to touch screens.

BRIEF SUMMARY

[0004] In one embodiment, an apparatus and associated method are provided, comprising: a display; one or more processors; memory; and one or more programs, wherein the one or more programs are stored in the memory and configured to be executed by the one or more processors, the one or more programs including instructions for: displaying a plurality of user interface elements on the display including a first user interface element and a second user interface element; detecting a first contact moving across the display; and, while the first contact is detected moving across the display: moving the first user interface element in a first direction on the display at a first speed; and moving the second user interface element on the display at a second speed greater than the first speed.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0005] So that the features of various embodiments of the present invention can be understood, a more detailed description, briefly summarized above, may be had by reference to various embodiments, some of which are illustrated in the accompanying drawings. It is to be noted, however, that the accompanying drawings illustrate only embodiments and are therefore not to be considered limiting of the scope of various embodiments of the invention, for the invention may admit to other effective embodiments. The following detailed description makes reference to the accompanying drawings that are now briefly described.

[0006] So that the features of various embodiments of the present invention can be understood, a more detailed description, briefly summarized above, may be had by reference to various embodiments, some of which are illustrated in the accompanying drawings. It is to be noted, however, that the accompanying drawings illustrate only embodiments and are therefore not to be considered limiting of the scope of the invention, for the invention may admit to other effective embodiments. The following detailed description makes reference to the accompanying drawings that are now briefly described.

[0007] Figure 1 illustrates a network architecture, in accordance with one embodiment.

[0008] Figure 2 shows a representative hardware environment that may be associated with the servers and/or clients of Figure 1, in accordance with one embodiment.

[0009] Figure 3 shows a method for altering a user experience based on a received signal, in accordance with one embodiment.

[0010] Figure 4 shows a method for defining a selection made within a user interface based in part on contact pressure, in accordance with one embodiment.

[0011] Figure 5 shows a pressure-sensitive user interface for making a selection, in accordance with one embodiment.

[0012] Figure 6 shows a method for determining the context of a contact pressure-based selection and choosing an appropriate selection function, in accordance with one embodiment.

[0013] Figure 7 shows a device having a backtouch interface, in accordance with one embodiment.

[0014] Figure 8 shows a method for providing feedback to the user of a backtouch interface, in accordance with one embodiment.

[0015] Figure 9 shows a pressure-sensitive user interface for making a selection using a backtouch interface, in accordance with one embodiment.

[0016] Figure 10 shows a user interface for defining settings associated with a backtouch interface, in accordance with one embodiment.

[0017] Figure 11 shows a user interface for defining settings associated with a pressure-sensitive interface, in accordance with one embodiment.

[0018] Figure 12 shows a method for assisting a user in defining touch states, in accordance with one embodiment.

[0019] Figure 13 shows a user interface for assisting a user in defining touch states, in accordance with one embodiment.

[0020] Figure 14 shows a user interface for indicating that a backtouch or pressure-sensitive interface is activated, in accordance with one embodiment.

[0021] Figure 15 shows a user interface for defining a backtouch feedback style, in accordance with one embodiment.

[0022] Figure 16 shows an alternative method for defining a selection made within a user interface based in part on contact pressure, in accordance with one embodiment.

[0023] Figure 17 shows a user interface for performing operations on a selection, in accordance with one embodiment.

[0024] Figure 18 shows a method for utilizing contact pressure-based gestures, in accordance with one embodiment.

[0025] Figure 19 shows an example of a contact pressure-based gesture for scrolling a text field, in accordance with one embodiment.

[0026] Figure 20 shows an example of a multitouch pressure gesture for indicating a direction, in accordance with one embodiment.

[0027] Figure 21 shows an example of a multitouch pressure gesture for indicating a rotation, in accordance with one embodiment.

[0028] Figure 22 shows a 3D layered user interface, in accordance with one embodiment.

[0029] Figure 23 shows exemplary pattern-based gestures, in accordance with one embodiment.

[0030] Figure 24 shows a user interface for defining custom gestures, in accordance with one embodiment.

[0031] Figure 25 shows a user interface for providing quick access to favorite operations, in accordance with one embodiment.

[0032] Figure 26 shows a method for gesture differentiation, in accordance with one embodiment.

[0033] Figure 27 shows a 3D layered user interface having a clipboard layer, in accordance with one embodiment.

[0034] Figure 28 shows a 3D layered user interface having an operation layer, in accordance with one embodiment.

[0035] While the invention is susceptible to various modifications, combinations, and alternative forms, various embodiments thereof are shown by way of example in the drawings and will herein be described in detail. It should be understood, however, that the accompanying drawings and detailed description are not intended to limit the invention to the particular form disclosed, but on the contrary, the intention is to cover all modifications, combinations, equivalents and alternatives falling within the spirit and scope of the present invention as defined by the relevant claims.

DETAILED DESCRIPTION

[0036] Terms that are special to the field of the invention or specific to this description may, in some circumstances, be defined in this description. Further, the first use of such terms (which may include the definition of that term) may be highlighted in italics just for the convenience of the reader. Similarly, some terms may be capitalized, again just for the convenience of the reader. It should be noted that such use of italics and/or capitalization and/or other formatting, highlighting etc, by itself, should not be construed as somehow limiting such terms: beyond any given definition, and/or to any specific embodiments disclosed herein, etc.

[0037] In this description there may be multiple figures that depict similar structures with similar parts or components. Thus, as an example, to avoid confusion an Object in Figure 1 may be labeled and/or referenced as "Object (1)" and a similar, but not identical, Object in Figure 2 is labeled and/or referenced as "Object (2)", etc. Again, it should be noted that use of such labeling and reference manner, by itself, should not be construed as somehow limiting such terms: beyond any given definition, and/or to any specific embodiments disclosed herein, etc.

[0038] In the following detailed description and in the accompanying drawings, specific terminology and images are used in order to provide a thorough understanding. In some instances, the terminology and images may imply specific details that are not required to practice all embodiments. Similarly, the embodiments described and illustrated are representative and should not be construed as precise representations, as there are prospective variations on what is disclosed that may be obvious to someone with skill in the art. Thus this disclosure is not limited to the specific embodiments described and shown but embraces all prospective variations that fall within its scope. For brevity, not all steps may be detailed, where such details will be known to someone with skill in the art having benefit of this disclosure.

[0039] In the following detailed description and in the accompanying drawings, some embodiments and their constituent parts may have been simplified for clarity of explanation. In some cases, a complex system may be broken down into its constituent parts and pieces and each part or piece explained separately. The explanations for each part or piece may possibly use a separate figure along with accompanying text to describe variations and alternative implementations. In some cases, complex elements have been simplified to more clearly define their function. In many cases, a system may be comprised of multiple complex elements with each element being a more complex version of a simple part or piece that has been explained separately. It is not possible to describe every possible combination of complex elements in all possible systems. Thus, the description herein

is not limited to just the specific embodiments of parts or pieces described with each figure or in an accompanying explanation, or even those example systems described, but rather the possible combinations of complex elements based on the parts and pieces described.

[0040] Definitions

[0041] A computer system (e.g., a host system, host, computer, etc.) may include one or more storage systems (or storage subsystems, disk systems, disk subsystems, etc.) that may include storage arrays that include storage devices. A storage device may include a solid-state storage device, hard-disk drive (HD or HDD), or other device (e.g., tape, optical media, etc.).

[0042] A solid-state storage device may refer to a solid-state disk (SSD), but the solid-state storage device is not necessarily an SSD. A solid-state storage device may, for example, comprise memory devices such as flash memory devices (e.g., NAND, NOR, MLC, SLC, etc.), but may also comprise other forms of solid-state memory devices or memory components (e.g., SRAM, DRAM, MRAM, volatile memory, non-volatile memory, etc.), a combination of different types of solid-state components and/or other memory devices, or a combination of solid-state memory with other types of storage devices (e.g., hybrid disk, etc.). An SSD may be in a form-factor that is a drop-in replacement for a hard-disk (3.5", 2.5" form factors, etc.) or may be in any other form-factor or with any interface (e.g., Compact Flash CF, MultiMediaCard MMC, miniSD, Memory Stick, SmartMedia, TransFlash, Secure Digital SD, DIMM or other memory module form factor, PCI Express Card, mini PCI-E card, etc.). An SSD may use a standard storage interface.(e.g., IDE, SAS, SATA, etc.) or an IO bus interface (e.g., PCI, PCI-E, USB, LightPeak, etc.), a networking interface (e.g., Ethernet, FCoE, Infiniband, etc.), a CPU bus interface (e.g., Intel QPI, HyperTransport, etc.), or other interface (e.g., PCI-E over Ethernet, etc.). An SSD in a storage array may have a capacity of more than 100 Gbytes and contain tens of NAND flash memory chips. A typical 1 Gbit NAND flash memory chip may contain 1024 flash blocks with each flash block containing 64 flash pages and each flash page containing 2 kbytes.

[0043] Storage arrays may also include a combination of SSD and HDD, or combinations of various storage devices (e.g., magnetic, optical, tape, solid-state, etc.).

[0044] A solid-state storage device may use a disk controller (e.g., storage controller, controller, ASIC, other chips component(s), etc.) to provide the computer system with a standard storage (e.g., disk, storage networking, etc.) interface (e.g., IDE, SATA, SAS, Fibre Channel (FC), etc.), a standard peripheral (e.g., IO bus, IO attach, etc.) interface (e.g., PCI-E, USB, PCI Express, PCI, etc.), other standard interface (e.g., Ethernet, wireless 802.11, etc.), a proprietary (e.g., non-standard,

etc.) interface, a combination of these (e.g., PCI-E over Ethernet, FC over Ethernet (FCoE), etc.), or other storage, networking, interconnect interface(s) etc.

[0045] A storage array controller (often also called disk controller, host-bus adapter, etc.) may be logically located between the computer system and one or more SSDs or HDDs in a disk subsystem. In the context of the present description, the use of the term disk controller has been avoided as a term to describe a controller that controls one or more disks. The term storage array controller has been used herein for a controller that controls one or more disks. In some cases, each disk (HDD or SSD etc.) may have its own disk controller, thus causing potential confusion over terms. Alternative terms for storage array controller may include host-bus adapter, host adapter, host controller. However, the term host-bus adapter (often abbreviated HBA) and similar terms have been avoided herein to avoid confusion with HBA used here for host block address.

[0046] An SSD may include its own SSD controller, but, in some cases, a storage array controller may have more resources than an SSD controller. A storage array controller may use resources, such as memory, CPU, logic, non-volatile memory, etc., as well as unique information (e.g., because a storage array controller is higher than the SSD controller in the storage array hierarchy, i.e., further from the storage devices) in order to manage and control a storage array as well as provide information to an SSD controller.

[0047] A computer system typically contains one or more CPUs. A CPU may execute (e.g., run, etc.) an operating system (e.g., Microsoft Windows, Linux. MacOS, etc.). An operating system (OS) typically sees a storage array as a collection of disk sectors or just sectors (and sectors may also be called blocks). Disk sectors may be 512 bytes in length (and typically are in the 2011 timeframe). The sectors or blocks of a storage device are typically addressed as logical blocks using a logical block address (LBA).

[0048] To avoid confusion, the term host block address (HBA) is used herein for the LBA used to address a storage array controller. Unless explicitly stated otherwise, it is assumed that the host block size (HBS) is equal to the disk block size (DBS). The HBA may be a composite or union of a logical unit number (LUN) that identifies a logical portion of the storage array or disk or other device in the storage array; an LBA; the virtual machine (VM), if any; a UserID that identifies the user application; a VolumeID that identifies a logical target volume; and other data that may be used for logical access or management purposes. To simplify the description, clarify the figures, and in particular to make it clear that operations may be performed on different LUNs, the LUN may be shown separately from HBA in figures.

[0049] A disk number (D) may identify a disk or other storage device in the storage array. A disk logical block address (DBA) is the LBA that identifies the disk sector on the disk or other storage device. An array block address (ABA) is a composite or union of D and DBA, written <D, DBA>. The storage array may be a RAID array, JBOD, or any other particular type of storage array.

[0050] A disk controller for an HDD or SSD maintains the relationship between an ABA (or the DBA portion of the ABA) and the disk sectors that are physically part of a storage device (often called the physical disk sectors or physical sectors).

[0051] To summarize, with just a single disk, the host may provide an LBA directly to the disk; the disk controller may convert the LBA to the physical disk sector (e.g., for an HDD) or to the PBN (e.g.,for an SSD). In the presence of a storage array controller the host may still provide an LBA, but now to the storage array controller (and thus the LBA may be referred to as an HBA to avoid confusion); the storage array controller may then map this HBA to an ABA and may provide the ABA (or possibly just the DBA portion of the ABA) to the disk; the disk (e.g., an HDD or SSD, etc.) may then convert this DBA or ABA (treating the DBA portion of the ABA as though it were just an LBA, which it is) to a physical disk address: either the physical disk sector (e.g., for an HDD) or PBN (e.g., for an SSD).

[0052] In various embodiments, structures and their functions, operations and algorithms (e.g., methods, functions, etc.) may be described in terms of software operations, code and pseudo-code. It should be noted that the algorithms may be performed in hardware; software; firmware; microcode; a combination of hardware, software, firmware or microcode; or in any other manner that performs the same function and/or has the same effect. In various embodiments, the data structures, or parts of the structures, may be stored in the storage array controller in SRAM, DRAM, embedded flash, or other memory. Additionally, the data structures, or parts of them, may be stored outside the storage array controller. For example, the data structures may be stored on any of the storage devices of a storage array (the local storage or remote storage, i.e., remote from the storage array connected to the storage array controller) or on a host system (the local host or a remote host, i.e., remote from the host connected to the storage array controller).

[0053] A storage command may be directed to a storage device and may specify one or more operations, such as read, write, etc. A storage command may be referred to as a disk command or just command. To help prevent such confusion, the term storage command may be used when referencing commands in general. The term disk command (or disk write, etc.) may be utilized for the command as it arrives at (or is received by) the disk (either SSD or HDD, usually via a standard interface or storage bus, such as SATA, etc.). The term host command (or host write, etc.) may be

utilized for the command as it leaves (or is transmitted by) the OS. A disk command may be the same as a host command when there is a direct connection between the OS on a host system and a single disk.

[0054] A storage array controller may perform certain functions instead of (or in addition to) an OS running on a host system; and a storage array controller may also perform certain functions instead of (or in addition to) disk controller(s) in a storage array. A storage array controller may be logically located between a host system and storage array (or disk subsystem, storage subsystem, etc.). Each disk may contain its own disk controller, but a storage array controller may have more resources than a disk controller. The algorithms described here allow a storage array controller and attached storage accelerator units (SAUs) to use resources, such as memory, non-volatile memory, etc., as well as unique information (because a storage array controller is higher than a disk controller in a storage array hierarchy, i.e., further from the storage devices) in order to manage and control a storage array as well as provide information to disk controller(s). For example, a storage array controller may be aware of LUNs but a disk controller may not be aware of LUNs. This hierarchical management approach has advantages and potential uses that are explained throughout this description in the forms of various algorithms that may be employed by themselves or in combination.

[0055] A device driver is typically (though not necessarily) software that may be manufactured with and sold with a storage array controller. In various embodiments, the device driver may be implemented in software, hardware, firmware or a combination, and may be designed, manufactured and/or sold separately.

[0056] In one embodiment, a computer system may comprise multiple virtual machines (VMs), each VM including an operating system, and a hypervisor.

[0057] Each OS may include a file system and one or more storage drivers. The file system (sometimes considered part of an OS) may translate or convert from file-based access (i.e., in terms of directories, file names and offsets, etc.) to disk-based access (i.e., in terms of LBAs etc.). The storage driver (sometimes considered part of an OS) may be responsible for handling a disk or other storage device(s). The storage driver may be separate and distinct from the device driver. The storage driver may or may not be part of a storage stack, which is the software that controls access to a file system.

[0058] In the context of solid-state storage, typically flash memory, when a flash page (or some other portion) of a storage device is no longer required (i.e., it is obsolete, no longer valid, or is invalid, etc.) that flash page may be marked as dirty. When an entire flash block (e.g., typically

between 16 to 256 flash pages) is dirty, the entire flash block may be erased and free space may be reclaimed. If free space on the device is low, a flash block may be chosen that has some dirty flash pages and some clean (i.e., pages that are not dirty, are good, or valid, etc.) flash pages. The clean flash pages may be transferred (i.e., written, moved or copied) to a new flash block. All the original clean flash pages may be marked as dirty and the old flash block may be erased. In the context of solid-state storage, this process of transferring flash pages to new flash blocks and erasing old flash blocks may be referred to as garbage collection

[0059] Example embodiments described in this disclosure include one or more computer systems with one or more central processor units (CPUs) and possibly one or more I/O systems coupled to one or more storage systems that contain one or more storage array controllers and one or more storage devices.

[0060] In one embodiment, the storage system may include one or more bus structures. Depending on the constraints (e.g., signaling methods used, the intended operating frequencies, space, power, cost, and other constraints, etc.) various alternate bus structures may be used. A point-to-point bus may provide the optimal performance in systems requiring high-speed interconnections, due to the reduced signal degradation compared to bus structures having branched signal lines, switch devices, or stubs. However, when used in systems requiring communication with multiple devices or subsystems, a point-to-point or other similar bus will often result in significant added cost (e.g., component cost, board area, increased system power, etc.) and may reduce the potential memory density due to the need for intermediate devices (e.g., buffers, re-drive circuits, etc.).

[0061] Functions and performance similar to that of a point-to-point bus can be obtained by using switch devices. Switch devices and other similar solutions offer advantages (e.g., increased memory packaging density, lower power, etc.) while retaining many of the characteristics of a point-to-point bus. Multi-drop bus solutions provide an alternate solution, and though often limited to a lower operating frequency can offer a cost/performance advantage for many applications. Optical bus solutions permit significantly increased frequency and bandwidth potential, either in point-to-point or multi-drop applications, but may incur cost and space impacts.

[0062] Although not necessarily shown in all the Figures, the storage systems may also include one or more separate control (e.g., command distribution, information retrieval, data gathering, reporting mechanism, signaling mechanism, register read/write, configuration, etc.) buses (e.g., a presence detect bus, an I2C bus, an SMBus, combinations of these and other buses or signals, etc.) that may be used for one or more purposes including the determination of the storage device and/or storage system attributes (generally after power-up), the reporting of fault or other status information

to part(s) of the system, calibration, temperature monitoring, the configuration of storage device(s) and/or storage subsystem(s) after power-up or during normal operation or for other purposes. Depending on the control bus characteristics, the control bus(es) might also provide a means by which the valid completion of operations could be reported by storage device(s) to the storage controller(s), or the identification of failures occurring during the execution of storage controller requests, etc.

[0063] As used herein, the term bus refers to one of the sets of conductors (e.g., signals, wires, traces, and printed circuit board traces or connections in an integrated circuit) connecting two or more functional units in a computing system. The data bus, address bus and control signals may also be referred to together as constituting a single bus. A bus may include a plurality of signal lines (or signals), each signal line having two or more connection points that form a main transmission line that electrically connects two or more transceivers, transmitters and/or receivers.

[0064] As used herein, a signal (or line, signal line, etc.) refers to one or more electrical conductors or optical carriers, generally configured as a single carrier or as two or more carriers, in a twisted, parallel, or concentric arrangement, used to transport at least one logical signal. A logical signal may be multiplexed with one or more other logical signals generally using a single physical signal but logical signal(s) may also be multiplexed using more than one physical signal.

[0065] As used herein, memory devices are generally defined as integrated circuits that are composed primarily of memory (e.g., storage, etc.) cells, such as DRAMs (Dynamic Random Access Memories), SRAMs (Static Random Access Memories), FeRAMs (Ferro-Electric RAMs), MRAMs (Magnetic Random Access Memories), Flash Memory (e.g., NAND flash, NOR flash, etc.) and other forms of random access and related memories that store information in the form of electrical, optical, magnetic, chemical, biological, combination(s) of these, and/or in other forms.

[0066] Dynamic memory device types may include FPM DRAMs (Fast Page Mode Dynamic Random Access Memories), EDO (Extended Data Out) DRAMs, BEDO (Burst EDO) DRAMs, SDR (Single Data Rate) Synchronous DRAMs, DDR (Double Data Rate) Synchronous DRAMs, DDR2, DDR3, DDR4, or any of the expected follow-on devices and related technologies such as Graphics RAMs, Video RAMs, LP RAM (Low Power DRAMs) which are often based on the fundamental functions, features and/or interfaces found on related DRAMs.

[0067] Flash memory device types may include: NAND, NOR, SLC, MLC, TLC using any interface (e.g., standard interface (e.g., ONFI, etc.); non-standard interface; etc.). Flash memory device types may also include any of the expected follow-on devices and related technologies.

[0068] Memory devices may include chips (die) and/or single or multi-chip or multi-die packages of various types, assemblies, forms, and configurations. In multi-chip packages, the memory devices may be packaged with other device types (e.g., other memory devices, logic chips, CPUs, hubs, buffers, intermediate devices, analog devices, programmable devices, etc.) and may also include passive devices (e.g., resistors, capacitors, inductors, etc.). These multi-chip packages may include cooling enhancements (e.g., an integrated heat sink, heat slug, fluids, gases, micromachined structures, micropipes, capillaries, etc.) that may be further attached to the carrier or another nearby carrier or other heat removal or cooling system. Other forms of packaging (e.g., assemblies, modules, cards, units, molding, encapsulation, etc.) for memory devices are also possible.

[0069] Although not necessarily shown in all the Figures, storage and memory support devices (e.g., storage controller(s), network controller(s), chipset(s), adapter(s), expander(s), buffer(s), buffer circuit(s), buffer chip(s), register(s), intermediate circuit(s), power supply regulator(s), VRMs, hub(s), re-driver(s), PLL(s), DLL(s), non-volatile memory, SRAM, DRAM, logic circuits, analog circuits, digital circuits, diodes, switches, LEDs, crystals, active components, passive components, combinations of these and other circuits, etc.) may be comprised of multiple separate chips (e.g., die, dies, dice, integrated circuits, etc.) and/or components, may be combined as multiple separate chips onto one or more substrates, may be combined into a single package (e.g., using die stacking, multi-chip packaging, etc.) or even integrated onto a single device based on tradeoffs such as: technology, power, space, weight, cost, etc.

[0070] One or more of the various passive devices (e.g., resistors, capacitors, inductors, combination(a) of these, etc.) may be integrated into the support chip packages, or into the substrate, board, PCB, or raw card itself, based on tradeoffs such as: technology, power, space, cost, weight, etc. These packages may include an integrated heat sink or other cooling enhancements (e.g., such as those described above, etc.) that may be further attached to the carrier or another nearby carrier or other heat removal or cooling system.

[0071] Memory and storage devices, intermediate devices and circuits, hubs, buffers, registers, clock devices, passives and other memory and storage support devices etc. and/or other components may be attached (e.g., coupled, connected, etc.) to the storage system(s) and/or subsystem(s) and/or other component(s) via various methods including solder interconnects, conductive adhesives, socket structures, pressure contacts, electrical/mechanical/optical and/or other methods that enable communication between two or more devices (e.g., via electrical, optical, wireless, combinations of these, or alternate means, etc.).

[0072] The one or more storage system(s) and/or subsystem(s) and/or other components/devices may be connected (e.g., electrically, optically, wireless, etc.) to the CPU complex, computer system or other system environment via one or more methods such as soldered interconnects, connectors, pressure contacts, conductive adhesives, optical interconnects (e.g., laser, LED, optic fiber, etc.), wireless links (e.g., coupling, coils, etc.) and/or other signal communication and/or power delivery methods. Physical connector systems may include mating connectors (male/female), conductive contacts and/or pins on one carrier mating with a male or female connector, optical connections, pressure contacts (often in conjunction with a retaining, alignment, and/or closure mechanism) and/or one or more of various other communication and power delivery methods. The interconnection(s) may be disposed along one or more edges of an assembly (e.g., module, card, adapter, etc.) and/or placed a distance from the storage or other subsystem depending on such application requirements as ease of upgrade, ease of repair, cost, available space and/or volume, heat transfer constraints, component size and shape and other related physical, electrical, optical, visual/physical access, requirements and constraints, etc. Electrical interconnections on a card are often referred to as contacts, pins, connection pins, tabs, etc. Electrical interconnections on a connector are often referred to as contacts or pins.

[0073] The integrity, reliability, availability, serviceability, performance etc. of a communication path, data storage contents, and all functional operations associated with each element of a storage system or storage subsystem may be improved by using one or more fault detection and/or correction methods. Any or all of the various elements of a storage system or storage subsystem may include error detection and/or correction methods such as CRC (cyclic redundancy code, or cyclic redundancy check), ECC (error-correcting code), EDC (error detecting code, or error detection and correction), LDPC (low-density parity check), parity, checksum or other encoding/decoding methods suited for this purpose. Further reliability enhancements may include operation re-try (e.g., repeat, re-send, etc.) to overcome intermittent or other faults such as those associated with the transfer of information, the use of one or more alternate, stand-by, or replacement communication paths to replace failing paths and/or lines, complement and/or re-complement techniques or alternate methods used in computer, storage, communication, and related systems.

[0074] Additional functions that may reside local to the storage subsystem and/or storage system include write and/or read buffers, one or more levels of cache, protocol translation, error detection and/or correction circuitry, data scrubbing, local power management circuitry and/or reporting, operational and/or status registers, initialization circuitry, performance monitoring and/or control, and other functions.

[0075] Terminology

[0076] The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting of the invention. As used herein, the singular forms (e.g., a, an, the, etc.) are intended to include the plural forms as well, unless the context clearly indicates otherwise.

[0077] The terms comprises and/or comprising, when used in this specification, specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof.

[0078] In the following description and claims, the terms include and comprise, along with their derivatives, may be used, and are intended to be treated as synonyms for each other.

[0079] In the following description and claims, the terms coupled and connected may be used, along with their derivatives. It should be understood that these terms are not necessarily intended as synonyms for each other. For example, connected may be used to indicate that two or more elements are in direct physical or electrical contact with each other. Further, coupled may be used to indicate that that two or more elements are in direct or indirect physical or electrical contact. For example, coupled may be used to indicate that that two or more elements are not in direct contact with each other, but the two or more elements still cooperate or interact with each other.

[0080] The corresponding structures, materials, acts, and equivalents of all means or step plus function elements in the claims below are intended to include any structure, material, or act for performing the function in combination with other claimed elements as specifically claimed. The description of the present invention has been presented for purposes of illustration and description, but is not intended to be exhaustive or limited to the invention in the form disclosed. Many modifications and variations will be apparent to those of ordinary skill in the art without departing from the scope and spirit of the invention. The embodiment was chosen and described in order to best explain the principles of the invention and the practical application, and to enable others of ordinary skill in the art to understand the invention for various embodiments with various modifications as are suited to the particular use contemplated.

[0081] As will be appreciated by one skilled in the art, aspects of the present invention may be embodied as a system, method or computer program product. Accordingly, aspects of the present invention may take the form of an entirely hardware embodiment, an entirely software embodiment (including firmware, resident software, micro-code, etc.) or an embodiment combining software and hardware aspects that may all generally be referred to herein as a circuit, component, module or system. Furthermore, aspects of the present invention may take the form of a computer program

product embodied in one or more computer readable medium(s) having computer readable program code embodied thereon.

[0082] In this description a portable multifunction device (a *device*) is used as an example. It should be understood, however, that one or more of the embodiments described herein may be applied to any device (e.g., consumer device, phone, phone system, cell phone, internet phone, music player, video player, camera, social interaction device, radios, TV, watch, personal communication device, electronic wallet, smart jewelry, personal computer, tablet, laptop computer, computer, server, embedded system, electronic glasses, displays, projector, computer appliance, kitchen appliance, home control appliance, lighting control, network device, router, switch, TiVO, AppleTV, GoogleTV, set-top box, cable box, modem, cable modem, PC, tablet, media box, streaming device, entertainment center, GPS device, automobile system, ATM, toy, gaming system, camera, video camera, music device, storage device, back-up device, exercise machine, e-book reader, PDA, combinations of these, etc.).

[0083] The device may support one or more *applications* e.g., search applications contacts and/or friends applications, messaging applications, telephone applications, video conferencing applications, e-mail applications, communications applications, voice recognition applications, instant messaging (IM) applications, blog and/or blogging applications, photographic applications (e.g., catalog, management, upload, editing, etc.), shopping, payment, digital camera applications, digital video camera applications, web browsing and browser applications, digital music player applications, digital video player applications, cloud applications, office productivity applications, backup and storage applications, other applications or combinations or multiple instances (e.g., versions, etc.) of these, etc.

[0084] Devices themselves may include (e.g., comprise, be capable of including, have features to include, have attachments, communicate with, etc.) one or more devices, e.g., as separate components, working in cooperation, as a collection of devices, as a multi-function device, with sockets or ports for extra devices and/or components, attached (e.g., direct attach, network attached, etc.) devices, upgrade components, expansion devices and/or modules, etc.

[0085] The device may have (e.g., execute, perform, capable of being programmed to perform, etc.) multiple functions (e.g., telephone, video conferencing, e-mail, instant messaging, blogging, digital photography, digital video, web browsing, digital music playing, social interaction, shopping, searching, combinations of these, etc.). Instructions for performing the device functions may be included in a computer readable storage medium or other computer program product configured for execution by one or more processors.

[0086] Language

[0087] The terminology and language used herein is for the purpose of describing particular embodiments only and is not intended to be limiting.

[0088] As used herein, the singular forms (e.g., a, an, the, one, etc.) are intended to include the plural forms as well, unless the context clearly indicates otherwise.

[0089] As used herein, the terms comprises and/or comprising, when used in this specification, specify the presence of stated features, numbers, integers, steps, operations, elements, and/or components, etc, but do not preclude the presence or addition of one or more other features, numbers, integers, steps, operations, elements, components, etc. and/or groups thereof.

[0090] In the following description and claims, the terms include and comprise, along with their derivatives, may be used, and are intended to be treated as synonyms for each other.

[0091] In the following description and claims, the terms coupled and connected may be used, along with their derivatives. It should be understood that these terms are not necessarily intended as synonyms for each other. For example, connected may be used to indicate that two or more elements are in direct physical or electrical contact with each other. Further, coupled may be used to indicate that that two or more elements are in direct or indirect physical or electrical contact. For example, coupled may be used to indicate that that two or more elements are not in direct contact with each other, but the two or more elements still cooperate or interact with each other.

[0092] The corresponding structures, materials, acts, and equivalents of all means or step plus function elements in the following claims are intended to include any structure, material, or act for performing the function in combination with other claimed elements as specifically claimed.

[0093] This description is presented for purposes of illustration and explanation, but is not intended to be exhaustive or limited to the invention in the forms disclosed. Modifications, permutations, combinations, and variations of embodiments will be understood and apparent to those of ordinary skill in the art without departing from the scope and spirit of this description.

[0094] The embodiments chosen and described herein are presented in order to best explain the principles of the embodiments and their practical applications, and to enable others of ordinary skill in the art to understand the embodiments with various modifications as are suited to the particular use contemplated.

[0095] As will be understood and appreciated by one skilled in the art, one or more embodiments described herein may be a system, device, method, or computer program product, etc. Accordingly, one or more embodiments described herein may take the form of an entirely hardware embodiment, an entirely software embodiment (including firmware, resident software, micro-code, etc.) or an

embodiment combining software and hardware aspects that may all generally be referred to herein as a circuit, component, module or system. Furthermore, one or more embodiments described herein may take the form of a computer program product embodied in one or more computer readable medium(s) having computer readable program code embodied thereon.

[0096] Figure 1 illustrates a network architecture 100, in accordance with one embodiment. As shown, a plurality of networks 102 is provided. In the context of the present network architecture 100, the networks 102 may each take any form including, but not limited to a local area network (LAN), a wireless network, a wide area network (WAN) such as the Internet, peer-to-peer network, etc.

[0097] Coupled to the networks 102 are servers 104 which are capable of communicating over the networks 102. Also coupled to the networks 102 and the servers 104 is a plurality of clients 106. Such servers 104 and/or clients 106 may each include a desktop computer, lap-top computer, hand-held computer, mobile phone, personal digital assistant (PDA), tablet computer, peripheral (e.g., printer, etc.), any component of a computer, and/or any other type of logic. In order to facilitate communication among the networks 102, at least one gateway 108 is optionally coupled therebetween.

[0098] Figure 2 shows a representative hardware environment that may be associated with the servers 104 and/or clients 106 of Figure 1, in accordance with one embodiment. Such figure illustrates a typical hardware configuration of a mobile device in accordance with one embodiment having a central processing unit 210, such as a microprocessor, and a number of other units interconnected via a system bus 212.

[0099] The mobile device shown in Figure 2 includes a Random Access Memory (RAM) 214, Read Only Memory (ROM) 216, an I/O adapter 218 for connecting peripheral devices such as disk storage units 220 to the bus 212, a user interface adapter 222 for connecting a keyboard 224, a mouse 226, a speaker 228, a microphone 232, and/or other user interface devices such as a touch screen (not shown) to the bus 212, communication adapter 234 for connecting the mobile device to a communication network 235 (e.g., a data processing network) and a display adapter 236 for connecting the bus 212 to a display device 238.

[00100] The mobile device may have resident thereon any desired operating system. It will be appreciated that an embodiment may also be implemented on platforms and operating systems other than those mentioned. One embodiment may be written using JAVA, C, Objective C, and/or C++ language, or other programming languages, along with an object oriented programming

methodology. Object oriented programming (OOP) has become increasingly used to develop complex applications.

[00101] Of course, the various embodiments set forth herein may be implemented utilizing hardware, software, or any desired combination thereof. For that matter, any type of logic may be utilized which is capable of implementing the various functionality set forth herein.

[00102] Figure 3 shows a method 300, in accordance with one embodiment. As an option, the method may be implemented in the context of the architecture and environment of any subsequent Figure(s). Of course, however, the method may be implemented in any desired environment.

[00103] As shown in operation 302, a signal is received in association with a touch interface of a device. In one embodiment, the signal may include a pressure signal which is indicative of a magnitude of pressure. In the context of the present description, such pressure signal may include any signal that is a function of or related to a pressure applied to the device. In one embodiment, such pressure signal may be indicative of a magnitude of pressure being applied to a touch interface of the device. In various embodiments, such pressure signal may be generated by a pressure sensor including, but not limited to those described in the context of subsequently described embodiments, or any other mechanism, for that matter, that is capable of generating the pressure signal.

[00104] In other embodiments, the signal may include a touch signal indicative of a touch interface being touched. In the context of the present description, such touch signal may or may not be indicative of a magnitude of pressure being applied to a touch interface of the device. For example, such touch signal may, in one embodiment, simply indicate whether applied pressure is sensed, or not, e.g., not necessarily gauge any more than two pressure states, including pressure-sensed and pressure-not-sensed, etc.

[00105] Also in the context of the present description, the aforementioned device may include any device including, but not limited to those described in the context of this and/or subsequently described embodiments. Further, in various embodiments, the touch interface may or may not be combined with a display. For example, if the touch interface is combined with a display, the touch interface may include a touch screen. Thus, the touch interface may, in various embodiments, include, but is not limited to a touch screen or any other interface responsive to touch that is described in the context of this and/or subsequently described embodiments.

[00106] In one optional embodiment, the touch interface may be positioned on a first face of a device that includes a display on a second face thereof. Further, the first face and second face may include any respective faces (e.g., front, back, left side, right side, top side, bottom side, etc.) that are different. Just by way of example, in various embodiments, the first face and the second face may

be on opposite faces of the device of the device. Further, the first face may include a side face and the second face may include a front face of the device. Even still, the first face may include a back face and the second face may include a front face of the device. Of course, the touch interface may be positioned on the same face as the display, in other embodiments.

[00107] As indicated in operation 304, a user experience may be altered, utilizing the signal. In the context of the present description, the user experience may include any aspect of the device that is capable of being directly or indirectly experienced by a user including, but not limited to those described in the context of this and/or subsequently described embodiments.

[00108] For example, in the context of an embodiment involving the pressure signal, the user experience may be altered as a function of the magnitude of the pressure being applied to the touch interface, utilizing the pressure signal. Just by way of example, in various embodiments, the user experience may be altered by causing input to the device, by causing output from the device, by causing processing by the device, etc. In other embodiments involving a touch signal, the user experience may be altered in any manner, utilizing the touch signal (dependent or independent of any fluctuation of pressure).

[00109] Of course, the foregoing embodiments may be altered by adding and/or removing various features. For example, in one embodiment, the pressure signal may be received which is indicative of the magnitude of pressure being applied to a touch interface positioned on a first face of a device that includes a display on a second face thereof. To this end, the user experience may be altered as a function of the magnitude of the pressure being applied to the touch interface, utilizing the pressure signal.

[00110] In another embodiment, a pressure signal may be received which is indicative of a magnitude of pressure being applied to a touch screen. To this end, the user experience may be altered as a function of the magnitude of the pressure being applied to the touch screen, utilizing the pressure signal. In still yet another optional embodiment, a touch signal may be received which is indicative of a touch interface being touched, where the touch interface is positioned on a first face of a device that includes a display on a second face thereof. To this end, the user experience may be altered, utilizing the touch signal. Again, any of the features described above (or hereinafter, for that matter) may or may not be combined in any desired manner.

[00111] More illustrative information will now be set forth regarding various optional architectures and features with which the foregoing techniques discussed in the context of any of the present or previous figure(s) may or may not be implemented, per the desires of the user. For instance, various optional examples and/or options associated with the operations 302 and/or 304,

and/or other optional features have been and will be set forth in the context of a variety of possible embodiments. It should be strongly noted, however, that such information is set forth for illustrative purposes and should not be construed as limiting in any manner. Any of such features may be optionally incorporated with or without the inclusion of other features described.

[00112] Figure 4 shows a method 400 for defining a selection made within a user interface based in part on contact pressure, in accordance with one embodiment. As an option, the method 400 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the method 400 may be carried out in any desired environment. It should also be noted that the aforementioned definitions may apply during the present description.

[00113] As shown, it is determined whether sufficient initial contact pressure is being exerted on an interaction surface. See determination 402.

[00114] In the context of the present description, an interaction surface refers to a surface through which a user may interact with a device. It may take up the majority of a device face, or just a subset. In various embodiments, an interaction surface may be sensitive to one or more types of interaction, including but not limited to, contact, pressure, and/or proximity. In one embodiment, an interaction surface is receptive to multitouch input. In another embodiment, an interaction surface may be non-planar. In yet another embodiment, an interaction surface may be transparent, and combined with a display. In still another embodiment, an interaction surface may be replaceable. Some embodiments of an interaction surface may have more than one texture, to provide tactile guides to a user when used on the back face of a device. Other embodiments of an interaction surface are non-rectangular.

[00115] In various embodiments, an interaction surface may utilize one or more forms of technology to sense contact. These contact-sensing technologies may include, but are not limited to, capacitive, resistive, optical, surface acoustic wave based, and/or any other contact sensing technologies now known or later developed.

[00116] In various embodiments, an interaction surface may utilize one or more forms of technology to sense proximity. These proximity-sensing technologies may include, but are not limited to, capacitive, resistive, eddy current, optical, ultrasonic, heat, electric field based, and/or any other contact sensing technologies now known or later developed.

[00117] In various embodiments, an interaction surface may utilize one or more forms of technology to sense pressure. These pressure-sensing technologies may include, but are not limited to, conductive, resistive, piezoelectric, and/or any other pressure sensing technologies now known or

later developed. In some embodiments, an interaction surface may be able to only detect the total pressure being exerted on the surface. In other embodiments, an interaction surface may be able to discern the contact pressures associated with one or more points or areas of contact.

[00118] In the context of the present description, contact pressure is the pressure associated with one or more contact points or contact areas, the pressure being exerted on an interaction surface. For example, in one embodiment, contact pressure may be the pressure exerted on an interaction surface by a single finger press.

[00119] In the context of the present description, a contact area refers to the area of an interaction surface which is in physical contact with an implement of interaction. In various embodiments, the contact area may be described, stored, and processed, as a collection of cells that are part of an array. In one embodiment, this array may directly correspond to pixels of a display. In another embodiment, the array may correspond to a grid of discrete areas on an interaction surface which sense contact, pressure, or both. In still another embodiment, the contact area is represented as a primitive shape (e.g., circle, square, etc.) which best fits the actual area in contact with an implement of interaction.

[00120] In the context of the present description, an implement of interaction refers to an object which is detectable by an interaction surface in one or more ways (e.g., proximity, contact, pressure, etc.). In various embodiments, implements of interaction may include, but are not limited to, fingers, skin, a stylus, and/or any other object with which a user may interact with a device.

[00121] In the context of the present description, a contact point refers to a single location on an interaction surface which is associated with physical contact with an implement of interaction. In various embodiments, the contact point may be determined from a contact area. For example, in one embodiment, a contact point may be located in the center of its associated contact area. In another embodiment, a contact point may be located on an edge of its associated contact area.

[00122] Determining whether sufficient initial contact pressure is being exerted on an interaction surface depends on a threshold contact pressure. In some embodiments, the smallest degree of contact pressure may be sufficient, such that the definition of a selection may be triggered by any contact. In other embodiments, the definition of a selection does not occur until a non-negligible threshold contact pressure has been detected. In one embodiment, this threshold contact pressure may be defined by the user. In this way, accidental definitions of a selection may be avoided.

[00123] In some embodiments, determination 402 may be performed only after certain events have occurred. For example, in one embodiment, the determination may be made only after receipt of an input or combination of inputs. Possible inputs include, but are not limited to, object proximity

to the interaction surface, activation of a hardware switch or button, activation of a software switch or button, and/or any other input capable of being detected. In one embodiment, the determination may not be made until the host device is woken from a sleep state. In another embodiment, the determination itself may also wake the host device from a sleep state.

[00124] If the result of determination 402 is that there is sufficient initial contact pressure being exerted on an interaction surface, the current contact pressure level is determined. See operation 404.

[00125] In the context of the present description, a contact pressure level is the pressure reading generated from the raw data received from a touch sensor. In various embodiments, the contact pressure level may be represented by a number. For example, in some embodiments, the contact pressure level may be represented by an integer. In another embodiment, the contact pressure level may be represented by a floating-point number. In various embodiments, the contact pressure level may be represented by a percentage of the measurable range of contact pressures. In one embodiment, the contact pressure level may be represented by a unit less number. In another embodiment, the contact pressure level may be represented by an actual measure of the contact pressure, associated with a unit of pressure.

[00126] In various embodiments, the contact pressure level may be represented by a touch state. In the context of the present description, a touch state refers to a predefined subset of the range of measurable contact pressures. For example, in one embodiment, contact pressure levels may be represented as one of four predefined touch states: no touch, light touch, medium touch, and heavy touch. As an option, the lowest touch state may require some form of proximity. In some embodiments, the user may be able to specify how the measurable range of contact pressures is partitioned across a predefined number of touch states. In one embodiment, the number and boundaries of touch states may be defined system-wide, for all applications. In another embodiment, the number and boundaries of touch states may be defined on a per-application basis.

[00127] As shown, the selection area is calculated. See operation 406. In the context of the present description, the selection area refers to a region of the display, or a region of an object pictured on the display, which has been chosen for selection. The calculation of the selection area may be based upon one or more factors, including, but not limited to, a contact pressure level, a touch state, a contact area, a contact point, a selection boundary, a selection boundary geometry, and/or any other information derived from user interaction. In some embodiments, the selection area may be described as the pixels contained within a selection boundary.

[00128] In the context of the present description, a selection boundary describes the boundary of an associated selection area, and is based upon a selection boundary geometry. Additionally, in the context of the present description, a selection boundary geometry refers to the shape of a selection boundary. In some embodiments, a selection boundary geometry may not have reference to actual size or location. For example, in one embodiment, a selection boundary geometry may be described using fractional coordinates on a unit square.

[00129] In various embodiments, a selection area may be described, stored, and/or processed as the area contained within a selection boundary. A selection boundary may be represented by a selection boundary geometry, a screen location, and one or more transformations, such as scale or orientation. In one embodiment, the screen location is the point on which the transformed selection boundary geometry is centered.

[00130] In some embodiments, the selection area may be described, stored, and/or processed, as a collection of cells that are part of an array. In one embodiment, this array may directly correspond to pixels of a display. In another embodiment, the array may correspond to a grid based on a coordinate system specific to an object being displayed. In still another embodiment, the selection area may be described, stored, and processed as a mathematical function that defines the boundary of the selection area.

[00131] In one embodiment, the shape of a selection boundary may be one of a plurality of selection boundary geometries predefined within an operating system. In another embodiment, the shape of a selection boundary may be predefined within an application, independent of selection boundary geometries defined within the operating system. In yet another embodiment, the selection boundary geometry may be specified by a user. In still another embodiment, the geometry of the selection boundary may depend upon at least one form of user input, including but not limited to contact pressure, number of fingers in contact with the screen, device orientation, location of user fingers, and/or any other form of user input. Finally, in another embodiment, the geometry of a selection boundary may depend upon the content within or near a location associated with the selection (e.g., contact point, finger location, focal point of user's eyes, cursor location, etc.).

[00132] In some embodiments, selection boundaries may have geometries based upon simple shapes, including, but not limited to, ovals, circles, triangles, squares, rectangles, and/or higher order polygons. In other embodiments, selection boundaries may be based upon regular shapes (e.g., a star, a plus sign, etc.). In one embodiment, a selection boundary may be based upon the geometry of a contact area.

[00133] There are numerous ways in which a selection boundary may be described, stored, and/or processed. In various embodiments, a selection boundary may be represented by the combination of an established selection boundary geometry with a location, a scale, and/or a rotation.

[00134] In one embodiment, a selection boundary may be described using the vertex coordinates of a selection boundary geometry, in conjunction with location, scale, and/or rotation factors. For example, a rectangular selection boundary geometry may be described by the coordinates of the four corners. As an option, the vertices of a selection boundary geometry may be described using coordinates within the unit square.

[00135] In another embodiment, a selection boundary may be described using a mathematical function representing an established selection boundary geometry, in conjunction with location, scale, and/or rotation factors. For example, an elliptical selection boundary geometry may be described by an ellipse function whose foci depend upon the scale factor.

[00136] In yet another embodiment, a selection boundary may be described using a spline-based representation of a selection boundary geometry, in conjunction with location, scale, and/or rotation factors. For example, a curled selection boundary geometry may be described using splines combined with location, scale, and rotation factors.

[00137] In other embodiments, a selection boundary may be described by a bitmap representation of a selection boundary geometry, in conjunction with location, scale, and/or rotation factors. For example, in one embodiment, a bitmap representation of a contact area may be used as a selection boundary geometry associated with a selection boundary. In another embodiment, a bitmap representation of an irregular shape may be used as a selection boundary geometry associated with a selection boundary. In this way, geometries which may be difficult to describe using vertices, formulas, or splines may be used as the bases for a selection boundary.

[00138] The selection area is calculated by determining the selection boundary. In various embodiments, the selection boundary may be determined by transforming an appropriate selection boundary geometry as a function of user input, including but not limited to, contact pressure level, contact point, contact area, number of fingers detected, device orientation, etc. Once the selection boundary has been determined, the selection area is known.

[00139] In various embodiments, the selection boundary may be defined by transforming the scale of an appropriate selection boundary geometry as a function of user input. For example, in one embodiment, a selection boundary with a circular geometry may have a larger radius at higher contact pressure levels. In another embodiment, a rectangular selection boundary geometry may be scaled linearly by a factor proportional to the contact pressure level. In some embodiments, the

relationship between selection boundary geometry scale and a contact pressure level is proportional. In other embodiments, the relationship between selection boundary geometry scale and a contact pressure level is inversely proportional, such that higher pressure may make the geometry smaller.

[00140] In various embodiments, the selection boundary may be defined by transforming the orientation of an appropriate selection boundary geometry as a function of user input. For example, in one embodiment, a selection boundary with a star-shaped geometry may be rotated further clockwise at higher contact pressure levels. In some embodiments, the relationship between selection boundary geometry orientation and a contact pressure level is proportional, such that an increase in pressure may result in a clockwise rotation. In other embodiments, the relationship between selection boundary geometry orientation and a contact pressure level is inversely proportional, such that higher pressure may cause a counterclockwise rotation.

[00141] In some embodiments, a selection boundary may have an anchor point. In the context of the present description, an anchor point refers to a point located on or near the selection boundary geometry which remains fixed as the geometry is transformed. In one embodiment, a selection boundary may have a scaling anchor point, which remains fixed as the geometry is scaled. For example, a square selection boundary may have a scaling anchor point in the upper left corner, causing the square to expand down and to the right, keeping the upper left corner stationary.

[00142] In another embodiment, a selection boundary may have a rotational anchor point, which is used as an axis of rotation as the selection boundary geometry is rotated. For example, a star-shaped selection boundary may have a rotational anchor point located in the center, such that it rotates along an axis of symmetry.

[00143] In various embodiments, the calculation of the selection area may depend upon the context of the selection. Specifically, the selection boundary may be dependent upon the type of content on or near a point or area associated with the selection, including but not limited to, a contact point, a contact area, a cursor, a user focus, etc. In various embodiments, the selection boundary geometry and the manner in which it transforms as a function of user input may be context dependent. For example, in one embodiment, a selection made on or near a text field may cause the selection boundary geometry to be rectangular, with a scaling anchor point located in an upper corner appropriate for the text language (e.g., upper left corner for English, upper right corner for Arabic, etc.). In another embodiment, a selection on or near a text field may cause the rectangular boundary geometry to scale in increments of the same scale as the height and width of the text. In this way, it may be clear to the user which text has been selected, as there may never exist a selection boundary which contains only half a line or character.

[00144] In another embodiment, a selection on or near a text field may result in a rectangular selection boundary geometry which scales proportionally to a contact pressure level in a manner similar to how text is selected using a cursor. In this way, a user may select text in a familiar manner, while only having to vary the pressure being exerted on a contact point, for example. In one embodiment, the text selection begins to increase once a predefined contact pressure level has been achieved. As an option, the rate at which the selection grows may be a function of the contact pressure level, once the predefined contact pressure level has been achieved and the selection grown initiated. In another embodiment, the text selection scaling may be tiered, such that at one touch state, the selection grows character by character, at an intermediate touch state the selection grows word by word, and so on, such that the user is able to enlarge the text selection in increments of characters, words, lines, paragraphs, and pages, depending on the touch state. As an option, the selection may also be incremented by sentences.

[00145] In other embodiments, the above-mentioned methods for selecting text using a selection which expands in the direction the text would be read in may also be applied to the selection of other linear subject matter. For example, in one embodiment, this method may be used to select a video segment. As an option, the selection scaling may be tiered, growing from frame-by-frame to second-by-second to minute-by-minute, and so on. In another embodiment, this method may be used in the selection of a portion of chronologically arranged material. Possible material with a temporal arrangement may include, but is not limited to, a collection of photos, messages in an email account, text messages, web browser history, and/or any other collection of items which may be arranged chronologically.

[00146] In various embodiments, a selection made within a graphic (e.g., photograph, drawing, movie still, bitmapped or rasterized text, etc.) may utilize a default selection boundary geometry with a default scaling anchor point. In one embodiment, the user may be able to predefine the default selection boundary geometry and/or default scaling anchor point, to be used when making a selection within a graphic. In still another embodiment, the default selection boundary geometry and/or default scaling anchor point may be predefined within the operating system. As an option, these defaults may be predefined on a per-application basis.

[00147] In various embodiments, a selection made within a photograph may result in the use of a context-specific selection boundary geometry which transforms in a context specific manner. For example, in one embodiment, a selection made within a photograph containing one or more people may utilize the rough shape of the subjects' faces as a selection boundary geometry. As an option, the selection boundary geometry may be composed of the perimeter of all faces within a certain

distance of a point related to the selection (e.g., contact point, user focus, etc.), the distance being proportional to a user input (e.g., contact pressure level, touch state, etc.). Face selection may be used to assist the user in establishing the identity of photographed individuals, allowing future identification to be performed automatically using facial recognition. In one embodiment, facial and other forms of recognition may be performed by a host device, a remote computer, a cloud service, or any other computational resource, or combination of these and other resources.

[00148] In another embodiment, a selection made within a photograph on or near an eye may utilize a rough shape of the eye as a selection boundary geometry. As an option, the exactness of the method used to automatically detect the shape of an eye may vary as a function of a user input, such as contact pressure level. Eye selection may be used to assist the user in removing the "red eye" effect sometimes seen in photographs.

[00149] In one embodiment, a selection made within a graphic may cause the selection boundary geometry to be defined by the collection of pixels near a point associated with the selection (e.g., contact point, user focus, etc.) which are similar in at least one aspect. Possible aspects include, but are not limited to, color, one or more dimensions of an associated color space, brightness, transparency, and/or any other aspect that may be associated with a pixel. As an option, the degree of similarity between pixels required to influence the selection boundary geometry may be a function of a user input, such as a contact pressure level. In this way, a user may be assisted in separating an object within the graphic from a background or other visual elements.

[00150] In various embodiments, there may exist limits to the amount a selection boundary geometry may be transformed as a function of user input. For example, in one embodiment, the selection boundary geometry may increase in size as the contact pressure level increases, until an upper contact pressure threshold is reached. Contact pressure levels beyond the upper threshold may not increase the size of the selection boundary geometry any further. In another embodiment, the scale of the selection boundary geometry may be limited by a lower contact pressure threshold, such that reducing the contact pressure level below the threshold may not reduce the scale of the selection boundary geometry any further. In yet another embodiment, both upper and lower contact pressure thresholds may be implemented. In other embodiments, this concept of thresholds may be applied to other variable aspects of the selection boundary, such as the orientation of the selection boundary geometry, and as a function of other user input, including but not limited to the location of a contact point, the size of a contact area, user focus, and/or any other type of user input.

[00151] In one embodiment, the user may be able to predefine one or more contact pressure thresholds associated with the limits of a transformation of the selection boundary geometry. As an

option, the user may also predefine the limits of the transformation, in addition to the maximum and/or minimum contact pressure level which may affect said transformation. In another embodiment, these contact pressure thresholds and/or transformation limits may be predefined within the operating system. In still another embodiment, the contact pressure thresholds may be automatically optimized over time, by observing the typical range of pressures the user exerts in various use scenarios.

[00152] In one embodiment, the selection boundary geometry and/or transformation of the selection boundary geometry may depend upon the proximity of an object to an interaction surface, rather than an aspect of physical contact with an interaction surface.

[00153] In various embodiments, the selection boundary may depend, at least in part, upon the user focus. In the context of the present description, user focus refers to a point or area on a display which is the visual and/or interactive focus of the user. For example, in one embodiment, the user focus may be determined by tracking the eyes of a user with one or more device-mounted cameras, and calculating where the user is looking. This may also be referred to as user gaze, or user gaze tracking. As an option, eye movement may also be monitored, to ascertain the manner in which the user is using the device (e.g., methodically reading text, quickly scanning text, examining a picture, visually searching for an icon, etc.). In another embodiment, the user focus may be defined as the location of a cursor in a text environment. In still another embodiment, the user focus may be established through user input, such as a finger tap.

[00154] Various aspects of the selection boundary may depend upon the user focus. For example, in one embodiment, the user focus may be used to determine the context of a selection. In another embodiment, the user focus may be used to determine the location of a selection, allowing the user to make a selection without having to change the location of a contact point. In still another embodiment, the tracking of eye movement may be used to determine the type of selection (e.g., reading eye movement may trigger a text selection, etc.).

[00155] Once the selection boundary has been determined using an appropriate selection boundary geometry that has been transformed as a function of a user input, the selection area may be calculated.

[00156] As shown, the selection area is displayed. See operation 408. In various embodiments, a selection area may be displayed using one or more selection functions. In the context of the present description, a selection function refers to a function of one or more inputs which determines one or more properties of a selection. For example, in one embodiment, possible selection function inputs may include, but are not limited to, touch state, contact pressure level, selection state, finger

locations, device orientation, user focus, pressure uncertainty, touch uncertainty, contact point, contact area, gestures, application type and/or context, application flags, operating system flags, and/or any other form of user or system input.

[00157] Within the context of the present description, pressure uncertainty refers to any data associated with the uncertainty inherent in measuring pressure exerted on an interaction surface. Pressure uncertainty may include, but is not limited to, the uncertainty of a measured contact pressure level, a multidimensional array of values representing the variance of contact pressure measured for each cell/pixel in the vicinity of a contact point, an uncertainty value inherent to a particular pressure sensor, and/or any other type of data associated with uncertainty in pressure measurement.

[00158] Within the context of the present description, touch uncertainty refers to any data associated with the uncertainty inherent in sensing contact with an interaction surface. Touch uncertainty may include, but is not limited to, the error range associated with the location of a contact point, a multidimensional array of values representing the probabilities of contact measured for each cell/pixel in the vicinity of a contact point, an uncertainty value inherent to a particular touch sensor, and/or any other type of data associated with uncertainty in sensing contact.

[00159] Within the context of the present description, a selection state refers to whether a selection is 'dynamic' and still able to vary as a function of user input, or 'static', and not currently varying as a function of user input.

[00160] In various embodiments, a selection function may determine one or more presentation properties of a selection. For example, possible presentation properties may include, but are not limited to, shading, color, contrast, brightness, line style, animation routine, transparency, pattern, border style, area style, and/or any other visual property that may describe an object on a display. Examples of animation routines include, but are not limited to, "marching ants", changing colors, flashing, simulated optical distortions, pulsing highlights, and/or any other routine which varies location, transparency, color, content, and/or any other graphical property over time. In some embodiments, an animation routine may be a function of user input.

[00161] In various embodiments, a selection function may vary one or more presentation properties as a function of contact pressure. In this way, the user has visual feedback as to the level of pressure they are exerting on the device. For example, in one embodiment, the selection function may indicate the contact pressure level by shading the selection with a color which is somewhere between a pair of colors which represent the extrema of measurable contact pressure levels.

[00162] In various embodiments, a selection function may determine one or more fundamental properties of a selection. Within the context of this description, fundamental selection properties may include, but are not limited to, selection boundary geometry, transformation(s) to be applied to the selection boundary geometry as a function of user input, anchor point(s), and/or any other property which may be associated with a selection area.

[00163] In various embodiments, the application of a selection function may display a secondary boundary. Within the context of this description, a secondary boundary is any boundary, radius, or area associated with a selection area, which is not the selection boundary. For example, in one embodiment, a secondary boundary may be the area within which facial detection is being performed, as opposed to the selection boundary, which may be the outline of detected faces. In another embodiment, a secondary boundary may be the area within which eye detection is being performed. In yet another embodiment, the secondary boundary may represent the pressure uncertainty or touch uncertainty associated with a contact area.

[00164] In various embodiments, the secondary boundary may be displayed in addition to, or instead of, the selection boundary. For example, in one embodiment where face detection is being performed as part of calculating the selection area, the selection boundary may be indicated with a solid color line while the secondary boundary may be indicated with a thin dotted line.

[00165] In various embodiments, the area unique to the secondary boundary (i.e. the portion of the enclosed area which does not overlap with the selection area) may have presentation properties that differ from the selection area. For example, in one embodiment, a user may make a text selection of which the intended boundaries are uncertain. The portion of the text which was almost certainly intended to be selected may be shaded in green, while the text which may or may not have been selected intentionally may be shaded in red. The user intention may be extrapolated from uncertainty associated with the contact and/or contact pressure used to make the selection, in accordance with one embodiment.

[00166] In various embodiments, the secondary boundary may be used to indicate uncertainty associated with a form of machine recognition including, but not limited to, facial recognition, OCR, and/or any other form of machine recognition. For example, faces within a selection which have been recognized with a threshold degree of confidence may be outlined in green, while faces whose recognition is suspect (i.e. multiple viable matches, etc.) may be outlined in red (i.e. a secondary border).

[00167] As shown, after the selection area has been displayed, it is determined whether the selection establishment conditions have been met. See determination 410.

[00168] Within the context of the present description, selection establishment conditions refer to one or more predefined conditions whose satisfaction may cause the selection state to switch from 'dynamic' to 'static'. For example, in one embodiment, once the selection establishment conditions have been satisfied, the selection may no longer vary with contact pressure levels until determination 402 once again detects sufficient initial contact pressure. In various embodiments, the selection establishment conditions may be defined within a selection function.

[00169] In various embodiments, one or more selection establishment conditions may depend upon changes in the contact pressure level. For example, in some embodiments, selection establishment may be conditioned upon whether the contact pressure level drops below a predefined level. In one embodiment, this threshold contact pressure level may be defined as being a set amount of pressure less than the current contact pressure level. In this way, a user may reduce the contact pressure a small amount to modify their selection, with further reduction causing a selection establishment condition to be satisfied. In another embodiment, the threshold contact pressure level may be a set pressure amount.

[00170] In various embodiments, a selection establishment condition may depend upon contact pressure velocity, or the rate at which the contact pressure level is changing. For example, in one embodiment, a user may be able to satisfy a selection establishment condition by quickly reducing the contact pressure level to a predefined level within a predefined amount of time. In another embodiment, selection establishment may be conditioned upon whether a user has increased the contact pressure level to a predefined level within a predefined amount of time. In yet another embodiment, a selection may be established by exceeding a predefined contact pressure velocity, without regard to the actual pressure levels. As a specific example, a user may establish their selection by a quick pulse of their finger, without having to reach a particular pressure level.

[00171] In various embodiments, a selection establishment condition may depend upon how much time has elapsed since a particular event. For example, in one embodiment, a selection may be established if the user maintains a contact pressure level for a predefined amount of time. As an option, there may be a predefine tolerance level for pressure variations which may not reset this timing, allowing for small fluctuations in contact pressure which may be difficult for a user to control. In another embodiment, a selection establishment condition may be satisfied once a predefined amount of time has elapsed since the satisfaction of determination 402.

[00172] In various embodiments, a selection establishment condition may depend upon forms of user input that are not related to contact pressure. These forms of user input may include, but are not limited to, gestures, a change in the number of fingers in contact with the device, change in device

orientation, surpassing a threshold level of accelerations (e.g., wrist flick, etc.), and/or any other form of user input. It should be noted that selection establishment may also be conditioned upon the satisfaction of a combination of any of the previously described conditions.

[00173] If it is determined that the selection establishment conditions have not been met, the selection is updated in a loop through performing operations 404, 406, and 408. The selection may continue to vary as a function of user input until the selection establishment conditions have been met.

[00174] If it is determined that the selection establishment conditions have been met, the selection state is changed from 'dynamic' to 'static'. See operation 412.

[00175] Setting the selection state to 'static' means the selection is no longer being modified by user input. In various embodiments, the selection function may depend in part on the selection state. For example, in one embodiment, when the selection state is 'static', the secondary boundary may be removed from the display. In another embodiment, a 'static' selection state may cause the selection area to be displayed in a different color, or with a different style of selection boundary. In yet another embodiment, changing a selection state from 'dynamic' to 'static' may cause one or more application and/or operating system flags to be set.

[00176] In various embodiments, changing a selection state from 'dynamic' to 'static' may prompt the user to choose an action to be performed on or with the contents of the selection. For example, in one embodiment, after the desired faces have been highlighted and the user has reduced the contact pressure level below the dynamic selection minimum threshold pressure, they may be prompted to confirm the identity of the selected faces. In another embodiment, after a text selection has been given a 'static' selection state, the user may be prompted with operations that may be performed on the selected text, including but not limited to copy, cut, paste, spell check, style (e.g., bold, underlined, italic, etc.), font, font size, and/or any other operation which may be performed on text.

[00177] In some embodiments, once a selection has become 'static', it can no longer be modified and may be destroyed upon creation of a new selection. In other embodiments, a user may further modify a static selection by first applying a contact pressure sufficient to satisfy determination 402. In one embodiment, satisfying determination 402 with a static selection already in existence may change the selection state of the previous selection from static to dynamic, allowing further variation as a function of user input. In another embodiment, satisfying determination 402 with a static selection already in existence may create a new selection, as a function of user input, which is combined with the previously made selection. In yet another embodiment, a user may chose

whether to replace a previously made selection or augment (i.e. add to, subtract from, etc.) a previously made selection with a new selection. As an option, the user choice may be indicated through gesture, voice command, toggling a hardware control, toggling a software control, and/or any other form of user input.

[00178] In various embodiments, method 400 may be adapted to allow for the definition, establishment, and modification of selections through other types of user input. Other types of user input may include, but are not limited to, proximity to an interaction surface, number of contact points, gestures, and/or any other form of user input. For example, in one embodiment, a user may expand a text selection by bringing their finger into proximity to the interaction surface.

[00179] Figure 5 shows a pressure sensitive user interface 500 for making a selection, in accordance with one embodiment. As an option, the user interface 500 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the user interface 500 may be implemented in any desired environment. The aforementioned definitions may apply during the present description.

[00180] As shown, the user interface 500 may be utilized in making a selection based in part on pressure exerted by the user upon one or more interaction surfaces located on a device. For example, in one embodiment, a user's finger 502 may exert a small amount of force over contact area 504, which is centered on contact point 506 located on a pressure sensitive touch screen. If the contact pressure level is sufficient, then a selection area 508 having a selection boundary 510 is calculated and displayed. As the contact pressure is increased, the selection boundary expands to encompass a larger selection area 512.

[00181] Figure 6 shows a method 600 for determining the context of a contact pressure-based selection and choosing an appropriate selection function, in accordance with one embodiment. As an option, the method 600 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the method 600 may be implemented in any desired environment. The aforementioned definitions may apply during the present description.

[00182] As shown, the context determination zone is defined. See operation 602. Within the context of the present description, a context determination zone refers to the area that is examined while determining the context of a selection. In various embodiments, the context determination zone may be initially defined as a function of one or more elements of user input upon which the selection itself is based. For example, in one embodiment, the context determination zone may be initially defined to be the contact area. In another embodiment, the context determination zone may

be a predefined shape (e.g., circle, square, etc.) of predefined size, centered on the contact point. As an option, the user may be able to specify the initial size and shape of the context determination zone. In yet another embodiment, the context determination zone may be located such that the contact point is off-center, to provide a more intuitive user experience (e.g., the zone may be offset to compensate for the user's view being obstructed by their finger, etc.).

[00183] In still another embodiment, the context determination zone may have a predefined size. As an option, the predefined initial size for a context determination zone may be chosen such that it is smaller than any user interface elements which may be detected. As an additional option, the predefined initial size may be chosen such that it is large enough to assist a user in distinguishing between potential selection targets which are close to each other.

[00184] As shown, once the context determination zone has been defined, it is then determined whether there is a user interface control widget within the context determination zone. See determination 604.

[00185] Within the context of the present description, a user interface control widget refers to any element within a user interface which may receive user input, which are typically non-textual. For example, in various embodiments, user interface control widgets may include, but are not limited to, buttons, radio boxes, check boxes, drop down lists, sliders, tabs, and/or any other non-textual UI widget.

[00186] In some embodiments, user interface control widgets may also include hyperlinks which are isolated from a text field. For example, text that responds to user interaction like a button, but is not located within a selectable text field. Sclectable text fields and hyperlinks embedded within a text field (e.g., links within a web page, links within a word processing document, etc.) are specifically excluded from this definition of user interface control widgets, as they are treated as separate cases within this method.

[00187] In various embodiments, the determination as to whether there is a user interface control widget within the context determination zone begins with determining whether there is a UI control widget located at the contact point upon which the zone is based. In this way, time is not wasted determining the context of a well-aimed contact point.

[00188] If a UI control widget is not located at the contact point, then it may be determined if there is a UI control widget in the vicinity, within the context determination zone. In various embodiments, this determination may be performed using the bounding boxes associated with user interface elements. Within the context of the present description, a bounding box refers to a rectangle within which a user interface control widget may reside. In some embodiments, a

bounding box may be the smallest rectangle which may contain a particular user interface control widget. In this way, detection of user interface control widgets whose shape is not rectangular is simplified.

[00189] For example, in one embodiment, the determination as to whether there is a user interface control widget within the context determination zone may be performed by determining if the boundary of the context determination zone intersects with the bounding box of any user interface control widgets. As an option, if the initial size of the context determination zone is larger than a predefined minimum (e.g., smallest bounding box associated with a typical UI control widget, smallest bounding box present within the present UI, etc.), the determination may also verify the absence of any bounding boxes completely contained within the context determination zone, on the initial pass.

[00190] In another embodiment, the determination may be performed by calculating the distances between the center of the context determination zone and the center of every UI control widget present in the interface, and comparing them with a distance related to the size of the context determination zone.

[00191] If it is determined in 604 that there is at least one user interface control widget within the context determination zone, then a context sensitive UI control widget selection function is chosen. See operation 606. In various embodiments, once an appropriate selection function is chosen, a selection is defined based upon user input. In one embodiment, the selection is defined using method 4.

[00192] Within the context of the present description, a context sensitive selection function refers to a selection function adapted for use in making a selection in a context which has been automatically determined. In various embodiments, a context sensitive selection function may include logic to use a different context sensitive selection function to define the user's selection, based upon user input. In this way, a user may be able to indicate that the initial context determination is not correct, and that another selection function should be used.

[00193] For example, in one embodiment, a context sensitive UI control widget selection function may include logic such that, if the contact pressure level exceeds a predefined limit P_0, further definition of the selection is handled by a different context sensitive selection function, such as one adapted for selecting hyperlinks. In another embodiment, a contact pressure level exceeding P_0 may cause the context determination zone to expand, and the process of choosing an appropriate selection function to resume, ignoring the UI control widget previously detected within the zone. As an option, future determinations may ignore all UI control widgets. In this way, a context-aware user

selection initiated with a contact point in the vicinity of a UI control widget may be redirected to a different type of subject matter without forcing the user to reposition their finger, for example.

[00194] In various embodiments, a context sensitive UI control widget selection function may depend upon the context determination zone. For example, in one embodiment, a context sensitive UI control widget selection function may use the context determination zone as a secondary boundary. In this way, the selection function may be able to continue searching the context determination zone for additional UI control widgets.

[00195] In various embodiments, a context sensitive UI control widget selection function may include logic to handle the case where there is more that one UI control widget within the context determination zone. In one embodiment, the selection function may choose the UI control widget whose center is closest to the center of the context determination zone. In another embodiment, the selection function may choose the UI control widget whose bounding box has greatest overlap with the context determination zone. In still another embodiment, the selection function may choose the UI control widget whose bounding box has an edge or corner closest to the center of the context determination zone.

[00196] In various embodiments, a context sensitive UI control widget selection function may include logic to allow the user to toggle between multiple widgets found within the context determination zone. For example, in one embodiment, the selection function may include a list of all UI control widgets found at least partially within the context determination zone. As an option, the widgets may be arranged in the list in order of distance from the center of the context determination zone. In another embodiment, the selection function may traverse the list sequentially, selecting a different widget. As an option, the list traversal may occur as a function of user input, including but not limited to, gestures, contact pressure velocity, accelerometer data, and/or any other user input. In still another embodiment, switching between different widgets found within the context determination may occur after a predefined amount of time has elapsed, and the selection establishment conditions have not yet been satisfied. In yet another embodiment, a context sensitive UI control widget selection function may use user focus to choose between multiple UI control widgets found within the context determination zone.

[00197] In various embodiments, a context sensitive UI control widget selection function may visually indicate the selection of a widget to the user before the selection has been established. For example, in one embodiment, the selection function may highlight the outline of the widget. In another embodiment, the selection function may shade the widget using a predefined mask of the widget. In still another embodiment, the selection function may shade and/or outline the widget

bounding box. In yet another embodiment, the selection function may change and aspect of text associated with the widget, aspects including but not limited to font, text style, text color, and/or any other text property. As a specific example, a context sensitive UI control widget selection function may cause the name of a button to be displayed in blue italics if it is the current context-based selection derived from user input. In this way, the user may see what control is about to be activated before satisfying the selection establishment conditions.

[00198] In various embodiments, a context sensitive UI control widget selection function may have selection establishment conditions that depend upon the type of user interface control widget that is being selected. Some user interface control widgets are multi-state in nature (e.g., sliders, drop down lists, etc.), while others are bi-state (e.g., buttons, check boxes, etc.). In some embodiments, it may be assumed that when a user satisfies the selection establishment conditions for a bi-state UI control widget, they intend for the state of the widget to be toggled. The selection establishment conditions for multi-state UI control widgets, on the other hand, may include the election of a widget state.

[00199] For example, in one embodiment, the selection establishment conditions for a multi-state widget may include one or more primary conditions to establish that the user intends for that particular multi-state widget to be selected, and a secondary condition, to establish the state of that widget.

[00200] In various embodiments, the secondary condition may be satisfied (and the widget state chosen) through user input which includes, but is not limited to, contact pressure. As an option, after the primary selection establishment conditions have been satisfied, the selection function may disregard pre-established pressure triggers (e.g., P_0, global pressure triggers, etc.) until the secondary selection establishment condition has been satisfied.

[00201] For example, in one embodiment, once the primary conditions for selecting a slider widget have been satisfied, a user may select a slider value by varying the contact pressure level between two predefined threshold pressures which represent the slider state extrema. In another embodiment, the contact pressure level at the time of satisfaction of the primary conditions may be used as a zero point, represented by the middle of the slider values. Increasing the contact pressure may increase the slider value, decreasing the contact pressure may decrease the slider value. In other embodiments, these methods may be used to traverse the items within a drop down list, or any other multi-state UI control widgets which may be assigned a value.

[00202] In various embodiments, the secondary selection establishment conditions may be finally satisfied using methods previously discussed, including but not limited to, a contact pressure velocity trigger.

[00203] Once the selection establishment conditions have been satisfied, the state of the UI control widget may be set. For example, a button may be toggled, a check box may be checked or unchecked, a slider value may be set, etc.

[00204] As a specific example of one embodiment, from a user perspective, a user may make contact with and exert pressure upon an interaction surface, with a contact point near a drop down menu. The user may increase the contact pressure until the drop down menu is highlighted. After maintaining that contact pressure level for a few seconds, the list of menu items becomes visible, after which the user may select an item by varying the contact pressure. Once the desired menu item is highlighted, the user may execute a rapid increase in pressure to finalize the selection of that menu item.

[00205] If it is determined in 604 that there is no user interface control widget within the context determination zone, it is then determined whether there is an embedded hyperlink within the context determination zone. See determination 608.

[00206] Within the context of the present description, an embedded hyperlink refers to a hyperlink which is embedded within a text field. For example, iIn one embodiment, embedded hyperlinks may include, but are not limited to, text or image links within a web page, text or image links within a word processing document, and/or any other type of link which may be contained within a document. It should bc noted that any link which may be classified as a hyperlink may fall within this definition of embedded hyperlink, or within the definition of a UI control widget.

[00207] In various embodiments, the determination as to whether there is an embedded hyperlink within the context determination zone begins with determining whether there is an embedded hyperlink located at the contact point upon which the zone is based.

[00208] If an embedded hyperlink is not located at the contact point, then it may be determined if there is an embedded hyperlink in the vicinity, within the context determination zone. In various embodiments, the methods described for locating a UI control widget within the context determination zone may also be applied to determining whether there is an embedded hyperlink in the zone. In one embodiment, the bounding boxes may be handled by the application displaying the document in which an embedded hyperlink may be found. In another embodiment, the bounding boxes may be handled at a lower level, by the operating system.

[00209] If it is determined in 608 that there is at least one embedded hyperlink within the context determination zone, then a context sensitive embedded hyperlink selection function is chosen. See operation 610. In various embodiments, once an appropriate selection function is chosen, a selection may be defined based upon user input. In one embodiment, the selection may be defined using method 4.

[00210] In various embodiments, a context sensitive embedded hyperlink selection function may include logic to use a different context sensitive selection function to define the user's selection, based upon user input. In this way, a user may be able to indicate that the initial context determination is not correct, and that another selection function should be used.

[00211] For example, in one embodiment, a context sensitive embedded hyperlink selection function may include logic such that, if the contact pressure level exceeds a predefined limit P_2, further definition of the selection is handled by a different context sensitive selection function, such as one adapted for selecting text. In another embodiment, a contact pressure level exceeding P_2 may cause the context determination zone to expand, and the process of choosing an appropriate selection function to resume, ignoring the embedded hyperlink previously detected within the zone. As an option, future determinations may ignore all embedded hyperlinks. In this way, a context-aware user selection initiated with a contact point in the vicinity of an embedded hyperlink may be redirected to a different type of subject matter without forcing the user to reposition their finger, for example.

[00212] In various embodiments, a context sensitive embedded hyperlink selection function may depend upon the context determination zone. For example, in one embodiment, a context sensitive embedded hyperlink selection function may use the context determination zone as a secondary boundary. In this way, the selection function may be able to continue searching the context determination zone for additional embedded hyperlinks.

[00213] In various embodiments, a context sensitive embedded hyperlink selection function may include logic similar to that used in a context sensitive UI control widget selection function to handle the case where there is more that one embedded hyperlink within the context determination zone. Additionally, in various embodiments, a context sensitive embedded hyperlink selection function may include logic similar to that used in a context sensitive UI control widget selection function to allow a user to toggle between multiple embedded hyperlinks found within the context determination zone.

[00214] In various embodiments, a context sensitive embedded hyperlink selection function may visually indicate the selection of an embedded hyperlink before the selection has been established. For example, in one embodiment, the selection function may change the color of an embedded text

hyperlink. In another embodiment, the selection function may change the font, style, or font size of an embedded text hyperlink. In yet another embodiment, the selection function may highlight the borders of a linked image. In this way, the user may see which embedded hyperlink is about to be activated before satisfying the selection establishment conditions.

[00215] In various embodiments, a context sensitive embedded hyperlink selection function may have selection establishment conditions which change, depending upon previous user input. For example, in one embodiment, if the contact pressure level surpasses a value of P_1, but not P_2, the selection establishment condition may change to require the selection of an option from a hyperlink contextual menu. The contextual menu may provide options common to web browsers, including but not limited to "open link", "copy link", and/or any other action which may be performed on or with a hyperlink. In various embodiments, the selection of the contextual menu item may be established using methods including, but not limited to, those described for multi-state UI control widgets, or other types of selections.

[00216] In various embodiments, once the selection establishment conditions have been satisfied, the selected embedded hyperlink may be activated.

[00217] If it is determined in 608 that there are no embedded hyperlinks within the context determination zone, it is then determined whether there is a selectable text field within the context determination zone. See determination 612.

[00218] Within the context of the present description, a selectable text field refers to a field of text which a user may select and perform operations upon (e.g., copy, cut, paste, etc.). In one embodiment, a selectable text field may also include any rasterized text which is recognized using an optical character recognition routine.

[00219] In various embodiments, the determination as to whether there is a selectable text field within the context determination zone begins with determining whether there is a selectable text field located at the contact point upon which the zone is based.

[00220] If a selectable text field is not located at the contact point, then it may be determined if there is a selectable text field in the vicinity of the contact point and within the context determination zone. In various embodiments, the methods described for locating a UI control widget within the context determination zone may also be applied to determining whether there is a selectable text field in the zone, including the use of bounding boxes.

[00221] If it is determined in 612 that there is at least one selectable text field intersecting with or within the context determination zone, then a context sensitive selectable text selection function is chosen. See operation 614. In various embodiments, once an appropriate selection function is

chosen, a selection may be defined based upon user input. In one embodiment, the selection may be defined using method 4.

[00222] In various embodiments, if there is a selectable text field located at the contact point, the context sensitive selectable text selection function may behave like other text selection functions. For example, in one embodiment, the selection of the text would start at the contact point, and expand with pressure in the direction in which the text would be read.

[00223] In various embodiments, if there is a selectable text field within the context determination zone, but not at the contact point, the selection function may define the selection based upon the entire selectable text field. For example, in one embodiment, the text within selectable text field found in the context determination zone may be selected starting at the beginning of the text field, even if it is not near the contact point. In another embodiment, the selection of the text begins at the location closest to the contact point.

[00224] In various embodiments, a context sensitive selectable text selection function may depend upon the context determination zone. For example, in one embodiment, a context sensitive selectable text selection function may use the context determination zone as a secondary boundary. In this way, the selection function may be able to continue searching the context determination zone for additional selectable text fields.

[00225] In various embodiments, a context sensitive selectable text selection function may include logic to handle the case where there is more than one selectable text field within the context determination zone. In one embodiment, the selection function may choose the selectable text field which is closest to the contact point, the selection not extending beyond that text field. In another embodiment, the selection function may start the text selection in the selectable text field closest to the contact point; once all of the text in that closest field has been selected, the selection may continue to expand into the next closest text field, starting at the beginning of the field. In still another embodiment, the selection function may include logic similar to that used in a context sensitive UI control widget selection function to handle the case where there is more that one selectable text field within the context determination zone. Additionally, in yet another embodiment, a context sensitive selectable text selection function may include logic similar to that used in a context sensitive UI control widget selection function to allow a user to toggle between multiple selectable text fields found within the context determination zone.

[00226] In various embodiments, a context sensitive selectable text selection function may include logic to use a different context sensitive selection function to define the user's selection,

based upon user input. In this way, a user may be able to indicate that the initial context determination is not correct, and that another selection function should be used.

[00227] For example, in one embodiment, a context sensitive selectable text selection function may include logic such that, if the contact pressure level exceeds a predefined limit P_4, further definition of the selection is handled by a different context sensitive selection function, such as one adapted for selecting graphics. In another embodiment, a contact pressure level exceeding P_4 may cause the context determination zone to expand, and the process of choosing an appropriate selection function to resume, ignoring the selectable text field previously detected within the zone. As an option, future determinations may ignore all selectable text fields. In this way, a context-aware user selection initiated with a contact point in the vicinity of a selectable text field may be redirected to a different type of subject matter without forcing the user to reposition their finger, for example.

[00228] In various embodiments, a context sensitive selectable text selection function may visually indicate the selection of a selectable text field before the selection has been established. For example, in one embodiment, the selection function may shade the selected text within a selectable text field. In another embodiment, the selection function may highlight the borders of an entire selectable text field which has been selected.

[00229] In various embodiments, a context sensitive selectable text selection function may have selection establishment conditions which change, depending upon previous user input. For example, in one embodiment, if the contact pressure level surpasses a value of P_3, but not P_4, the selection establishment condition may change to require the selection of an option from a text selection contextual menu. The contextual menu may provide options including, but not limited to, copy, cut, paste, style, send via email, send via SMS, lookup online, and/or any other action which may be performed on selected text. In various embodiments, the selection of the contextual menu item may be established using methods including, but not limited to, those described for multi-state UI control widgets, or other types of selections.

[00230] If it is determined in 612 that there is no text within the context determination zone, it is then determined whether there is a selectable graphic within the context determination zone. See determination 616.

[00231] Within the context of the present description, a selectable graphic refers to an image or display, or a portion of an image or display, which a user is able to select and perform operations upon (e.g., copy, cut, paste, save, etc.). In one embodiment, a selectable graphic may refer to any portion of a user interface which is able to be captured with a screenshot.

[00232] In various embodiments, the determination as to whether there is a selectable graphic within the context determination zone begins with determining whether there is a selectable graphic located at the contact point upon which the zone is based.

[00233] If a selectable graphic is not located at the contact point, then it may be determined if there is a selectable graphic in the vicinity of the contact point and within the context determination zone. In various embodiments, the methods described for locating a UI control widget within the context determination zone may also be applied to determining whether there is a selectable text field in the zone, including the use of bounding boxes. As an option, in addition to determining the boundaries of the bounding boxes within the context determination zone, it may also be determined whether they are able to be selected (e.g., checking a system flag, DRM, copy protection, etc.).

[00234] If it is determined in 616 that there is at least one selectable graphic within the context determination zone, then a context sensitive selectable graphic selection function is chosen. See operation 618. In various embodiments, once an appropriate selection function is chosen, a selection may be defined based upon user input. In one embodiment, the selection may be defined using method 4.

[00235] In various embodiments, if there is a selectable graphic located at the contact point, the context sensitive selectable graphic selection function may behave like other graphic selection functions. For example, in one embodiment, the selection of the graphic may be defined using method 4.

[00236] In various embodiments, if there is a selectable graphic within the context determination zone, but not at the contact point, the selection function may define the selection based upon the entire selectable graphic object. For example, in one embodiment, an image file embedded in a document near the contact point and at least partially within the context determination zone may be selected in its entirety. In another embodiment, said image file may be partially selected, starting at a location within the image that is closest to the contact point, and scaling as a function of user input and in a manner defined by the selection function.

[00237] In various embodiments, a context sensitive selectable graphic selection function may depend upon the context determination zone. For example, in one embodiment, a context sensitive selectable graphic selection function may use the context determination zone as a secondary boundary. In this way, the selection function may be able to continue searching the context determination zone for additional selectable graphic objects.

[00238] In various embodiments, a context sensitive selectable graphics selection function may include logic to handle the case where there is more than one selectable graphic object within the

context determination zone. In one embodiment, the selection function may choose the selectable graphic object which is closest to the contact point.

[00239] In another embodiment, the selection function may include logic similar to that used in a context sensitive UI control widget selection function to handle the case where there is more that one selectable graphic object within the context determination zone. Additionally, in yet another embodiment, a context sensitive selectable graphic selection function may include logic similar to that used in a context sensitive UI control widget selection function to allow a user to toggle between multiple selectable graphic objects found within the context determination zone.

[00240] In various embodiments, a context sensitive selectable graphics function may pass control to another user interface function, depending upon user input. In this way, a user may be able to indicate that the initial context determination is not correct, and that they wish to activate a different user interface routine (e.g., application launcher, favorites list, system settings, etc.).

[00241] For example, in one embodiment, a context sensitive selectable graphic selection function may include logic such that, if the contact pressure level exceeds a predefined limit P_6, further user input is handled by a different context sensitive selection function, such as one adapted for selecting graphics. In another embodiment, a contact pressure level exceeding P_4 may cause the context determination zone to expand, and the process of choosing an appropriate selection function to resume, ignoring the selectable graphic previously detected within the zone. As an option, future determinations may ignore all selectable graphics. In this way, a context-aware user selection initiated with a contact point in the vicinity of a selectable graphic may be redirected to a different type of subject matter without forcing the user to reposition their finger, for example.

[00242] In various embodiments, a context sensitive selectable graphics selection function may visually indicate the selection of a selectable graphic object before the selection has been established. For example, in one embodiment, the selection function may shade the selected graphic object. In another embodiment, the selection function may highlight the borders of a graphic object which has been selected.

[00243] In various embodiments, a context sensitive selectable graphics selection function may have selection establishment conditions which change, depending upon previous user input. For example, in one embodiment, if the contact pressure level surpasses a value of P_5, but not P_6, the selection establishment condition may change to require the selection of an option from a graphic selection contextual menu. The contextual menu may provide options including, but not limited to, copy, cut, paste, set as wallpaper, send via email, send via SMS, and/or any other action which may be performed on selected graphics. In various embodiments, the selection of the contextual menu

item may be established using methods including, but not limited to, those described for multi-state UI control widgets, or other types of selections.

[00244] If it is determined in 616 that there is no selectable graphics within the context determination zone, then the determination zone is expanded. See operation 620.

[00245] In one embodiment, the context determination zone may be expanded by a fixed number of pixels. In another embodiment, the determination zone may be expanded by a scaling factor. Once the context determination zone has been expanded, the context determinations are performed again.

[00246] In one embodiment, if the context determination zone reaches a predefined threshold size, the user may be informed that a context could not be determined and a selection cannot be made. Other forms of user feedback indicating a failure to determine context include an alert, a prompt, audio feedback, visual feedback, LED light, and/or any other type of feedback.

[00247] In various embodiments, the user may be able to specify which contexts they wish to be detected automatically. In some embodiments, additional types of subject matter may be detectable, including types of text data, such as dates, email addresses, phone numbers, and/or any other type of text information.

[00248] In some embodiments, contextual selections may be performed using method 600 only in situations where a contact pressure based form of user interaction has not been defined. In other embodiments, contextual selections may be made system wide using method 600 or similar methods.

[00249] Figure 7 shows a device 700 having a backtouch interface, in accordance with one embodiment. As an option, the device 700 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the device 700 may be implemented out in any desired environment. It should also be noted that the aforementioned definitions may apply during the present description.

[00250] In the context of the present description, a device with a backtouch interface refers to a device with one or more backtouch sensors or backtouch switches. In one embodiment, a device with a backtouch interface may also include one or more other sensors and/or buttons, including but not limited to cameras, hardware buttons, and/or any other type of device or control. A device with a backtouch interface may also be referred to as a backtouch-enabled device.

[00251] Within the context of the present description, a backtouch sensor refers to an interaction surface located on a device which has reduced user visibility while the device is being operated, because it is obscured by the device itself. For example, in one embodiment, a backtouch sensor may be located on the back of the device, facing away from the user as they look at a display on the

front side. A backtouch sensor may result in a better user interface experience since the user is able to interact with the device without obscuring the front display with an implement of interaction.

[00252] Additional embodiments may be described using the terms 'front' and 'back', but a backtouch-enabled device is not limited to those having parallel surfaces. Within the context of the present description, the terms 'front' or 'front surface' and 'back' or 'back surface' refer to any two surfaces of any portion, piece, section, slice, component, part, and/or face of a device or its parts.

[00253] In various embodiments, a backtouch interface may also be a display. For example, in one embodiment, a device may have high-resolution touchscreens on the front and back. In another embodiment of a multi-display, backtouch-enabled device, the front face may be a high-resolution touchscreen and the back face may be a low-resolution touchscreen. As an option, one or more of the touch screens in these embodiments may be black and white. In still another embodiment, the front and back displays may utilized different display technologies and/or different display properties. For example, in one embodiment, the front display may be a high-resolution trans missive touchscreen and the back display may be a low-resolution reflective touchscreen.

[00254] As shown, device 700 is an example of one embodiment of a backtouch-enabled device, possessing a backtouch sensor 702 and a display 704. In various embodiments, the display 704 may also be an interaction surface.

[00255] As previously defined, an interaction surface is a surface capable of sensing touch, pressure, proximity, or any combination thereof. In various embodiments, a backtouch sensor may be capable of sensing one or more of touch, pressure, or proximity.

[00256] For example, in one embodiment, a backtouch sensor may be a track pad. Within the context of the present description, a track pad is a touch sensitive pointing device which can detect the motion and position of an implement of interaction (e.g., user finger, stylus, etc.).

[00257] In various embodiments, a backtouch sensor may include a resistive touch sensor. In one embodiment, a resistive touch sensor is made up of two thin, conducting layers separated by a narrow gap. When an implement of interaction presses down on the outer layer, the two layers make contact at that point. A voltage may be applied across the upper layer, from top to bottom. The resistive touch sensor may act as a voltage divider; by measuring the output voltage on the lower layer, the vertical position of the touch position may be sensed. Swapping the voltage to the sides of the upper layer may allow the horizontal touch position to be sensed.

[00258] In various embodiments, a backtouch sensor may include a capacitive touch sensor. In one embodiment, a capacitive touch sensor is made of two layers of parallel conductive lines, separated by an insulator. The layers are arranged such that the conductive lines are perpendicular.

When an implement of interaction is placed over the conducting lines, there is a change in capacitance. A high frequency signal may be applied to pairs of conducting lines; the resulting current that passes between the conducting lings is proportional to the capacitance between the conducting lines. This current may be used to sense the touch or proximity of an implement of interaction. A capacitive touch sensor may be capable of detecting more than one contact point or contact area.

[00259] The backtouch-enabled device shown in Figure 7 is one exemplary embodiment. The geometry of a backtouch-enabled device need not be confined to parallel surfaces, with a distinct front and back. For example, in one embodiment, the device may have fold-out sections with interaction surfaces which become backtouch interfaces once the sections are folded out. In another embodiment, the backtouch-enabled device may be composed of curved parts, multiple parts, or complex plan form parts. In still another embodiment, the backtouch-enabled device may not be rectilinear in any outline and/or cross section. In yet another embodiment, the device may have one or more curved or non-planar surfaces, including but not limited to surfaces which are concave or convex. In some embodiments, the device may have one or more surfaces which are rigid or hard. In other embodiments, the device may have one or more surfaces which are soft or flexible. In still other embodiments, the device may change shape, depending on the mode of operation (e.g., slide-out hardware keyboard, plug-in modules, etc.).

[00260] In one embodiment, a backtouch-enabled device may have one or more backtouch sensors located on plane(s) parallel to the plane of a display. For example, see device 700. In another embodiment, a backtouch-enabled device may have one or more backtouch sensors located on plane(s) that are at an angle to the plane of a display.

[00261] In one embodiment, a backtouch sensor may be located on a plane which is completely obscured from the display. In another embodiment, a backtouch sensor may be located on a plane which is partially obscured from the display. For example, a backtouch sensor may be located on the back side of a transparent or translucent display.

[00262] In one embodiment, a backtouch interface is an interaction surface which may be made up of one or more touch sensors, one or more pressure sensors, one or more proximity sensors, one or more switches, or any combination of one or more such sensors or switches. In another embodiment, the switches which are part of a backtouch interface may be real or virtual, displayed or mechanical, soft or hard, or any combination of these properties.

[00263] In various embodiments, gestures and interactions described in terms of a backtouch interface may also be performed on sidetouch (left and right sides of a device) and captouch (top and bottom sides of a device) interfaces.

[00264] Figure 8 shows a method 800 for providing feedback to the user of a backtouch interface, in accordance with one embodiment. As an option, the method 800 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the method 800 may be implemented in any desired environment. The aforementioned definitions may apply during the present description.

[00265] As shown, it is determined whether the backtouch interface is enabled. See determination 802.

[00266] Within the context of the present description, an enabled interface or surface refers to an interface or surface which is not disabled. Within the context of the present description, a disabled interface or surface refers to an interface or surface which is not passing user input to any process, system, application, or routine. In one embodiment, a disabled interface may continue to sense user input, even though it is not used. In another embodiment, a disabled interface may be able to recognize a predefined form or type of user input which then places the interface in an enabled state. As a specific example, in one embodiment, a disabled backtouch interface may not be used to make a selection until it detects a predefined pattern of increases and decreases of contact pressure. In this way, interfaces may be disabled to avoid unwanted input, and easily enabled when desired.

[00267] It is important to note that in various embodiments, an interface or surface may be enabled with respect to one type of user input, and disabled with respect to another type of user input. For example, it may be possible for an interaction surface to be enabled with respect to touch interactions, and disabled with respect to contact pressure or proximity.

[00268] In various embodiments, a backtouch interface may be enabled in response to user input. For example, in one embodiment, a backtouch interface may be enabled in response to a predefined gesture performed on an interaction surface receptive to touch. In another embodiment, a backtouch interface may be enabled in response to a predefined pattern of increases and decreases of contact pressure exerted upon an interaction surface receptive to pressure. In yet another embodiment, a backtouch interface may be enabled by a predefined series of taps or impacts with the device. As an option, the taps or impacts may be detected by an accelerometer. In still another embodiment, a backtouch interface may be enabled by toggling a hardware or software control (e.g., button, switch, etc.).

[00269] In various embodiments, a backtouch interface may be enabled without specific user input. For example, in one embodiment, a backtouch interface may be enabled by a backtouch-enabled application. In another embodiment, a backtouch interface may be enabled when the device orientation is within a predefined range. In yet another embodiment, a backtouch interface may always be enabled.

[00270] If it is determined that the backtouch interface is enabled, then it is determined whether there is an implement of interaction in proximity of the backtouch interface. See determination 804.

[00271] In various embodiments, there may be a threshold proximity that may be achieved before determination 804 is satisfied. In one embodiment, a user may define the threshold proximity. In another embodiment, the threshold proximity may be predefined within the operating system. In still another embodiment, the threshold proximity may be predefined on a per-application basis.

[00272] If it is determined that an implement of interaction is in proximity to the backtouch interface, a visual indication of the proximity is displayed. See operation 806.

[00273] In various embodiments, the location of the implement of interaction in proximity to the backtouch interface may be indicated to the user. For example, in some embodiments, a point associated with the location of the implement may be displayed. In one embodiment, the point may be the centroid of the area with the highest proximity value. As an option, the point may be represented as a circle, a crosshair, and/or any other shape or icon.

[00274] In one embodiment, the point associated with the location of the implement may be displayed using a predefined color. As an option, the user may be able to select the color used. In yet another embodiment, thc point may be displayed by inverting the preexisting contents of the display located at that point.

[00275] In various embodiments, an area associated with the location of the implement may be displayed. For example, in one embodiment, the area may be the area with proximity values above a preset threshold value. In another embodiment, the area may be a circle centered upon the centroid of maximum proximity values. As an option, the size of the circle may be similar to a fingertip.

[00276] In one embodiment, the area associated with the location of the implement may be displayed with colored shading. As an option, the user may preset the color of the shading. In another embodiment, the area may be indicated by increasing the color brightness (e.g., moving towards white within a color space, etc.) of the display content within the area. In yet another embodiment, the area may be displayed by reducing the color brightness (e.g., moving towards black within a color space, etc.) of the display content outside the area. As an option, the area may be displayed with a sharp boundary, or with a softened boundary, creating a glow effect.

[00277] In various embodiments, the degree of proximity of the implement of interaction to the backtouch interface may be indicated to the user. For example, in one embodiment, the color of a point or area being displayed may be given a degree of transparency dependent upon the proximity values, allowing the original display content to be viewed. As an option, the proximity value may be averaged over the area, and a single transparency value given to the color applied. In another embodiment, the color of the content displayed within the area may be given a color brightness based upon the proximity, such that the area is white right before contact is made. In yet another embodiment, the color of the content displayed outside the area may be given a color brightness based upon an inverse relationship with the proximity, such that all but the area is black right before contact is made.

[00278] As shown, it is determined if an implement of interaction is in contact with the backtouch interface. See determination 808. If it is determined that there is no contact, the proximity may continue to be determined and displayed.

[00279] If it is determined that an implement of interaction is in contact with the backtouch interface, a visual indication of the contact is displayed. See operation 810.

[00280] In various embodiments, a visual indication of contact with a backtouch interface may differ from a visual indication of contact with a front display, where the contact point and area is usually obscured by an implement of interaction. For example, in one embodiment, the contact point may be displayed, instead of or in addition to the contact area. In another embodiment, the visual representation of the interior of the contact area may be colored. In yet another embodiment, the contact area may be represented by an iconic version of a fingerprint. In still another embodiment, the contact area may be distorted so as to appear to bulge out of the display. As an option, this distortion may increase as a function of contact pressure.

[00281] As shown, once the user has been given feedback regarding contact with the backtouch interface, further user interaction is handled by a different routine. See operation 8. For example, methods 4 or 6 may be implemented at this point, utilizing backtouch contact pressure and contact point to define a selection.

[00282] Figure 9 shows a pressure-sensitive user interface 900 for making a selection using a backtouch interface, in accordance with one embodiment. As an option, the user interface 900 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the user interface 900 may be implemented in any desired environment. The aforementioned definitions may apply during the present description.

[00283] As shown, the user interface 900 may be utilized in making a selection based in part on pressure exerted by the user upon a backtouch interface. For example, in one embodiment, a user's finger 902 may exert a small amount of force over contact area 904, which is centered on contact point 906. In one embodiment, contact area 904 and contact point 906 may be displayed on top of the content already being displayed, to assist the user in making contact at the desired location. In another embodiment, the contact point 906 may be displayed as a symbol, such as a plus sign, which may be rotated to an orientation estimated to match that of the contacting finger. As an option, the finger orientation may be estimated using the size and shape of the contact area, detected location of other fingers, and/or any other user input or observable properties.

[00284] If the contact pressure level is sufficient, then a selection area 908 having a selection boundary 910 and a secondary boundary 912 (indicating uncertainty related to the contact area) is calculated and displayed. As an option, the selection may be defined using method 4 or 6, or any other method of defining a selection based upon contact pressure.

[00285] Figure 10 shows a user interface 1000 for defining settings associated with a backtouch interface, in accordance with one embodiment. As an option, the user interface 1000 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the user interface 1000 may be implemented in any desired environment. The aforementioned definitions may apply during the present description.

[00286] In one embodiment, the user interface 1000 may include a plurality of check boxes 1002 which represent various types of user interactions detectable by the backtouch interface. The types of interactions may include, but are not limited to, pressure, touch, proximity, and/or any other type of user interaction. Through these checkboxes, a user may limit a backtouch interface to only certain types of interactions. As an option, the user interface 1000 may only present checkboxes for interaction types detectable by the particular backtouch interface associated with the settings being defined.

[00287] In one embodiment, the user interface 1000 may include a plurality of check boxes 1004 which represent various methods of enabling a backtouch interface. As an option, in one embodiment, more than one method of activation may be selected.

[00288] In one embodiment, the collection of backtouch interface enablement methods 1004 may include a checkbox 1006 which allows the interface to be activated by a gesture. In one embodiment, the gesture may be predefined within an application or operating system. In another embodiment, the user interface 1000 may include a button 1008 to allow a user to specify a gesture to activate the backtouch interface. As an option, the user may be presented with an interface where

they may specify the gesture by performing it. In yet another embodiment, the user may choose from a plurality of predefined gestures.

[00289] In one embodiment, the collection of backtouch interface enablement methods 1004 may include a checkbox 1010 which allows the interface to be activated by a grip. In the context of the present description, a grip refers to the set of sensor data associated with a particular manner of holding a device. The sensor data associated with a grip may include, but is not limited to, points and areas of contact on one or more interaction surfaces, device orientation, contact pressure levels exerted in one or more contact areas, proximity data (e.g., proximity to portions of a users hand not in contact with the device, etc.), and/or any other sensor data.

[00290] In one embodiment, the backtouch interface-enabling grip may be predefined within an application or operating system. In another embodiment, the user interface 1000 may include a button 1012 to allow a user to specify a grip to enable the backtouch interface. As an option, the user may be presented with an interface where they may specify the grip by performing it. In yet another embodiment, the user may choose from a plurality of predefined grips.

[00291] In one embodiment, the collection of backtouch interface enablement methods 1004 may include a checkbox 1014 which keeps the backtouch interface enabled whenever the device is powered on, similar to a primary touch screen, for example. In another embodiment, the collection of backtouch interface enablement methods 1004 may include a checkbox 1016 which keeps the backtouch interface disabled.

[00292] In one embodiment, the user interface 1000 may include a check box 1018 which allows the criteria for backtouch interface enablement to be set on a per-application basis. As an option, check box 1018 may allow any application to override the preferences set with the plurality of check boxes 1004.

[00293] In one embodiment, the user interface 1000 may include a plurality of check boxes 1020 which represent various methods of indicating that a backtouch interface is enabled. As an option, in one embodiment, more than one indicator may be selected.

[00294] In one embodiment, the collection of indicator check boxes 1020 may include a checkbox 1022 which indicates that the backtouch interface is enabled by displaying a colored border around the edge of a display. In one embodiment, the colored border may be animated.

[00295] In one embodiment, the collection of indicator check boxes 1020 may include a checkbox 1024 which indicates that the backtouch interface is enabled using an LED. In one embodiment, the LED may indicate the enabled backtouch interface through a specific color, with other colors being

reserved for indicating other device states. In another embodiment, the LED may pulse or flash when the backtouch interface is enabled.

[00296] In one embodiment, the collection of indicator check boxes 1020 may include a checkbox 1026 which indicates that the backtouch interface is enabled by displaying a colored border around a status bar (e.g., a minimal bar common to most user interfaces, etc.). In one embodiment, the colored border may be animated.

[00297] In one embodiment, the collection of indicator check boxes 1020 may include a checkbox 1028 which indicates that the backtouch interface is enabled by displaying an icon. In one embodiment, the icon may be located within a status bar.

[00298] In one embodiment, the collection of indicator check boxes 1020 may include a checkbox 1030 which indicates that the backtouch interface is enabled by changing the color of a status bar. In one embodiment, the color change may be animated.

[00299] In one embodiment, the collection of indicator check boxes 1020 may include a checkbox 1032 which allows the backtouch interface to be enabled without any indication to the user. As an option, this preference may be overridden by an application.

[00300] In various embodiments, the user interface 1000 may allow a user to configure the type and style of feedback provided while an enabled backtouch interface is being used. For example, in one embodiment, the user interface 70.0002.3-00 may include a button 1034 which allows a user to specify whether or not feedback is provided while the backtouch interface is being used. As an option, this preference may be overridden by applications (e.g., an application may be configured such that it provides backtouch interface feedback independent of any system preferences, etc.).

[00301] In one embodiment, the user interface 1000 may include a button 1036, which presents a user interface which allows a user to specify the style of feedback provided when a backtouch interface is being used. For example, a user may configure the feedback provided when an implement of interaction is in proximity to, contact with, and/or exerting pressure on the backtouch interface.

[00302] In one embodiment, the user interface 1000 may include a button 1038, which allows a user to test the style parameters they defined using button 1036. For example, in one embodiment, button 1038 may present a user interface where a user may experiment with a backtouch interface, observing the feedback styles they have configured. As an option, this interface may provide a quick way to reconfigure the feedback style.

[00303] In various embodiments, the user interface 1000 may allow a user to configure the sensitivity of a backtouch interface. In the context of the present description, the sensitivity of a

backtouch interface refers to the threshold level of interaction (e.g., proximity, contact, pressure, etc.) which a backtouch interface may receive before treating the interaction as being intentionally made by a user. In this way, backtouch interactions incidental to device usage may be ignored, while intentional backtouch user interactions may be acted upon.

[00304] In one embodiment, the user interface 70.0002.3-00 may include a plurality of checkboxes 1040 that represent a plurality of backtouch interface sensitivity levels. The backtouch interface sensitivity levels may include, but are not limited to, predefined levels (e.g., "high", "standard", "low", etc.), user defined levels, automatically defined levels, and/or any other type of sensitivity level.

[00305] In one embodiment, the user interface 1000 may allow a user to specify the sensitivity levels for particular aspects of a backtouch interface (e.g., proximity, contact, pressure, etc.). As an option, the user interface may provide the user with the ability to save and load user defined backtouch interface sensitivity profiles.

[00306] In the context of the present description, an interface sensitivity profile refers to a collection of sensitivity parameters associated with various aspects of an interaction interface. The sensitivity parameters may include, but are not limited to, an activation threshold, a maximum signal beyond which interaction is ignored, sample rate(s), and/or any other parameter which may be associated with an interaction interface. As an option, the sensitivity parameters may be specific to particular types of interaction (e.g., proximity, contact, pressure, etc.).

[00307] In the context of the present description, an activation threshold refers to a threshold signal below which interaction is ignored. An activation threshold may be set for different types of user interaction (e.g., pressure, contact, proximity, etc.). For example, in one embodiment, an interaction surface may have a pressure activation threshold of P, below which all pressure interactions are ignored.

[00308] It is important to recognize the distinction between activation and enablement. In various embodiments, activation serves as a filter of incidental interactions, defining the weakest sensor signal which may not be ignored. Enablement serves a similar purpose, to ignore unwanted interactions; a disabled interface may not act upon any sensor signals except those related to enabling the interface. In other words, activation filters sensor signals based on strength, while enablement filters sensor signals based on the signal itself.

[00309] In one embodiment, the plurality of checkboxes 1040 may include an "automatic" checkbox, representing a backtouch interface sensitivity profile automatically determined by the device. As an option, if an automatic sensitivity profile has not been created, the user may be

presented with the option of initiating the process of automatically determining an optimal backtouch interface sensitivity profile.

[00310] In one embodiment, the user interface 1000 may include a button 1042 which allows a user to initiate the process of automatically determining an optimal backtouch interface sensitivity profile. In the context of the present description, an optimal interface sensitivity profile refers to a sensitivity profile which would allow an interface to remain enabled all the time, with minimal accidental inputs. In one embodiment, the process of automatically determining an optimal backtouch interface sensitivity profile may include gathering data over a predefined amount of time. As an option, the time remaining may be displayed in user interface 1000. During this learning period, the backtouch enablement preferences specified in checkboxes 1004 may be overridden, and instead the user is required to enable the backtouch interface with a specific method, chosen such that accidental enablement is highly unlikely (e.g., two step activation using gestures, hardware switch with on-screen confirmation, etc.). This facilitates separating intentional interactions from incidental interactions. Once enabled, the backtouch interface may remain enabled for a short period of time. During the learning period, the device may gather data, including but not limited to sensor data from the backtouch interface, changes in orientation, backtouch interface enablements, and/or any other data related to use of the device. Once the learning period has elapsed, the gathered data may be used to estimate the levels of meaningless, incidental backtouch interaction, such as interaction due to holding the device. As an option, in another embodiment, the user may be able to specify the length of the learning period. In yet another embodiment, the user may be able to specify desired accuracy of the sensitivity level, balancing the reduction of unwanted interactions with a possible increase in intentional interactions being missed.

[00311] In one embodiment, the user interface 1000 may include a button 1044 which allows a user to test the specified sensitivity settings. For example, in one embodiment, button 1044 may present a user interface which provides feedback regarding interactions with the backtouch interface. As an option, the testing user interface may utilize a default set of backtouch feedback settings, if the user had previously turned feedback off. In another embodiment, button 1044 may activate a backtouch interface, and present feedback to the user within user interface 1000. As an option, user interface 1000 may ignore any input received from the backtouch interface, only provide feedback related to the user interactions. In this way, a user may test the settings with the backtouch interface without accidentally interacting with any checkboxes, buttons, or other element of user interface 1000.

[00312] In various embodiments, the interfaces of Figure 10, as well as any other previous or subsequent interfaces, may take the form of webpages displayed utilizing a web browser on any desired computer, handheld device, etc. In such case, any of the parameters or other input disclosed herein may be entered without the use of the host device, whereby such parameters or other input (or derivatives thereof) may be pushed to the device for configuration/updating purposes.

[00313] Figure 11 shows a user interface 1100 for defining settings associated with a pressure-sensitive interface, in accordance with one embodiment. As an option, the user interface 1100 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the user interface 1100 may be implemented in any desired environment. The aforementioned definitions may apply during the present description.

[00314] In one embodiment, the user interface 1100 may include a checkbox 1102 to allow the user to enable the pressure-receptive aspect of one or more interaction surfaces. In one embodiment, this checkbox may enable all pressure-receptive surfaces. In another embodiment, the user may be able to specify which pressure-receptive surfaces shall be enabled. In various other embodiments, enablement of pressure-receptive surfaces may be accomplished through user input outside of user interface 1100. Pressure-receptive surface enabling user input may include, but is not limited to, gestures, software buttons, hardware buttons, accelerometer data, contact pressure patterns, and/or any other form of user input.

[00315] In one embodiment, the user interface 1100 may include a plurality of check boxes 1104 which allow a user to specify which types of feedback to provide when the pressure-sensitive interface(s) is activated, if any at all. For example, in one embodiment, the user may specify a sound which plays whenever the pressure-sensitive interface is activated. In another embodiment, the user may specify a form of visual feedback to be given when the pressure-sensitive interface is activated. As an option, the user may select from a plurality of predefined forms of feedback.

[00316] In one embodiment, the user interface 1100 may include a checkbox 1106 which allows a user to specify whether they want visual feedback regarding contact pressure level. As previously described, contact pressure level may be visually represented in a number of ways, including, but not limited to, a color which is part of a two color spectrum, a percentage, a unitless number, and/or any other representation of a value located within a finite range. In one embodiment, user interface 1100 may allow a user to specify the type of contact pressure level feedback. As an option, a separate user interface may be presented to the user to define the form of the feedback.

[00317] In various embodiments, the user interface 1100 may be used to define the pressure activation threshold. In the context of the present description, a pressure activation threshold is the

smallest contact pressure level which may not be ignored. In one embodiment, the current pressure activation threshold level 1108 may be displayed within user interface 1100. The current pressure activation threshold level may be displayed as a unitless number, a percentage of the maximum measurable contact pressure level, a color, a scale, and/or any other method of representing a value located within a finite range.

[00318] In one embodiment, the user interface 1100 may include a button 1110 which allows a user to manually specify the pressure activation threshold level. In one embodiment, the user may be presented with an interface where they may enter a specific value to be used as the pressure activation threshold. In another embodiment, the user may be prompted to exert the desired threshold pressure on a pressure-sensitive interface, confirming their selection by maintaining the desired contact pressure for a predefined amount of time. As an option, the user may be prompted to repeat this process more than one time, after which the resulting pressure levels may be averages. In yet another embodiment, the user may be given the chance to test the newly specified pressure activation threshold level.

[00319] In one embodiment, the user interface 1100 may include a button 1112 which resets the pressure activation threshold level to a predefined, default value. As an option, the user may be prompted to confirm this action before the default value is applied.

[00320] In one embodiment, the user interface 1100 may include a button 1114 which initiates a process which determines an optimal pressure activation threshold level. In the context of the present description, an optimal pressure activation threshold level refers to an activation threshold which would allow an interface to remain enabled all the time, with minimal erroneous inputs. In one embodiment, the process of automatically determining an optimal pressure activation threshold level may include gathering data over a predefined amount of time. As an option, the time remaining may be displayed in user interface 1100.

[00321] During this learning period, the pressure activation threshold may temporarily be set to a level sufficiently high that an accidental activation is highly unlikely. This facilitates separating intentional interactions from incidental interactions. During the learning period, the device may gather data, including but not limited to sensor data from the pressure-sensitive interface, changes in orientation, pressure-sensitive interface activations, and/or any other data related to use of the device. Once the learning period has elapsed, the gathered data may be used to estimate the levels of meaningless, incidental pressure interaction, such as interaction due to holding the device. As an option, in another embodiment, the user may be able to specify the length of the learning period. In yet another embodiment, the user may be able to specify desired accuracy of the pressure activation

threshold level optimization, balancing the reduction of unwanted interactions with a possible increase in intentional interactions being missed.

[00322] In one embodiment, the user interface 1100 may display the amount of time remaining in an ongoing learning period. See, for example, text field 1116. In various embodiments, the time remaining in the learning period may be displayed in user interfaces other than 1100. User interfaces where the remaining time may be displayed include, but are not limited to, a status bar, a contextual menu, a shortcut menu, a pop-up interface adapted for managing various interaction interfaces, and/or any other user interface.

[00323] In one embodiment, the user interface 1100 may include a plurality of checkboxes 1118 which represent a plurality of forms of feedback associated with the automatic determination of an optimal pressure activation threshold level. During the learning period, it may be helpful to provide the user with feedback every time the pressure-sensitive interface is activated. The forms of feedback include, but are not limited to, a sound, vibration, screen flash, and/or any other form of feedback. In one embodiment, the feedback associated with the automatic determination of an optimal pressure activation threshold level may override preferences set elsewhere. In another embodiment, the user may specify the parameters of these forms of feedback.

[00324] The user interface 1100 may be used to define and manage touch states. In one embodiment, a preset number of global touch states may be defined, which the operating system and applications may make use of. In another embodiment, the touch states may be defined on a per-application basis.

[00325] In one embodiment, the user interface 1100 may include a button 1120 which presents the user with a user interface that facilitates the definition of touch states. As an option, the user may be able to select from a plurality of predefined touch state definitions. Additionally, the user interface 1100 may display the currently defined touch states. See, for example, text field 1124. The touch states may be represented as a unitless number, a percentage of the range of allowable contact pressure levels, a color, and/or any other representation of a contact pressure level.

[00326] In one embodiment, the user interface 1100 may include a button 1122 which allows the user to reset the touch state definitions to a predefined default definition. As an option, the user may be prompted for confirmation before resetting the touch state definition to default values.

[00327] Figure 12 shows a method 1200 for assisting a user in defining touch states, in accordance with one embodiment. As an option, the method 1200 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of

course, however, the method 1200 may be implemented in any desired environment. The aforementioned definitions may apply during the present description.

[00328] As shown, the highest touch state is defined. See operation 1202. In one embodiment, the highest touch state may be predefined within the operating system. In another embodiment, the highest touch state may be specified by the user, in the form of a contact pressure value.

[00329] In various embodiments, the highest touch state may be defined through user interaction with a pressure-sensitive interface. For example, in one embodiment, a user may be prompted to exert a level of contact pressure beyond which the highest touch state may be triggered. As an option, the user may be prompted to exert this pressure multiple times, with the resulting values averaged. In another embodiment, the user may be prompted to exert the highest contact pressure level which is comfortable, and then defining the highest touch state using a contact pressure level slightly lower than that being exerted.

[00330] Once the highest touch state has been defined, the remaining spectrum of contact pressures is partitioned into the remaining touch states and displayed. See operation 1204.

[00331] In the context of the present description, the spectrum of contact pressures refers to the range of contact pressure levels a user may exert to interact with the device. For example, in one embodiment, the lower end of a spectrum of contact pressures may be equivalent to the pressure activation threshold level. In various embodiments, there may be multiple contact pressure spectrums defined. For example, in one embodiment, there may exist a distinct spectrum of contact pressures for each pressure-sensitive interaction surface. In another embodiment, there may exist a spectrum of contact pressures which is partitioned into touch states (a touch state spectrum), and a different spectrum of contact pressures for use with contact pressure levels (a contact pressure level spectrum).

[00332] In one embodiment, the touch state spectrum may have extrema defined by the user. As an option, the lower bound of the touch state spectrum may be the same as pressure activation threshold level.

[00333] In one embodiment, the touch state spectrum may be partitioned such that all touch states contain the same fraction of the touch state spectrum. In another embodiment, the touch state spectrum may be partitioned such that all touch states have equal portions of the touch state spectrum except for the highest touch state. In yet another embodiment, the touch state spectrum may be partitioned such that the touch states are weighted, some containing larger fractions of the spectrum than others. As an option, the weight factors may be predefined or may be user definable.

[00334] In one embodiment, the partitioned touch state spectrum may be displayed as a geometric shape (e.g., circle, rectangle, etc.) which has been segmented according to the touch state partitions. In another embodiment, the partitioned touch state spectrum may be displayed as an array of percentages of the total spectrum. In yet another embodiment, the touch state spectrum may be displayed as an array of contact pressure levels associated with the boundaries of the partitions.

[00335] Once the touch state spectrum has been partitioned and displayed, the user is given the opportunity to adjust the touch states. See operation 1206.

[00336] In one embodiment, the user may adjust the contact pressure levels associated with the touch states by specifying the numerical values of specific contact pressure levels. In another embodiment, the user may adjust the touch states by interacting with a graphical representation of the partitioned touch state spectrum. In yet another embodiment, the user may adjust the touch states by defining new partitions using a pressure-sensitive interface. As an option, the user may exert the desired contact pressure level to set the boundaries of a touch state.

[00337] Once the touch states have been adjusted, the newly partitioned touch state spectrum is verified. See operation 1208.

[00338] In one embodiment, the touch state spectrum may be verified by asking the user to confirm their choice through a user interface. In another embodiment, the user may verify the touch state spectrum by utilizing it in a testing interface. As an option, the user may be given visual feedback regarding the exact contact pressure level being exerted, in addition to the current touch state.

[00339] Figure 13 shows a user interface 1300 for assisting a user in defining touch states, in accordance with one embodiment. As an option, the user interface 1300 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the user interface 1300 may be implemented in any desired environment. The aforementioned definitions may apply during the present description.

[00340] In one embodiment, the user interface 1300 may include a graphical representation 1302 of a touch state spectrum, hereinafter referred to as touch space spectrum rendering 1302. As another embodiment, the touch space spectrum rendering 1302 may be colored with the spectrum of colors between two colors representing spectrum extrema. As an option, the same colors used to provide pressure dependent feedback to the user of a pressure-sensitive interface may be used here.

[00341] The touch space spectrum rendering 1302 found in user interface 1300 may be broken up into ranges of contact pressure representing touch states. In various embodiments, the touch space spectrum rendering may be partitioned by one or more touch state dividers 1304. In one

embodiment, the touch state dividers may simply be a line drawn between two touch states. In another embodiment, the touch state dividers may also display the contact pressure level separating those two touch states.

[00342] In various embodiments, a plurality of touch states may be defined. In one embodiment, the user may specify the number of touch states to define. In another embodiment, the number of touch states may defined within the operating system. In still another embodiment, the number of touch states may be defined on a per-application basis, by the applications themselves or by the user (if so allowed by the application). In yet another embodiment, there may exist a set of default touch states of a fixed number which may be overridden by a different set of touch states defined within an application.

[00343] In various embodiments, the touch space spectrum rendering 1302 found in user interface 1300 may have a labeled scale. For example, in one embodiment, the lower boundary 1306 of the lowest touch state (e.g., the touch state associated with the lowest contact pressures) may be displayed. As an option, the lower boundary of the touch space spectrum may be equivalent to the pressure activation threshold, which the user may define using, for example, user interface 1100.

[00344] In another embodiment, the upper boundary 1308 of the touch space spectrum rendering may be displayed. As an option, upper boundary 1308 may be automatically set to a value slightly higher than the lower boundary of the highest touch state, since the highest touch state is made up of all pressures above that lower boundary. In this way, the scale of the touch space spectrum rendering is not skewed due to the potentially large range of contact pressures making up the highest touch state. In yet another embodiment, the touch space spectrum rendering may change in scale due to user interaction, with upper boundary 1308 being automatically updated.

[00345] In various embodiments, the touch state dividers 1304 found in the user interface 1300 may possess touch state divider handles 1310 with which a user may adjust the partitioning of touch states. For example, in one embodiment, a user may touch and drag a touch state divider handle to change the value of the associated divider. In another embodiment, a user may select a touch state divider handle; after the touch state divider handle has been selected, the divider may be assigned a value equivalent to whatever contact pressure level the user exerts for a predefined amount of time. As a specific example, a user may select a touch state divider handle and then press on an interaction surface. Once the desired contact pressure level is reached, the user maintains the pressure for 3 seconds, after which the value of the touch state divider is updated.

[00346] In one embodiment, the user interface 1300 may include a contact pressure gauge 1312 which reports the contact pressure level currently being exerted, to assist the user in selecting a

practical partitioning of the touch state spectrum. In another embodiment, the scale of the contact pressure gauge may match that of touch state spectrum rendering 1302. As an option, the scale of both contact pressure gauge 1312 and touch state spectrum rendering 1302 may be set to accommodate the larger of two values: the current contact pressure level, or a value slightly higher than the lower boundary of the highest touch state.

[00347] In various embodiments, the touch state dividers 1304 found in the user interface 1300 may each be associated with a plurality of icon buttons 1314 which a user may use to lock a touch state divider at a particular value. In one embodiment, adjusting one touch state divider may cause all other unlocked dividers to shift such that the remaining portions of the touch state spectrum are partitioned as evenly as possible. As an option, the user interface 1300 may include a button to unlock all touch state dividers. In another embodiment, the user interface 1300 may include a button 1316 which distributes all unlocked touch state dividers evenly throughout the remaining parts of the touch state spectrum.

[00348] In one embodiment, the user interface 1300 may include a button 1318 which allows the user to establish the highest touch state boundary through pressure-based user input. In another embodiment, the user may be prompted to establish this touch state boundary as soon as user interface 1300 is displayed, in accordance with method 1200. In one embodiment, the user may only specify the highest touch state, with the remaining touch state spectrum being evenly partitioned across the touch states.

[00349] In one embodiment, the user interface 1300 may include a button 1320 which resets all touch state boundaries to default values. In another embodiment, the highest touch state boundary may be preserved, only able to be reset within the interface used to define it that may be displayed in response to activating button 1318.

[00350] In various embodiments, the user interface 1300 may include a button 1322 which allows a user to test the currently defined touch states. For example, in one embodiment, a user may be asked to achieve various touch states, and maintain them for a certain period of time. In another embodiment, the user may be presented with an interface similar to 1300, but where the touch state spectrum rendering 1302 and the contact pressure gauge 1312 are more predominantly displayed. As an option, a sound may be played every time a touch state boundary is crossed.

[00351] Figure 14 shows a user interface 1400 for indicating that a backtouch and/or pressure-sensitive interface is activated, in accordance with one embodiment. As an option, the user interface 1400 may be implemented in the context of the architecture and environment of the previous Figures

or any subsequent Figure(s). Of course, however, the user interface 1400 may be implemented in any desired environment. The aforementioned definitions may apply during the present description.

[00352] In one embodiment, the user interface 1400 may include one or more icons 1402 to indicate that a backtouch and/or pressure-sensitive interface has been activated. As an option, the icons may also indicate whether an interface is enabled. For example, an icon may only be visible if the interface is enabled, and only in color if the interface is activated. In another embodiment, the icons may have a color which depends upon the contact pressure level currently being exerted on that particular interface.

[00353] In various embodiments, the user interface 1400 may include a status bar 1404 which provides the user feedback regarding various device functions, in addition to other information, such as the date and/or time. The status bar itself may be used to indicate whether a backtouch and/or pressure-sensitive interface has been activated. For example, in one embodiment, the status bar may have a shading color which depends upon the contact pressure level currently being exerted on an activated interface. This may be done in conjunction with displaying an icon 1402 to indicate which interface has been activated. In another embodiment, the change in color may be restricted to just the border 1406 of the status bar. In yet another embodiment, the type of interface which has been activated may be indicated through an animation routine, including, but not limited to, a pulsing of the border, a cyclical variation of transparency of the status bar shading, "marching ants" along the status bar border, and/or any other animation routine.

[00354] In one embodiment, the status bar 1404 within the user interface 1400 may include one or more items of textual information 1408. The items of textual information may include, but are not limited to, date, time, network type, battery level, other device or application status information, and/or any other type of textual information.

[00355] In one embodiment, the activation of a backtouch and/or pressure-sensitive interface may be indicated through the presentation properties of the textual information 1408. Presentation properties for textual information which may be altered to indicate the activation of an interface include, but are not limited to, font, style, size, color, animation routine (e.g., flashing text, cycling colors, etc.), and/or any other type of presentation property. In another embodiment, activation of a backtouch and/or pressure-sensitive interface may be indicated by temporarily replacing textual information 1408 with a message, which may include, but is not limited to, the identity of the activated interface.

[00356] In one embodiment, the user interface 1400 may indicate the activation of a backtouch and/or pressure-sensitive interface by displaying a border 1410 around the display. As an option, border 1410 may change color depending upon the current contact pressure level.

[00357] Figure 15 shows a user interface 1500 for defining a backtouch feedback style, in accordance with one embodiment. As an option, the user interface 1500 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the user interface 1500 may be implemented in any desired environment. The aforementioned definitions may apply during the present description.

[00358] When interacting with a backtouch interface, it may or may not be important to provide the user with some form of feedback regarding the location and/or activity of their chosen implement of interaction. Providing interaction feedback allows the user to interact with the device using an interaction surface they may not be able to see.

[00359] In one embodiment, the user interface 1500 may include a plurality of checkboxes 1502 which represent various types of feedback which may be provided as an implement of interaction is in proximity to the backtouch interface. The types of feedback may include, but are not limited to, visual (e.g., screen flashes, status bar icons, iconic depictions of the location of the implement, etc.), sound, vibration, and/or any other form of feedback. In another embodiment, one or more of these types of feedback may be configured by the user. For example, in one embodiment, the user may select a sound to be played whenever an implement of interaction is in proximity to the backtouch interface. In yet another embodiment, the feedback may be limited to only those instances where the proximity to the backtouch interface appears intentional, rather than incidental. As a specific example, in one embodiment, feedback might be given for a fingertip, but not for a palm which is in proximity to the backtouch interface due to the user's grip.

[00360] In one embodiment, the user interface 1500 may include a plurality of checkboxes 1504 which represent various types of visual feedback that may indicate that an implement of interaction is in proximity to a backtouch interface. The types of visual feedback include, but are not limited to, graphical representation of probable implement location, status bar icon, screen flash, and/or any other type of visual feedback.

[00361] In various embodiments, a backtouch interface may be able to estimate the location of an implement of interaction in proximity to the backtouch interaction surface. This information can be used to provide useful feedback to the user. For example, in one embodiment, a point associated with the location may be displayed. As an option, the point may be the centroid of the area with the

highest proximity value within a predefine threshold. In another embodiment, the point may be replaced or combined with an icon, shape, or symbol.

[00362] In another embodiment, the user may be provided with proximity feedback in the form of a visual representation of the proximity data received from the backtouch interface. As an option, the proximity values may be scaled such that the visual representation has the appearance of a glow, centered on the estimated location of the implement.

[00363] In one embodiment, the user interface 1500 may include a plurality of checkboxes 1506 which represent various styles of visual proximity feedback. The styles include, but are not limited to, dynamic coloring, the feedback described in conjunction with operation 806 of method 800, and/or any other type or style of visual feedback. In the context of the present description, dynamic coloring refers to coloring which varies as a function of proximity to the backtouch interface. For example, in one embodiment, the color of the visual proximity feedback may vary between two colors which represent the least discernable proximity and the greatest proximity before contact. As an option, the colors may include a transparency factor, so the visual feedback does not obstruct display contents any more than necessary.

[00364] In one embodiment, the user interface 1500 may include a plurality of checkboxes 1508 which represent various types of feedback which may be provided as an implement of interaction comes in contact with the backtouch interface. The types of feedback may include, but are not limited to, visual (e.g., screen flashes, status bar icons, iconic depictions of the location of the implement, etc.), sound, vibration, and/or any other form of feedback. In another embodiment, one or more of these types of feedback may be configured by the user. For example, in one embodiment, the user may select a sound to be played whenever an implement of interaction makes contact with the backtouch interface. In yet another embodiment, the feedback may be limited to only those instances where the contact with the backtouch interface is estimated to be intentional, rather than incidental. As a specific example, in one embodiment, feedback might be given for contact with a fingertip, but not for a palm which is in contact with the backtouch interface due to the user's grip.

[00365] In one embodiment, the user interface 1500 may include a plurality of checkboxes 1510 which represent various types of visual feedback indicating contact with the backtouch interface. The types of visual feedback include, but are not limited to, graphical representations of contact location and extent (e.g., contact point, contact area, etc.), a status bar icon, screen flash, and/or any other type of visual feedback, including those described in other embodiments.

[00366] In one embodiment, the user interface 1500 may include a plurality of checkboxes 1512 which cause the visual feedback indicating contact with the backtouch interface to fade after a set

amount of time. In another embodiment, the user may specify the amount of time before fading begins, how quickly the fade occurs, and/or the limits of the fade (e.g., completely disappear, fade to 70% transparency, etc.). As an option, the fading of the visual feedback may be reversed if the implement of interaction moves beyond a preset threshold while still in contact with the backtouch interface.

[00367] In one embodiment, the user interface 1500 may include a plurality of checkboxes 1514 which allow the user to specify the style of visual feedback associated with making contact with the backtouch interface. The styles may include, but are not limited to, shading of a contact area, line style of the border of a contact area, animation routine, and/or any other style aspect of visual feedback, including those described in other embodiments.

[00368] In one embodiment, the user interface 1500 may include a plurality of checkboxes 1516 which represent various types of feedback which may be provided as an implement of interaction exerts pressure on the backtouch interface. The types of feedback may include, but are not limited to, visual (e.g., screen flashes, status bar icons, iconic depictions of the contact pressure of the implement, etc.), sound, vibration, and/or any other form of feedback. In another embodiment, one or more of these types of feedback may be configured by the user. For example, in one embodiment, the user may select a sound to be played whenever an implement of interaction exceeds a predefined contact pressure level with the backtouch interface. In another embodiment, the sound may play whenever there is a change in touch state. In yet another embodiment, the feedback may be limited to only those instances where the contact pressure on the backtouch interface is estimated to be intentional, rather than incidental. As a specific example, in one embodiment, feedback might be given for a finger press, but not for a palm squeeze incidental to the user's grip.

[00369] In one embodiment, the user interface 1500 may include buttons 1518 which allow the user to specify the colors which represent the extrema of measurable contact pressure levels. As an option, the colors may be specified with a transparency value.

[00370] In one embodiment, the user interface 1500 may include a plurality of checkboxes 1520 which represent various venues for presenting visual feedback based upon the current contact pressure level. The venues for pressure-related visual feedback include, but are not limited to, an area equivalent to or based upon the contact area, the contact point, the border of the display, the status bar, and/or any other type or example of visual feedback, including those described in other embodiments.

[00371] In one embodiment, the user interface 7.002.8-00 may include a button 1522 which returns all settings defined within user interface 7.002.8-00 to predefined default values. As an option, the user may be prompted to confirm the reset before restoring the default values.

[00372] In one embodiment, the user interface 7.002.8-00 may include buttons 1524 which allow a user to save and load collections of backtouch feedback settings. As an option, the user may be prompted to confirm loading a new collection of settings before overwriting the current collection.

[00373] In one embodiment, the user interface 1500 may include a button 1526 which allows a user to test the current backtouch feedback style settings. In one embodiment, button 1526 may enable the backtouch interface (if not already enabled) and allow the user to experience the current backtouch feedback style without being able to interact with user interface 1500 through the backtouch interface. In other words, the user may be able to expose the backtouch interface to a range of proximity, contact, and pressure interactions without accidentally changing any of the settings found within 1500.

[00374] In another embodiment, button 1526 may present to the user a user interface which allows the user to experience the current backtouch feedback style settings within a variety of simulated scenarios. The simulated scenarios may include, but are not limited to, web browsing, photo viewing, an application launcher, an eBook, word processing, and/or any other common use scenario. As an option, the simulated use scenarios may be defined such that the user is able to experience the current feedback style in a wide range of color schemes, subject matter, degrees of screen clutter, etc.

[00375] As a specific example of a backtouch feedback style collection in use, in one embodiment, a user may configure the backtouch interface through user interface 1500 such that having a finger in proximity to the backtouch interface causes a faint blue glow to appear on the display, over the location of the finger. The blue glow becomes brighter as the distance between the finger and the backtouch interface decreases, until contact is made. Upon contact, the display shows a small plus sign at the contact point and a thin "marching ants" border around the contact area. The contact area is not shaded. As the user increases contact pressure, the contact area is shaded red, which becomes more opaque as the pressure increases.

[00376] Figure 16 shows an alternative method 1600 for defining a selection made within a user interface based in part on contact pressure, in accordance with one embodiment. As an option, the method 1600 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the method 1600 may be carried out in

any desired environment. It should also be noted that the aforementioned definitions may apply during the present description.

[00377] As shown, it is determined if a touch event has occurred. See determination 1602.

[00378] In the context of the present description, a touch event refers to an event in which an implement of interaction comes into contact with an interaction surface. For example, in one embodiment, pressing on a pressure-sensitive backtouch interface with a finger may be a touch event. Another example may be making contact with a touch-sensitive display with a stylus.

[00379] If it is determined that a touch event has occurred, then the touch event attributes are determined. See operation 1604.

[00380] In the context of the present description, touch event attributes refer to one or more measurable aspects of the user interaction which resulted in a touch event. The measurable aspects may include, but are not limited to, touch state, contact area, contact point, contact pressure level, pressure uncertainty, touch uncertainty, and/or any other measurable aspect of user interaction.

[00381] As shown, it is determined whether the system is in a selection mode. See determination 1606.

[00382] In the context of the present description, a selection mode refers to a system state where a user may create or modify a selection in a display. In various embodiments, a selection mode may be represented by a system flag. Examples of when a system may be in a selection mode include, but are not limited to, instances where a selection already exists, instances where a user has indicated a desire to create a selection.

[00383] In various embodiments, a system may be placed in a selection mode through user input. For example, in one embodiment, the user may activate a selection mode by performing a predefined gesture on an interaction surface. In another embodiment, a user may activate a selection mode by exerting contact pressure on an interaction surface for a sufficient amount of time, the contact pressure exceeding a predefined threshold.

[00384] If the system is in a selection mode, then a selection is created and/or modified as a function of the touch event attributes, then displayed. See operation 1608.

[00385] In one embodiment, the selection may be created, modified, and/or displayed using one or more selection functions. In another embodiment, a display function may be applied in addition to a selection function, to display the selection.

[00386] In the context of the present description, a display function refers to a function of one or more inputs which determines one or more properties of a display. Properties of a display may include, but are not limited to, color values for individual pixels, brightness of a display backlight or

portions of a backlight, and/or any other properties of a display. Display functions may apply to an entire display and/or multiple displays.

[00387] In one embodiment, the selection may be displayed with a secondary boundary representing the uncertainty in the selection. As a specific example, there may be displayed a small, pale green tinged transparent circle to show the area that the device is certain the user selected and a surrounding pale-red tinged transparent area (a secondary boundary) representing the area where the device thinks the user may have tried to select, but is not certain.

[00388] Operation 1608 may continue to be performed, updating the selection with each iteration, until there is a change in the touch state. See determination 1614.

[00389] If it is determined in 1606 that the system is not in a selection mode, then it is determined if a gesture has been detected. See determination 1610. In one embodiment, a user may be given feedback when a gesture is detected. Possible feedback may include, but is not limited to, sound, flashing display, appearance of an icon, a colored border on the display, and/or any other form of user feedback.

[00390] If a gesture has been detected, then an associated action is performed. See operation 1612. In one embodiment, any gesture may be mapped to any command or operation of the device. In another embodiment, a user may be provided feedback when the action is performed. Possible feedback may include, but is not limited to, sound, flashing display, appearance of an icon, a colored border on the display, and/or any other form of user feedback.

[00391] A gesture may be associated with a variety of different actions. These actions may include, but are not limited to, scrolling a display or user interface element, zooming in or out, modifying the display brightness, and/or any other action. With respect to making or modifying a selection through method 1600, it is important to note that, in one embodiment, a gesture may be associated with placing the system in a selection mode.

[00392]

[00393] Figure 17 shows a user interface 1700 for performing operations on a selection, in accordance with one embodiment. As an option, the user interface 1700 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the user interface 1700 may be implemented in any desired environment. The aforementioned definitions may apply during the present description.

[00394] After selecting an object, using methods, interfaces, and embodiments described above or others, a user may wish to perform an operation upon the object. Providing easily accessible methods to perform operations on a selected object may enhance the user experience. The

availability of multiple interaction surfaces and/or multiple sensitivities increases the number of simple, intuitive ways a user may interact with the device.

[00395] In various embodiments, once a selection is static, a user may perform operations on the selected object. Possible operations include, but are not limited to, replication operations (i.e. copy, cut, paste, etc.), relocation operations, text-specific operations, image-specific operations, cross-application operations, and/or any other type of operation.

[00396] In various embodiments, a user may perform replication operations on a selected object through simple gestures and other types of user input. For example, in one embodiment, a user may copy a selected object to a clipboard (i.e. temporary storage, etc.) by pressing sharply on a pressure-sensitive front interaction surface, on top of the selected object. In another embodiment, a user may cut a selected object by pinching the object (i.e. applying contact pressure on the object through a front and back interaction surface), then applying greater contact pressure on the front interaction surface than the back interaction surface. In yet another embodiment, a user may perform a paste operation, replacing the selected object with the contents of a clipboard, by pinching the selected object, then applying greater contact pressure on the back interaction surface than the front interaction surface. Of course, in other embodiments, these operations and those following may be assigned to any other gesture, depending upon the location, number, and sensing ability of the host device's interaction surface(s).

[00397] In various embodiments, a user may perform relocation operations on a selected object through simple gestures and other types of user input. For example, in one embodiment, a user may move a selected object by making contact with the object on an interaction surface (front or back) and dragging the contact point to relocate the object. As an option, if the selection was made within a sequential or ordered environment (i.e. word processing document, etc.), the selected object may become transparent or translucent while being relocated, so the user may better see the insertion point (i.e. cursor, etc.). As shown in this example, the same dragging gesture may have different effects, depending on the state of the selection (i.e. static vs. active, etc.).

[00398] In various embodiments, a user may perform text-specific operations on a selected text object using simple gestures and other types of user input. See, for example, user interface 1700 in Figure 17. As shown, a selection 1702 has been made within a block of text 1704. In accordance with one embodiment, a user has temporarily magnified the selected text by bringing a finger into proximity to a back interaction surface, said proximity localized in an area 1706 on the selection. As an option, the degree of magnification may increase as the finger is brought closer to the interaction surface.

[00399] Another example of a text-specific operation is data detection, in accordance with one embodiment. For example, in one embodiment, a user may perform a data detection operation on a selected text object by pressing on the selection with two fingers through a back interaction surface. In various embodiments, the data detection operation may highlight detectable information found within the selected text including, but not limited to, email addresses, phone numbers, dates and times, addresses, web addresses, and/or any other form of information. In another embodiment, the data detection may only highlight types of information which may be further acted upon by the device, such that after detection, a user may initiation further action by touching the highlighted information. For example, in one embodiment, touching a highlighted phone number may dial the number, touching a highlighted address may activate a navigation application, touching a date may create an appointment in a calendar application, and so forth.

[00400] Other examples of text-specific operations may include, but are not limited to, highlighting, modifying the style (i.e. bold, italic, underline, strikethrough, color, shadow, etc.), modifying the font, modifying the font size, translating to a different language, and/or any other operation which may be performed on text. In one embodiment, a user may perform a gesture, such as a two finger, double press on the selected text, to bring up a menu of different text operations (or any other operation in the present description). In another embodiment, each operation may be assigned a different gesture.

[00401] In various embodiments, a user may perform image-specific operations on a selected object through simple gestures intuitively related to the operation being performed. For example, in one embodiment, a user may apply facial recognition and/or red eye removal by simply tapping (on a front or back interaction surface) on peoples faces within the selection. In another embodiment, a user may resize the selected object using the two finger pinch-to-zoom gesture. In still another embodiment, a user may rotate the selected object by making two points of contact on the object, then twisting the contacting hand. In yet another embodiment, a user may warp or distort a selected object by applying different levels of contact pressure to the selection via a front or back interaction surface. As an option, a front interaction may cause puckering, while a back interaction may cause bulging.

[00402] In various embodiments, a user may perform cross-application operations on a selected object through simple gestures. Cross-application operations may include, but are not limited to, placing the selected object in a new email or SMS message, placing the selected object in a social network posting, sending the object to an application capable of performing further operations (i.e. image editing application, word processing application, etc.), and/or any other operation which may

involve another application. In other embodiments, a user may be presented with application-specific operations in a menu, in addition to cross-application operations, upon performing a predefined gesture.

[00403] Figure 18 shows a method 1800 for utilizing contact pressure-based gestures, in accordance with one embodiment. As an option, the method 1800 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the method 1800 may be carried out in any desired environment. It should also be noted that the aforementioned definitions may apply during the present description.

[00404] As shown, it is determined if a touch event has occurred. See determination 1802.

[00405] If it is determined that a touch event has occurred, then the initial touch event attributes are determined. See operation 1804.

[00406] As shown, the gesture is identified from gesture input. See operation 1806.

[00407] In the context of the present description, gesture input refers to the collection of inputs, flags, and signals by which a gesture is identified and parameterized. For example, in one embodiment, a two-finger pinch gesture may be identified by two contact points combined with their motion with respect to each other, and parameterized by the extent of the motion. Possible gesture inputs may include, but are not limited to, touch event attributes (both initial and over time), system and/or application flags, switches, buttons, states, sensor data, and/or any other possible input.

[00408] For example, in one embodiment, a gesture may be made up of one or more contact points on an interaction surface, each associated with a different contact pressure level.

[00409] In various embodiments, a gesture may be identified from gesture input. Some gestures may be able to be identified solely from initial touch event attributes. Other gestures may only be identified after the gesture has been performed for some period of time. As a specific example, a two finger pinch gesture and a two finger swipe are indistinguishable based solely on initial touch event attributes. However, once the swipe or pinch motion has begun, the gestures are immediately distinguished from each other.

[00410] In various embodiments, gestures may include one or more contact pressures being exerted upon an interaction surface. In some embodiments, pressure may be used to distinguish between two gestures. For example, in one embodiment, two gestures involving a two finger pinch on the front display and one finger contact with the backtouch interface may be defined based on the contact pressure level exerted on the back touch interface. In other embodiments, pressure may be used to specify one or more dimensions of the operation linked to a gesture. For example, in one embodiment, a swipe gesture to control scrolling of a text field may use contact pressure to

determine the speed of the scrolling (e.g., higher pressure yields faster scrolling, etc.). In still other embodiments, contact pressure may be used to both identify as well as parameterize a gesture.

[00411] Once the gesture has been identified, the corresponding operation is performed. See operation 1808.

[00412] In various embodiments, a gesture may be associated with the modification of one or more device audio settings. For example, in one embodiment, a user may adjust the device volume by applying contact pressure to a back interaction surface, and dragging the contact point up and down to increase or decrease the device volume. As an option, the ringer volume may be adjusted by dragging left and right. In another embodiment, a user may change where audio is sent (i.e. internal speakers, headphone jack, Bluetooth device, etc.) by quickly pressing twice on a back interaction surface, then selecting an audio destination from a pop-up menu presented in response to the rapid double press. In yet another embodiment, a user may mute the audio by applying pressure on front and back interaction surfaces (i.e. a pinching motion), in a predefined corner of the device. In various embodiments, some or all of these device audio related operations may be available through gesture only after the user provides some form of activation input (i.e. touching an icon in the status bar, performing a simple gesture, etc.). In this way, gesture collisions (i.e. assignment of more than one operation to the same gesture, etc.) may be avoided. Of course, these and the following operations may be associated with any gesture or other user input, in various embodiments.

[00413] In various embodiments, a gesture may be associated with the modification of one or more display attributes. For example, in one embodiment, a user may adjust the intensity of a display backlight by applying contact pressure with three fingers on the display of interest. As an option, the backlight intensity may vary as a function of average contact pressure among the three contacts. In another embodiment, a user may activate a "night mode" (i.e. use of a monochrome red/black color space, inverting the display, etc.) by sequentially applying and releasing contact pressure on each corner of a front interaction surface. In various embodiments, some or all of these display attribute related operations may be available through gesture only after the user provides some form of activation input (i.e. touching an icon in the status bar, performing a simple gesture, etc.). In this way, gesture collisions (i.e. assignment of more than one operation to the same gesture, etc.) may be avoided.

[00414] In various embodiments, a gesture may be associated with the modification of one or more device attributes. For example, in various embodiments, a device may have a status bar along one side of a display which indicates the status of device hardware including, but not limited to, Wi-

Fi signal strength, cellular network type and signal strength, Bluetooth status (i.e. on, off, etc.), system volume, battery remaining, etc. In some embodiments, a user may modify the status of these device attributes by interacting with status bar icons. For example, in one embodiment, a user may apply front surface contact pressure, above a predefined threshold for a predefined amount of time, to a status bar icon to turn off the associated device hardware (i.e. Wi-Fi, cellular modem, Bluetooth, etc.). In another embodiment, a user may apply similar pressure via a back interaction surface to a deactivated status bar icon to turn the associated hardware back on. As an option, applying said contact pressure may present the user with a menu of options associated with that device hardware (i.e. Wi-Fi networks to join, Bluetooth devices to pair, activate cellular voice/data/both, etc.).

[00415] In yet another embodiment, a user may apply contact pressure to a status bar battery indicator icon to activate a menu populated with one or more predefined collections of settings for various power scenarios (i.e. extreme cutbacks for low battery, high performance for charged battery, maximum performance while charging, etc.). In this way, a user may activate a power saving mode that allows them to stay connected to a Wi-Fi network while saving power by diming the display (i.e. while web browsing), and a different power saving mode which turns off Wi-Fi without having to dim the display as much (i.e. reading an eBook, etc.).

[00416] In various embodiments, some or all of these device attribute related operations may be available through gesture only after the user provides some form of activation input (i.e. touching an icon in the status bar, performing a simple gesture, etc.). In this way, gesture collisions (i.e. assignment of more than one operation to the same gesture, etc.) may be avoided.

[00417] In various embodiments, a gesture may be associated with application-specific operations. For example, in some embodiments, a user may interact with an email client through multiple interaction surfaces. In one embodiment, a user may scroll through a list of messages and select one for viewing using a back interaction surface. In another embodiment, a user may apply a contact pressure on a back interaction surface, then swipe downward, to forward the current message. In yet another embodiment, a user may apply a contact pressure on a back interaction surface, then swipe upward, to reply to the current message. As an option, a user may perform this gesture using two fingers to reply to all recipients of the message.

[00418] In other embodiments, a user may interact with a web browser through multiple interaction surfaces. In one embodiment, for example, a user may apply contact pressure on a link within a webpage, then perform a quick flicking gesture, in any direction, to open the link in a background tab or window. In another embodiment, a user may open a link in a new tab or window by pressing on the link through a back interaction surface for a predetermined amount of time.

[00419] In still other embodiments, a user may interact with a camera application through multiple interaction surfaces. For example, in one embodiment, a user may indicate a point to be used for white balancing by making contact with the displayed point through a back interaction surface. In another embodiment, a user may adjust one or more camera properties by applying different amounts of contact pressure on an icon shown on the front display. Possible camera properties may include, but are not limited to, aperture settings, simulated film speed, f-stop, degree of fill flash, and/or any other camera property or setting.

[00420] In even more embodiments, a user may interact with a movie player through a back interaction surface. For example, in one embodiment, a menu may fade into view when a user applies a contact pressure on the back interaction surface. The menu may allow the user to perform one or more movie-related operations, including but not limited to, toggling subtitles, selecting an audio track, selecting a chapter or bookmark, and/or any other movie related operation or setting.

[00421] In other embodiments, a user may interact with a navigation application using a back interaction surface. For example, in one embodiment, a user may cycle through a plurality of map layers by applying different levels of contact pressure on the back interaction surface. Possible map layers may include, but are not limited to, satellite images, street maps, weather maps, traffic maps, points of interest, navigational route, and/or any other type of map or navigational information.

[00422] In various embodiments, some or all of these application-specific operations may be available through gesture only after the user provides some form of activation input (i.e. touching an icon in the status bar, performing a simple gesture, etc.). In this way, gesture collisions (i.e. assignment of more than one operation to the same gesture, etc.) may be avoided.

[00423] In various embodiments, gestures may be associated with operations that are carried out as functions of the gesture input, when the gesture is performed and identified.

[00424] In various embodiments, the operations associated with a gesture may be carried out as a function of the associated gesture dynamics. In the context of the present description, gesture dynamics are aspects of a gesture that may vary without changing the identity of the gesture. Possible aspects may include, but are not limited to, contact point velocity, contact point acceleration, contact pressure velocity, contact pressure acceleration, time to complete gesture, and/or any other aspect which may be associated with a gesture.

[00425] In various embodiments, the association between gesture and operation may be context-dependent. In some embodiments, the association depends on application context (e.g., which application is active, etc.). For example, in one embodiment, a gesture which scrolls a text field in one application may turn a page when performed in a different application.

[00426] In other embodiments, the association may depend on application or state context (e.g., whether or not there is an active selection, whether or not a control has been activated, etc.). For example, in one embodiment, a gesture which may be used to select text may move text if performed when text has already been selected.

[00427] In other embodiments, the association may be independent of context, such that performing the gesture may cause the same operation to be carried out, regardless of what application is active. For example, a gesture which brings up an interface to adjust screen brightness and volume may be defined such that it is always available.

[00428] In various embodiments, a user may be given feedback as a gesture is performed. For example, in one embodiment, a representation of the gesture may be temporarily displayed as the gesture is performed. In this way, a user may be more aware of the form of the gesture they are performing. As an option, the geometry of the displayed gesture may be smoothed or otherwise modified.

[00429] Figure 19 shows an exemplary contact pressure-based gesture 1900 for scrolling a text field, in accordance with one embodiment. As an option, the gesture 1900 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the gesture 1900 may be carried out in any desired environment. It should also be noted that the aforementioned definitions may apply during the present description.

[00430] In one embodiment of a pressure-based gesture, the display properties of one or more display(s) may be altered by the gesture, including the scroll speeds of one or more scrollable objects (e.g., text fields, images, cover art, etc.). Scrolling is a common operation, and is often assigned to a gesture in touch-based devices.

[00431] In one embodiment of a pressure-based gesture, one or more inputs may alter the scrolling speeds of one or more areas on the display. As a specific example, a user may wish to scroll quickly through a very large collection of objects (e.g., contact names, pages of text, photographs, etc.), and desires to control the speed of scrolling in a simple fashion. While performing a classic swipe gesture to scroll through the collection, the user may also apply increasing contact pressure to a pressure-sensitive surface as a means of controlling the scroll speed (e.g., increased contact pressure yields increased scroll speed, etc.). A swipe, slide or other simple gesture may be used.

[00432] See, for example, exemplary pressure-based gesture 1900. As shown, the gesture starts at touch event 1902, which involves a single finger is making contact at location L1, at time T1, while exerting contact pressure P1, in accordance with one embodiment. The gesture ends at touch event

1904, with touch event attributes L2, T2, and P2. In one embodiment, the sliding motion from L1 to L2 may be described as a swipe gesture.

[00433] As shown in plot 1906, as the contact pressure increases from P1 to P2, the scroll speed increases as well, from S1 to S2. In one embodiment, scroll speed may be a display function (in this case, a function of contact pressure). As an option, pressure-dependent display functions may be step-wise, changing in response to changes in discrete touch states, or continuous functions of a contact pressure level.

[00434] In various embodiments, pressure-based gestures may be classified as either dynamic gestures or static gestures. In the context of the present description, a dynamic gesture is a gesture that requires movement across or in proximity to an interaction surface. For example, in one embodiment, a swipe gesture may be classified as a dynamic gesture.

[00435] In the context of the present description, a static gesture refers to a gesture which does not involve movement across or in proximity to an interaction surface. Examples of static gestures may include, but are not limited to, button presses (real or virtual), multi-finger taps, operating a mechanical switch, a squeeze, and/or any other gesture which does not require motion.

[00436] In one embodiment of a pressure-based gesture that alters display properties, a scroll speed display function may be defined such that scroll speed increases in a non-linear fashion with respect to the contact pressure exerted in a swipe gesture.

[00437] In various embodiments, pressure-based gestures may be associated with different operations. For example, in one embodiment, pressure-based gestures may alter one or more display properties. Display properties may include, but are not limited to, backlight intensity, pixel color, scroll bar sensitivity, slideshow rate, and/or any other property associated with a display or its contents. As a specific example, a device may be in a sleep mode with the display and backlight inactive. A user may move his finger into proximity of a backtouch sensor in order to activate the display and the display backlight intensity to a low intensity level. By increasing the pressure on the backtouch sensor, the backlight intensity may be increased. Alternatively, the backlight intensity may be initially activated at a high level (e.g., depending on ambient light sensor etc.). In this case increasing pressure on the backtouch display may dim the backlight.

[00438] In one embodiment of a pressure-based gesture that alters a scroll speed, as the gesture magnitude is increased, the rate of scroll speed increase is increased. In other words, the scroll acceleration is increased.

[00439] In the context of the present description, gesture magnitude refers to the magnitude of the associated gesture dynamics. For example, in one embodiment, the gesture magnitude of a swipe gesture may include the length of the swipe and/or the contact pressure exerted during the swipe.

[00440] In one embodiment of a pressure-based gesture to control scroll acceleration, the scroll acceleration may depend on the gesture acceleration. Thus, if the contact is such that the contact point is accelerating with time (e.g., positive contact point acceleration), the scroll acceleration may be positive. In another embodiment, if the contact point acceleration is negative then the scroll acceleration may be negative (e.g., scroll speed decreased, etc.).

[00441] In one embodiment of a pressure-based gesture to control scroll acceleration, the scroll acceleration may be both positive and negative, depending on the contact point movement.

[00442] In one embodiment of a pressure-based gesture to control scroll acceleration, other display functions may also be altered. Possible display functions include, but are not limited to, selection(s), color, shape, image and/or text magnification, indicator(s) to provide feedback to user, and/or any other display function.

[00443] The addition of pressure dependence to already established touch gestures may facilitate user interactions with the device. Often, the efficacy of a gesture is limited by the size of the device. For example, on a device which uses the pinch-to-zoom gesture, zooming far in or out may require repetition of the gesture multiple times, due to screen size.

[00444] In one embodiment, the pinch-to-zoom touch gesture may be enhanced as a pressure-based gesture; after performing the pinch motion, the user exerts pressure on the two contact points. So long as the pressure remains above a predefined threshold, the zoom operation may continue inward/outward without requiring additional pinch motions. As an option, the speed of the zooming may be modified by changing the contact pressure level. As another option, any differences in contact pressure level between the two contact points may be dealt with by using the average pressure.

[00445] In another embodiment, the swipe to scroll touch gesture may be enhanced as a pressure-based gesture; after performing the swipe, the user exerts pressure on the contact point without further motion. So long as the pressure remains above a predefined threshold, the scroll operation may continue without requiring additional swiping motions. As an option, the scroll speed may vary as a function of the contact pressure level.

[00446] Figure 20 shows an exemplary multitouch pressure gesture 2000 for indicating a direction, in accordance with one embodiment. As an option, the gesture 2000 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent

Figure(s). Of course, however, the gesture 2000 may be carried out in any desired environment. It should also be noted that the aforementioned definitions may apply during the present description.

[00447] As previously discussed, touch gestures may sometimes be modified to be pressure-dependent. In various embodiments, multitouch gestures may also be modified to depend upon pressure. As an option, the modified multitouch gestures may depend upon contact pressure differences between different contact points. In the context of the present description, a multitouch pressure gesture refers to a multitouch gesture whose definition relies in part on differences in contact pressure between different contacts. The definition of multitouch pressure gestures may rely on a variation in pressure differences over time, but it is not required of all multitouch pressure gestures.

[00448] See, for example, multitouch pressure gesture 2000 shown in Figure 20. This static gesture is based upon two points of contact, 2002 and 2004. In various embodiments, this gesture may be used to indicate a direction. As depicted in Figure 20, this multitouch pressure gesture is indicating a left-to-right direction, in accordance with one embodiment. In other embodiments, this gesture may be associated with any other operation, function, or action.

[00449] In various embodiments, multitouch pressure gesture 2000 may be performed by first exerting a contact pressure upon contact point 2002 which exceeds a contact pressure being exerted upon contact point 2004. As an option, various embodiments may require that both of these initial contact pressures exceed a predefined threshold contact pressure level. The gesture is completed by altering the contact pressures on the two contact points such that the pressure exerted on 2004 now exceeds that being exerted on 2002. As an option, a user may be required to maintain this pressure inequality for a predefined amount of time. When this gesture is performed using two digits on the same hand, the user's hand may appear to be rocking from left to right. A right to left direction may be indicated by changing the order of the pressures. This type of multitouch pressure gesture is hereinafter referred to as a rocker pressure gesture.

[00450] In various embodiments, a rocker pressure gesture may be preferable over simply indicating a side of the device through touch or pressure because it is less likely to be accidentally performed.

[00451] In various embodiments, a rocker pressure gesture may be used to modify a selection. For example, in one embodiment, a text selection may be expanded in a particular direction by performing a rocker pressure gesture in the desired direction, and maintaining the contact pressure difference between the two contact points until the text selection is the desired size. As an option, the speed at which the selection expands may be increased/decreased by increasing/decreasing the

contact pressure differential. In another embodiment, this gesture may be used to modify the shape of a selection. For example, it may be used to modify the aspect ratio of the selection boundary geometry associated with the selection.

[00452] In various embodiments, a rocker pressure gesture may be used in conjunction with a user interface adapted for the visually impaired. For example, in one embodiment, the rocker pressure gesture may be used to move a selection from one UI element (e.g., button, slider, drop down menu, etc.) to the next. When a UI element is selected, the assistive interface may speak the object name and/or magnify it such that the visually impaired user understands. In this way, a visually impaired user may operate a user interface displayed on a screen which often provides zero tactile feedback.

[00453] In various embodiments, a rocker pressure gesture may be used to facilitate interaction with the operating system. For example, in one embodiment, this gesture may be used to traverse a list of applications running in a multi-tasking environment. In another embodiment, this gesture may be used to switch between windows in a windowed user environment. In yet another embodiment, a rocker pressure gesture may be used to increase/decrease system settings such as volume and display brightness.

[00454] In various embodiments, a rocker pressure gesture may be advantageous in an application environment. For example, in one embodiment, a rocker pressure gesture may be used to turn the pages of an electronic book, or other multipage document displayed as a book. Using a rocker pressure gesture would allow a user to hold the device with both hands while reading, thumbs in contact with the screen, without danger of accidentally triggering a page turn, nor requiring movement of hands or fingers to turn the page.

[00455] Figure 21 shows an exemplary multitouch pressure gesture 2100 for indicating a rotation, in accordance with one embodiment. As an option, the gesture 2100 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the gesture 2100 may be carried out in any desired environment. It should also be noted that the aforementioned definitions may apply during the present description.

[00456] In various embodiments, multitouch gestures may enhance the user experience with the addition of pressure sensitivity. For example, in one embodiment, the measured difference in contact pressure levels among different contact points associated with a gesture may determine one or more parameters associated with the gesture. As an option, the one or more parameters may vary as a function of the pressure differential. Possible parameters may include, but are not limited to,

speed of transformation, direction of transformation, stringency of a color matching selection, and/or any other parameter which may be associated with any type of action, command, or operation.

[00457] In another embodiment, the presence of a pressure differential among contact points associated with a gesture may change the identity of the gesture itself. For example, see Figure 21.

[00458] As shown, multitouch pressure gesture 2100 is a static gesture based upon two points of contact, 2102 and 2104. In various embodiments, this gesture may be used to indicate a rotation. As depicted in Figure 21, this multitouch pressure gesture is indicating a clockwise rotation, in accordance with one embodiment. In other embodiments, this gesture may be associated with any operation, function, or action.

[00459] In various embodiments, multitouch pressure gesture 2100 may be performed by exerting contact pressure upon contact points 2102 and 2104 such that there is a pressure differential. For example, as seen in Figure 21, the contact pressure associated with contact point 2104 is greater than that associated with contact point 2102. As an option, various embodiments may require that both of these contact pressures exceed a predefined threshold contact pressure level. The gesture is completed by ending one or both contacts, or by performing a different gesture. As an option, a user may be required to maintain this pressure inequality for a predefined amount of time. This type of multitouch pressure gesture is hereinafter referred to as a tipping pressure gesture.

[00460] In various embodiments, a tipping pressure gesture may be used to rotate an object or element on a display. For example, in one embodiment, an image or selected portion of an image may be rotated by performing a tipping pressure gesture. As an option, the speed of rotation may depend upon the pressure differential between the two contact points. In another embodiment, the speed of rotation may vary as a function of the distance between the two contact points.

[00461] In one embodiment, the rotation may be performed in small angular increments, continuing until the tipping pressure gesture has ended. In another embodiment, the rotation is performed in 90° increments (e.g., changing the orientation of photographs, etc.), independent of gesture length or pressure differential. In some embodiments, the rotation may be performed using one of the contact points as the axis of rotation.

[00462] In some embodiments, a tipping pressure gesture may only cause a rotation in one direction (e.g., clockwise, etc.). In other embodiments, the direction of rotation caused by a tipping pressure gesture may depend on the positions of the two contact points with respect to each other. For example, in one embodiment, if the high pressure contact point is to the right of the low pressure contact point, the rotation may be in a clockwise direction, and in a counterclockwise direction otherwise. See, for example, multitouch pressure gesture 2100. In one embodiment, the axis used to

make the left/right determination may be the horizontal axis as defined by the current device orientation. In another embodiment, the horizontal axis used to make the left/right determination is defined by device geometry, and is orientation independent. In still other embodiments, the axis used to determine left/right may be independent of device geometry or orientation (e.g., display diagonal, vertical, etc.).

[00463] In various embodiments, a tipping pressure gesture may be used to interact with user interface elements. For example, in one embodiment, a tipping pressure gesture may be used to increase/decrease the value of a selected slider or scale. In another embodiment, a tipping pressure gesture may be used to cycle through options on a circular pop-up menu. In still another embodiment, a tipping pressure gesture may be used to quickly scroll through a list of items. Possible items may include, but are not limited to, email messages, songs or videos, files, photos, and/or any other object or data.

[00464] In some embodiments, there may exist two or more gestures which are the same or similar in execution. For example, see multitouch pressure gestures 2000 and 2100. While performing a tipping pressure gesture, if a user allows the contact pressure differential to switch sign (i.e. low pressure contact point becomes the high pressure contact point, and visa versa), a rocker pressure gesture may be recognized by the device. In various embodiments, constraints may be placed upon gestures to assist the operating system in differentiating between similar gestures.

[00465] In various embodiments, similar or identical gestures may be distinguished from each other through the context of their use. For example, in one embodiment, the recognition of a tipping pressure gesture may be limited to instances where there is a rotatable object selected; the rocker pressure gesture would be available in all other instances. By ensuring similar gestures are not recognizable in the same context, user confusion and erroneous gestures may be reduced. These contexts may include, but are not limited to, selection status, device state, active application, system flags, selection subject matter, and/or any other property or attribute by which contexts may be defined.

[00466] In various embodiments, similar or identical gestures may be distinguished from each other by the positions of points of interaction, relative to a common axis system. In the context of the present description, a point of interaction refers to any point on an interaction surface where user interaction may be localized. Points of interaction include, but are not limited to, contact points, localized proximity and/or any other localized user interaction.

[00467] In the context of the present description, a common axis system refers to an axis system upon which all gesture data may be evaluated. For example, in one embodiment, the common axis

system may be tied to the device geometry (i.e. the "horizontal" axis is always parallel to the long edge of the main display, etc.). In another embodiment, the common axis system may be tied to device orientation, such that the axis system changes depending on accelerometer data (though it is still common to all gestures).

[00468] Using a common axis system, an examination of the relative positions of points of interaction associated with a gesture may facilitate differentiation. For example, in one embodiment, rocker pressure gestures may only be recognized if a line between the two contact points is within a predefined deviation from the common horizontal axis (and the tipping pressure gesture available in all other cases). In another embodiment, the similar gestures may all be available at all times, but the location of points of interaction with respect to the common axis system may be used to give priority to certain gestures over others in certain situations.

[00469] In various embodiments, similar or identical gestures may be distinguished from each other through the timing associated with their execution. For example, in one embodiment, the performance of a rocker pressure gesture may have to be done within a certain amount of time, otherwise it may be interpreted as multiple tipping pressure gestures. In another embodiment, a tipping pressure gesture may have to be held for a certain amount of time before being recognized, such that the beginning of a rocker pressure gesture may not be identified as a tipping pressure gesture.

[00470] In various embodiments, one or more pressure-based gestures may be combined with other multi-touch and/or pressure-based gestures, such that a user may give multiple gesture-based instructions without breaking contact with one or more interaction surfaces. For example, suppose a user finger is at 3 o'clock and a user thumb at 9 o'clock and finger and thumb are one inch apart, both on a front touchscreen. The user may slide finger and thumb further apart. In one embodiment, this may result in an increase in selection area, for example. The user may then increase finger pressure. This may result in the increased selection area being rotated.

[00471] In other embodiments, other combinations and permutations of various inputs and gestures on various surfaces and using various sensors may be used to simplify the user interface and make pressure-based gestures more intuitive. As an option, such gestures may be pre-programmed, or programmed by the user, or a combination of both.

[00472] Pattern-based gestures may be simple to perform and easy for a user to remember. For this reason, they are well suited to a number of applications. One of the most basic pattern-based gestures is the finger press. In various embodiments, a pattern-based gesture made up of one or more fluctuations of contact pressure between a low level and a higher level at a single contact point

may be associated with often used operations. For example, in one embodiment, a double press (i.e. increase then decrease contact pressure twice) may activate an interface to switch between active applications in a multitasking environment. In another embodiment, a triple press may activate a pop-up menu populated with iconic representations of the user's preferred actions, contacts, applications, and scripts. In one embodiment, these gestures may be surface agnostic. For example, the application switching interface may be activated no matter which interaction surface received the double press. In another embodiment, these gestures may be surface specific, allowing other system processes and applications to assign operations to these simple gestures without colliding with a system-wide gesture. For example, a triple press on a side surface may activate a pop-up favorites menu, while a triple press on a back surface may activate an application-specific contextual menu.

[00473] Another simple pattern-based gesture is the pinch gesture. In various embodiments, this gesture is performed by making simultaneous contact with two different interaction surfaces such a line connecting the two contact points is roughly parallel to the force vectors being applied at said points. An example is pinching a device between a finger and a thumb, the finger and thumb contacting different interaction surfaces. In another embodiment, this gesture may be pressure based. Variations on this gesture may incorporate multiple pinches (i.e. fluctuations of contact pressure between a low level and a higher level, similar to the finger presses previously described).

[00474] These simple gestures may be associated with often used operations, including but not limited to, activating device interfaces (i.e. backtouch interface, proximity sensitivity, pressure sensitivity, etc.), displaying a common system interface (i.e. application launcher, system settings, etc.), displaying a menu of user defined "favorites" (i.e. applications, contacts, songs, movies, web bookmarks, recently used documents, etc.), mute volume, and/or any other often used interface or operation. Of course, in other embodiments, these gestures may be associated with any operation, function, or interface.

[00475] Building off the previous gesture, a pinch slide gesture is an example of a pattern-based generalized gesture which combines a pinch with a sliding motion. In some embodiments, it may be described as a 1-6 gesture, though it is not limited to just front/back interaction. In various embodiments, this gesture may be performed by pinching the device, then sliding the pinch across the interaction surfaces while maintaining contact. In one embodiment, a contact pressure above a predefined threshold may also be required. This gesture mimics the tactile experience of pushing or pulling an object such as a lever or cord.

[00476] In one embodiment, a pinch slide gesture may be used to quickly move through an alphabetical list, similar to using tabs to quickly find a contact quickly in a paper address book. In

another embodiment, this operation may be adopted to moving quickly through other sorted lists of items, including but not limited to song lists, application lists, eBooks, and/or any other collection of organized data. As an option, the display may invite the use of this gesture by displaying virtual tabs (i.e. the alphabet, numbers, etc.) along a side of the display where the gesture would be performed.

[00477] In another embodiment, a pinch slide gesture may be used to quickly select text. For example, in one embodiment, a selection may be initiated by pinching at the desired location. The selection may be expanded by sliding the pinch to the desired selection end. In another embodiment, this method of selection may be adapted to selecting a portion of an image or graphic (i.e. pinch at one corner of desired selection bounding box and sliding to opposite corner, etc.).

[00478] In another embodiment, a pinch slide may be used to move quickly through a large document (i.e. word processing document, web page, image, etc.). For example, in one embodiment, the user may slide a pinch up and down the device, changing the displayed portion of the document relative to the position of the pinch (i.e. the top of the device represents the start of the document, the bottom of the device represents the end, and the relative location of the pinch becomes the portion of the document displayed. In another embodiment, the pinch slide may have to be initiated at a particular location to activate this document navigation functionality. For example, a web browser may have an icon near the top of the display that activates pinch slide navigation when the gesture is initiated on the icon. This functionality may be adapted to two dimensional navigation in a large image, displaying the portion of the image represented by the relative location of the pinch.

[00479] In yet another embodiment, a pinch slide gesture may be used to display menus of common operations or applications. For example, in one embodiment, a pinch slide gesture which begins near an edge of a display and then moves inward may cause a menu or window to slide in from that edge of the display. As an option, the menu or window may remain visible until a selection is made. In another embodiment, there may be different menus or windows associated with each edge of a display. In still another embodiment, a window may be closed (i.e. slid back out of view) by using a pinch slide to pull it out a bit farther, then releasing it, similar to rolling up a window shade.

[00480] In one embodiment, a user interface may be utilized to present a context based menu for the user. In one embodiment, a user may interact with a display element by exerting contact pressure on a front interaction surface over contact area. At the same time, the user may be in contact with a back interaction surface, over contact area. In various embodiments, contextual menu may be displayed near the backtouch contact, after the user performs a predefined static gesture

within contact area. The user may then select a menu item using small movements and contact pressure applied on the back interaction surface.

[00481] In one embodiment, the user interface may be utilized to provide easy, quick access to a plurality of favorite operations, applications, contacts, documents, and/or other types of objects. In various embodiments, favorites panel may be displayed in response to a gesture, the selection of a hardware or software button, voice command, accelerometer input (i.e. shaking the device, flicking the users wrist, etc.), and/or any other form of user input. In one embodiment, once favorites panel is displayed, a user may select an item using a slide pad located on the side of the device.

[00482] In one embodiment, a user may configure which items are displayed in the favorites panel. In another embodiment, the favorites panel may be automatically populated by the device, based upon factors which may include, but are not limited to, historical usage, date of last use, frequency of use, popularity information obtained from a remote system, and/or any other factors.

[00483] In the various embodiments described above, different combinations of user input have been associated with different actions. It should be understood that the described user inputs may be associated with any action, function, operation or interface, just as the described actions may be triggered by any combination of user inputs, according to different embodiments.

[00484] In the context of the present description, a cue refers to feedback, visual or otherwise, which is provided to the user. Examples of cues include, but are not limited to, the display logic within selection functions, visual representation of contact point movement, proximity feedback, contact pressure level feedback, and/or any other form of user feedback. For example, in one embodiment, the anchor object may be highlighted (e.g., change of color, text highlight, 3D representation, flashing or other dynamic selection area behavior, etc.)

[00485] In various embodiments, cues may include 3D or pseudo-3D effects. For example, in one embodiment, the anchor object may be made to appear to be floating above a background image, using 3D cues.

[00486] In various embodiments, a cue may modify a 2D representation into a pseudo-3D representation responsive to user inputs such as device orientation. For example, in one embodiment, the shadow of an object may be adjusted according to device orientation, to provide the illusion that an object is floating above a background. In another embodiment, the pseudo-3D representation may be responsive to user focus (including, in some embodiments, user gaze).

[00487] Figure 22 shows a 3D layered user interface 2200, in accordance with one embodiment. As an option, the user interface 2200 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the user

interface 2200 may be implemented in any desired environment. The aforementioned definitions may apply during the present description.

[00488] In the context of the present description, a 3D layered user interface refers to a user interface in which displayed objects may exist in one of a plurality of layers. For example, see Figure 22.

[00489] As shown, user interface 2200 is comprised of two layers, a front layer 2202 and a back layer 2204. These layers are depicted in a staggered arrangement, to illustrate the depth; it should be noted that in various embodiments, the layers would be aligned. Object 2206 exists in the front layer, while object 2208 exists in the back layer. In various embodiments, a user may interact with the layers separately.

[00490] In various embodiments, a 3D layered user interface may be implemented in a layered display device. In the context of the present description, a layered display device refers to a device with at least one display that is made up of a plurality of overlapping display layers, each layer able to display content independent of other layers, with all layers facing the same direction. For example, in one embodiment of a layered display device, the device may have a display made up of a transparent display located on top of a second display, both facing forward. In another embodiment, the display layers may be separated by a non-opaque material, to enhance the layered appearance.

[00491] In another embodiment of a layered display device, the display layers may include one or more e-ink layers. In yet another embodiment, the display layers may include one or more LCD layers. In still another embodiment, the display layers may include both e-ink and LCD layers. Other embodiments may include any combination of layers embodying any display technology.

[00492] In various embodiments, a 3D layered user interface may be implemented in a device having single layer displays through the use of virtual display layers. In the context of the present description, a virtual display layer refers to a collection of display elements which have all been assigned the same apparent depth within the 3D layered user interface. In various embodiments, a 3D layered user interface may make use of multiple virtual display layers. For example, in one embodiment, a 3D layered user interface may have a virtual foreground display layer and a virtual background display layer.

[00493] Additionally, in the context of the present description, a display element refers to the region of the display allotted to an identifiable visual object. Identifiable visual objects may include, but are not limited to, digital objects (i.e. images, text boxes, UI control widgets, selections, etc.), subject matter objects (i.e. people within a photograph, letters and/or words within text, etc.), and/or

any other type of identifiable visual object. When located in a virtual display layer, display elements may be referred to as 3D display elements.

[00494] In various embodiments, virtual display layers may be given the appearance of depth through the use of 3D depth cues. In the context of the present description, a 3D depth cue refers to an effect, manipulation, transformation, animation, or operation which gives a visual indication of simulated depth. For example, in one embodiment, a 3D depth cue may be a blur operation, such that layers located at successively greater depths may appear blurrier than those closer to the user. In various embodiments, one or more 3D depth cues may be used to give the appearance of depth to one or more virtual display layers. In one embodiment, different 3D depth cues may be used for different virtual display layers. In another embodiment, 3D depth cues may be used in conjunction with a 3D layered user interface implemented in a layered display device, to enhance the layered appearance.

[00495] In one embodiment, a 3D depth cue may include the addition of a shadow element to display elements located within a virtual display layer, making them to appear to float above the next virtual display layer. As an option, the location of the light source(s) casting the shadows may be based in part on data obtained from one or more cameras located on the host device.

[00496] In one embodiment, a 3D depth cue may include the addition of a depth-based fog, giving the appearance that the layers exist in an environment with a thin, uniform fog. In this way, distant objects may be "foggier" than objects close to the user.

[00497] In one embodiment, a 3D depth cue may include a depth-based apparent rate of movement. For example, in a situation where a user is swiping through multiple screens of layered content, the layers closer to the user may appear to move faster than those more distant, giving the appearance of depth.

[00498] In one embodiment, a 3D depth cue may include a time-dependent visual transformation. For example, in one embodiment, a background layer may be transformed such that it appears to be below rippling water, while the foreground layer appears to be floating on the surface. In another embodiment, the visual transformation may be static.

[00499] In one embodiment, a 3D depth cue may include animated visual elements which appear to exist in between layers. Elements may include, but are not limited to, birds or insects flying, shooting stars, tiny people walking, grass blowing in the wind, and/or any other visual element.

[00500] In one embodiment, a 3D depth cue may include moving and/or transforming display elements within a virtual display layer based upon detected user gaze and/or head position. For example, in one embodiment, display elements may be compressed and virtual display layers spread

apart if the device determines the user is viewing the display from an angle, the degree of transformation varying with estimated viewing angle. In another embodiment, display elements located on different virtual display layers may be slide around within their respective layers as the user changes their angle of viewing, allowing them to "look around a corner" to see display elements that would be obscured when viewed head on.

[00501] In one embodiment, a 3D depth cue may include moving and/or transforming display elements within a virtual display layer based upon changes in device orientation detected through one or more hardware interfaces (i.e. accelerometer, tilt sensor, compass, etc.).

[00502] In one embodiment of a 3D layered user interface, the 3D cues may be implemented such that the user interface has an apparent depth equal to the thickness of the device. In another embodiment, the 3D cues may be implemented such that the user interface has an apparent depth equal to the distance between a front display and a backtouch interface.

[00503] In various embodiments, a user may interact with the layers separately. For example, in one embodiment, a front interaction surface may be used to interact with display elements in a foreground display layer, and a back interaction surface may be used to interact with display elements in a background display layer. See, for example, Figure 22.

[00504] User interface 2200 is being implemented in a device having front and back touch-sensitive interaction surfaces. As shown, a user may manipulate display element 2206, located in front layer 2202, through a gesture 2210 performed on the front interaction surface. At the same time, a user may manipulated display element 2208, located in back layer 2204, through a gesture 2212 performed on the back interaction surface. In one embodiment, the manipulation of one of these display elements may be done completely independent of the other display element.

[00505] In one embodiment of a 3D layered user interface, a front input interface may be used to move display elements on a virtual foreground display layer. In another embodiment of a 3D layered user interface, a rear input interface may be used to move display elements on a virtual background display layer.

[00506] In various embodiments, there may be display layers with which a user may not interact. For example, in one embodiment, there may be an emphasis display layer situated in front of all other display layers. In the context of the present description, an emphasis display layer refers to a display layer (virtual or physical) which is used to provide visual emphasis to one or more display elements without providing independent means of user interaction. In other words, when a user interacts with a display element located in an emphasis display layer, they might also interact with one or more other layers. For example, in one embodiment, an emphasis display layer may be used

to indicate results of a text search within a document (i.e. target words appear to float above the document, etc.). Although located on a different display layer, any text selection made by the user may incorporate text from both the emphasis display layer and the display layer housing the document. In another embodiment, an emphasis display layer may cause hyperlinks within a webpage to appear to float above the rest of the page, though still able to be selected along with non-hyperlink text.

[00507] In another embodiment, an emphasis display layer may be used to display user avatars floating above the text of a chat session; the user may not interact with the avatars. Other examples of the use of an emphasis display layer may include, but are not limited to, a status bar floating at the top of a display, pop-up volume indicators which appear when the volume is changed, icons within the status bar, and/or any other circumstance where visual emphasis is desired.

[00508] Another example of a display layer with which a user may not interact is an ambiance display layer. In the context of the present description, an ambiance display layer refers to a display layer (virtual or physical) which is used to display decorative display elements with which a user may not directly interact with. For example, in one embodiment, one or more ambiance display layers may be used to create the appearance of three-dimensional structure within the 3D layered user interface (i.e. walls, shelves, backdrop, etc.). In another embodiment, an ambiance display layer may be used to display a wallpaper or some other backdrop which is present behind the elements and controls of the user interface. In yet another embodiment, a user may customize one or more ambiance display layers through a separate user interface, but not through direct interaction.

[00509] In one embodiment of a 3D layered user interface, a rear touch input may be used to control display elements located on a virtual display layer. In another embodiment, a rear touch input may be used together with a front touch input to control one or more display elements on one or more virtual display layers.

[00510] In other embodiments of a 3D layered user interface, a user may interact with one of a plurality of layers through a back interaction surface, the layer being selected using a pressure-sensitive front interface. For example, in one embodiment, a user may select one of a plurality of display layers by applying a predefined level of contact pressure on the front interaction surface, and interact with the selected layer using a back interaction surface. As an option, 3D depth cues may be used to indicate "moving" through the display layers as the contact pressure is changed (i.e. magnifying and fading display layers as they are passed by, sharpening previously blurry display layers as they grow closer, etc.).

[00511] In one embodiment, one or more display layers associated with a 3D layered user interface may only be interacted with through coordinated user input on multiple interaction surfaces. For example, in one embodiment, a touch input on the front of the device together with a touch input on the back of the device may control the overlap between two or more virtual display layers.

[00512] In one embodiment, display elements may be assigned to virtual display layers, just as they may be assigned to physical display layers in a layered display device. In another embodiment, the process of assigning display elements to virtual display layers may be the same as the process of assigning display elements to physical display layers in a layered display device. In yet another embodiment, a 3D layered user interface may be designed such that it may take advantage of physical display layers, if present, or use virtual display layers if only single layer displays are available. It should be understood that all functionality and embodiments described with respect to virtual display layers may also be implemented in a layered display device.

[00513] In various embodiments, a 3D layered user interface for augmented reality may use 3D depth cues to visually differentiate augmenting display elements associated with physical locations near the user from those associate with distant physical locations. In one embodiment, 3D depth cues may be used to give augmenting display elements an apparent distance from the user roughly equal to the physical location with which they are associated. In another embodiment, 3D depth cues may be used to augment the video signal such that it has a three dimensional appearance.

[00514] Figure 23 shows exemplary pattern-based gestures 2300, in accordance with one embodiment. As an option, the gesture 2300 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the gesture 2300 may be carried out in any desired environment. It should also be noted that the aforementioned definitions may apply during the present description.

[00515] In the context of the present description, a pattern-based gesture refers to a gesture defined, at least in part, by a path through a phase space of one or more dimensions. See, for example, the pattern-based gestures 2300.

[00516] In some embodiments, pattern-based gestures may be based upon paths through a phase space whose dimensions do not include any measure of location on an interaction surface. In other words, in these embodiments, pattern-based gestures may not depend upon the location or movement of user interaction across an interaction surface. In one embodiment, these gestures may act as gesture components, which may be combined with other gesture components to form generalized

gestures which may or may not be based upon location on or movement across an interaction surface.

[00517] See, for example, the pattern-based gesture 2302, described by a phase space path which represents the time evolution of the touch state associated with a contact point located on a front interaction surface. The location of the contact point upon the interaction surface is of no importance.

[00518] Pattern-based gesture 2302 is based upon three touch state transitions. At time t1, the contact point changes from touch state s0 to s1. Similar changes of state occur at t2 and t3. In various embodiments, these touch state transitions may be represented by ordered 2-tuples. For example, the first transition may be represented as (s1, t1). The pattern-based gesture itself may be represented as an ordered sequence of state transitions. For example, pattern-based gesture 2302 may be represented as {(s1,t1),(s2,t2),(s0,t3)}.

[00519] In other embodiments, pattern-based gestures may be based upon paths through a phase space that may include one or more measures of physical location upon an interaction surface. In other words, there may exist paths through the phase space that describe motion across an interaction surface.

[00520] In various embodiments, a pattern-based gesture may be based upon paths through a phase space which does not include time as a dimension. For example, in one embodiment, a pattern-based gesture may be defined by a series of transitions between touch states, where it does not matter how long the individual touch states are maintained.

[00521] In other embodiments, a pattern-based gesture may depend upon time to the extent that the entire path through phase space may be completed within a predefined amount of time (though still independent of how much time is spent at each state along the path). In still other embodiments, the gesture may be defined, in part, by the time spent on each leg of the path through phase space.

[00522] In one embodiment, a time-independent pattern-based gesture may be combined with a dynamic touch gesture (i.e. a one finger swipe, etc.) to form a generalized gesture.

[00523] In various embodiments, a touch state may be associated with a specific contact point upon a pressure-sensitive interaction surface. In other embodiments, the device may not be able to resolve the specific source of pressure exerted upon an interaction surface; in such cases, the pressure may be represented by surface touch states. In the context of the present description, a surface touch state is a partitioning of the range of measurable pressures exerted upon a surface (similar to touch states associated with contact points, but not contact point specific).

[00524] In various embodiments, there may exist a subset of generalized gestures referred to as pattern-based generalized gestures. In the context of the present description, a pattern-based generalized gesture refers to a pattern-based gesture which includes input from multiple sources. For example, see pattern-based gesture 2306, which is represented by a path through a two-dimensional phase space.

[00525] As shown, gesture 2306 is a pattern-based generalized gesture based upon the evolution of a touch state on a front interaction surface and a back interaction surface of a device, in accordance with one embodiment. The pattern-based gesture components are 2302 and 2304.

[00526] As depicted, gesture 2306 is represented by a state transition matrix of touch states, with transitions between touch states marked by directional arrows, in accordance with one embodiment. In the context of the present description, a state transition matrix refers to an iconic depiction of a path through a phase space.

[00527] As shown, 2306 represents the phase space made up of all nine possible combinations of the three possible front and back touch states. In one embodiment, these nine combinations may be referred to as touch state points. In another embodiment, the representation may also be shown as three-dimensional, with time as the third dimension.

[00528] It should be noted that the use of descriptors such as "front" and "back" in this example are for the sake of simplicity. In various embodiments, gesture 2306 may be performed using any two surfaces on a device, even if the device does not have distinct front and back surfaces. Additionally, in other embodiments, pattern-based generalized gestures such as 2306 may include any number of additional dimensions, each describing a form of user input and/or time.

[00529] In various embodiments, a pattern-based generalized gesture may be represented as an ordered sequence of n-tuples. For example, in one embodiment, the gesture 2306 may be represented as a sequence of 2-tuples, (front touch state, back touch state). Specifically, gesture 2306 may be represented as {(s1,s0), (s2,s2),(s0,s1)}. In another embodiment, gesture 2306 may be represented as a sequence of 3-tuples, of the form (front touch state, back touch state, time).

[00530] While exemplary gesture 2306 is based on a path through a touch state phase space, pattern-based gestures may also be based upon types and sources of user input which are not broken into discrete states (i.e. contact pressure level, etc.). Additionally, in some embodiments, pattern-based gestures may be defined in terms of the relative states of input, rather than exact. For example, in one embodiment, a pattern-based gesture may be defined in terms of relative pressure. In other words, rather than require that a fixed pressure be achieved, a user may simply cause a

particular change in pressure to occur. In one embodiment, such a pattern-based gesture may be defined in terms of gesture attributes, including derived input such as pressure velocity.

[00531] In various embodiments, the use of pattern-based gestures based upon relative states may be used to trigger some form of user assistance. These patterns are well suited to trigger some form of user assistance, as they may be performed and recognized in the middle of performing a different gesture. For example, in one embodiment, a pattern-based gesture defined as a rapid 20% decrease and increase of contact pressure of any contact, done three times, may present to the user an interface providing help specific to what the user was doing at the time. Possible contexts include, but are not limited to, providing a list of possible gestures when help is requested during performance of a gesture, application help or manual depending on what application is active, a detailed explanation of a user interface control which was being selected when help was requested, and/or any other scenario where a user is operating the device.

[00532] In some embodiments, pattern-based gestures may be recognized in the form of an ordered sequence of tuples using a decision tree. The use of a decision tree, or similar form of logic, has the advantage of being computationally inexpensive. This method may be more appropriate for pattern-based gestures which are represented by paths through an easily enumerated phase space. For example, this method of gesture recognition may be more appropriate for a gesture like 2306 than a similar gesture based upon contact pressure levels, rather than touch states.

[00533] In other embodiments, the pattern-based gestures may be recognized using pattern recognition or pattern matching. For example, in one embodiment, pattern-based gestures may be recognized using the methods, or similar methods, as those used to determine a gesture shape in a gesture component. In various embodiments, the pattern-matching algorithms and methods may search for a match within a predefined margin of error.

[00534] In one embodiment, pattern recognition or pattern matching to identify pattern-based gestures may be performed by the device. As an option, this functionality may be part of the operating system. In another embodiment, the pattern recognition or pattern matching may be performed using compute resources other than those of the device. Alternative compute resources include, but are not limited to, a similar device, computing resources on a local network, cloud computing resources, and/or any other computing resource. In yet another embodiment, the pattern recognition or pattern matching may be performed using device and/or alternative computing resources combined with help from the user.

[00535] In one embodiment, pattern recognition algorithms and methods may search for a match between input and predefined patterns, within a certain probability. In another embodiment, the

pattern recognition algorithms may be probabilistic and use statistical inference to find the best pattern match for a given set of input.

[00536] In one embodiment, probabilistic pattern recognition algorithms may output a probability that the input being described by a given pattern. In one embodiment, this probability may be reported to the user, either specifically (i.e. displayed as a number or percentage, etc.) or in summary (i.e. a label, a color coded border, an icon, etc.). In another embodiment, this probability may be used to alter or modify a selection. In yet another embodiment, this probability may be used to alter or modify one or more display properties.

[00537] In various embodiments, probabilistic pattern recognition algorithms may also determine the n best matches for the given input. In one embodiment, a user may specify the value of n. In another embodiment, these best matches may be reported to the user as a list of gesture names and/or iconic representations of the gestures. As an option, the associated probabilities may be reported as well.

[00538] In another embodiment, this list of probable gestures may be displayed to the user in response to a user input, such as a gesture associated with user assistance. In yet another embodiment, this list of probable gestures may be displayed to the user if the recognition algorithms were not able to recognize a gesture with a probability above a predefined threshold. The user may be able to select the intended gesture from the list; upon selection, the associated operation may be performed. As an option, one or more aspects of the list items may depend upon the associated probability of recognition. Possible aspects may include, but are not limited to, text size, button size, color, and/or any other aspect or property that may be associated with the list.

[00539] As a specific example, in one embodiment, the user may be typing on a soft keyboard and performs a gesture. The device then determines with probability 80% the gesture corresponds to pressing the letter W, with probability 15% the gesture corresponds to pressing Q, and with probability 5% that the user intended to press E. In this situation, the device may enlarge the W key by a large amount, enlarge the W key by a smaller amount, and enlarge the Q key by a still smaller amount.

[00540] In addition to gesture recognition, various embodiments may also perform user intent prediction. In the context of the present description, gesture prediction refers to a process of estimating user intent by assigning probabilities to candidate gestures based upon historical and real time use data. For example, in one embodiment,

[00541] In various embodiments, the process of gesture recognition may include the computation of the probability of user intent. In the context of the present description, computation of the

probability of user intent refers to the process of assigning probabilities to potential user actions, inputs, and intentions, based upon historical and current use data. Examples of historical data include, but are not limited to, often misspelled words, actions consistently followed by a correction, utilization of particular gestures in different use scenarios, and/or any other data which may establish a use pattern.

[00542] The estimation of user intent may enhance the user experience by making the device more responsive to user input. In various embodiments, computation of the probability of user intent may facilitate the entry of text though an interaction surface. For example, in one embodiment, frequently made spelling mistakes may be automatically corrected. In another embodiment, the user may be prompted with the word determined to be most likely to be what the user is intending to type.

[00543] As an option, the user may be able to accept or decline proposed word completions or proposed spelling corrections through a pressure-based gesture. For example, in one embodiment, a user may accept or decline a proposed completion or correction with a series of taps on a backtouch interface (i.e. one tap for accept, two taps for decline), in addition to keyboard based methods. In another embodiment, a user may be presented with a plurality of possible words to be used for auto completion. As an option, these words may be ordered depending upon a probability based upon historical usage. The words may be presented to the user in a line, with one word highlighted as a selection. In another embodiment, a user may cycle through proposed words with a backtouch gesture, such as a single finger swipe in the direction the words should be cycled in. Of course, these actions may be associated with any other type of gesture, including pattern-based gestures.

[00544] In various embodiments, gesture recognition may be enhanced by computation of the probability of user intent. For example, in one embodiment, probabilities may be assigned to potential gestures based upon historical gesture usage with similar context (i.e. application, selection mode, etc.). In another embodiment, estimated user intent may give weight to certain gestures during the recognition process. In this way, the gesture recognition process may be performed more efficiently, by considering the most likely gestures early in the process.

[00545] In various embodiments, the computation of the probability of user intent may affect the user interface. In various embodiments, the user interface may adapt in response to the user's intended form of interaction. For example, in one embodiment, upon determining that the probability that the user is performing a virtual control knob gesture has exceeded a predefined probability, and certain context requirements have been satisfied, a virtual control knob may appear for the user to interact with. In this way, the user is given visual feedback that their input is being received in the manner they intended. Examples of context requirements may include, but are not

limited to, the user performing the gesture in the vicinity of a user interface object which may be controlled via a virtual control knob (i.e. slider, date, time, etc.), the virtual control knob gesture has not been reassigned to a different function by the active application, and/or any other requirement to ensure that a virtual control knob only appears when the user so intends.

[00546] Pattern-based gestures may be simple to perform and easy for a user to remember. For this reason, they are well suited to a number of applications. One of the most basic pattern-based gestures is the finger press. In various embodiments, a pattern-based gesture made up of one or more fluctuations of contact pressure between a low level and a higher level at a single contact point may be associated with often used operations. For example, in one embodiment, a double press (i.e. increase then decrease contact pressure twice) may activate an interface to switch between active applications in a multitasking environment. In another embodiment, a triple press may activate a pop-up menu populated with iconic representations of the user's preferred actions, contacts, applications, and scripts. In one embodiment, these gestures may be surface agnostic. For example, the application switching interface may be activated no matter which interaction surface received the double press. In another embodiment, these gestures may be surface specific, allowing other system processes and applications to assign operations to these simple gestures without colliding with a system-wide gesture. For example, a triple press on a side surface may activate a pop-up favorites menu, while a triple press on a back surface may activate an application-specific contextual menu.

[00547] Another simple pattern-based gesture is the pinch gesture. In various embodiments, this gesture is performed by making simultaneous contact with two different interaction surfaces such a line connecting the two contact points is roughly parallel to the force vectors being applied at said points. An example is pinching a device between a finger and a thumb, the finger and thumb contacting different interaction surfaces. In another embodiment, this gesture may be pressure based. Variations on this gesture may incorporate multiple pinches (i.e. fluctuations of contact pressure between a low level and a higher level, similar to the finger presses previously described).

[00548] These simple gestures may be associated with often used operations, including but not limited to, activating device interfaces (i.e. backtouch interface, proximity sensitivity, pressure sensitivity, etc.), displaying a common system interface (i.e. application launcher, system settings, etc.), displaying a menu of user defined "favorites" (i.e. applications, contacts, songs, movies, web bookmarks, recently used documents, etc.), mute volume, and/or any other often used interface or operation. Of course, in other embodiments, these gestures may be associated with any operation, function, or interface.

[00549] Building off the previous gesture, a pinch slide gesture is an example of a pattern-based generalized gesture which combines a pinch with a sliding motion. In some embodiments, it may be described as a 1-6 gesture, though it is not limited to just front/back interaction. In various embodiments, this gesture may be performed by pinching the device, then sliding the pinch across the interaction surfaces while maintaining contact. In one embodiment, a contact pressure above a predefined threshold may also be required. This gesture mimics the tactile experience of pushing or pulling an object such as a lever or cord.

[00550] In one embodiment, a pinch slide gesture may be used to quickly move through an alphabetical list, similar to using tabs to quickly find a contact quickly in a paper address book. In another embodiment, this operation may be adopted to moving quickly through other sorted lists of items, including but not limited to song lists, application lists, eBooks, and/or any other collection of organized data. As an option, the display may invite the use of this gesture by displaying virtual tabs (i.e. the alphabet, numbers, etc.) along a side of the display where the gesture would be performed.

[00551] In another embodiment, a pinch slide gesture may be used to quickly select text. For example, in one embodiment, a selection may be initiated by pinching at the desired location. The selection may be expanded by sliding the pinch to the desired selection end. In another embodiment, this method of selection may be adapted to selecting a portion of an image or graphic (i.e. pinch at one corner of desired selection bounding box and sliding to opposite corner, etc.).

[00552] In another embodiment, a pinch slide may be used to move quickly through a large document (i.e. word processing document, web page, image, etc.). For example, in one embodiment, the user may slide a pinch up and down the device, changing the displayed portion of the document relative to the position of the pinch (i.e. the top of the device represents the start of the document, the bottom of the device represents the end, and the relative location of the pinch becomes the portion of the document displayed. In another embodiment, the pinch slide may have to be initiated at a particular location to activate this document navigation functionality. For example, a web browser may have an icon near the top of the display that activates pinch slide navigation when the gesture is initiated on the icon. This functionality may be adapted to two dimensional navigation in a large image, displaying the portion of the image represented by the relative location of the pinch.

[00553] In yet another embodiment, a pinch slide gesture may be used to display menus of common operations or applications. For example, in one embodiment, a pinch slide gesture which begins near an edge of a display and then moves inward may cause a menu or window to slide in from that edge of the display. As an option, the menu or window may remain visible until a

selection is made. In another embodiment, there may be different menus or windows associated with each edge of a display. In still another embodiment, a window may be closed (i.e. slid back out of view) by using a pinch slide to pull it out a bit farther, then releasing it, similar to rolling up a window shade.

[00554] The pinch slide gesture is well adapted for providing input where one of a plurality of values may be chosen; it is also easily combined with a pinch gesture. For example, in one embodiment, a user may activate a system and/or ringer volume slider with a double press pinch gesture, and then select a volume by sliding the pinch up and down the device. In another embodiment, a similar operation may be performed for backlight brightness. In yet another embodiment, a user may cycle between system volume, ringer volume, and system brightness sliders with a pinch gesture, and be able to interact with said sliders using a pinch slide. In still another embodiment, the selection of system/ringer volume or brightness may be determined by where on the device the pinch slide is being performed (i.e. left, middle, right, etc.).

[00555] A subset of pinch gestures are the side pinch gestures. In various embodiments, the side pinch gesture is performed by applying contact pressure beyond a threshold value to opposite sides of the device, the sides being those other than the front and back. As an option, the user may choose the predefined threshold value. In one embodiment, the pressure may be applied at contact points located on the sides such that a line connecting the contact points is roughly normal to the sides. In another embodiment, the side pinch gesture may also incorporate "presses" similar to the pinch and finger press gestures.

[00556] The side pinch gesture is a simple gesture well adapted for use with often used operations. For example, in one embodiment, a side pinch gesture may toggle the device mute, or activate an application launcher.

[00557] A variation on the side pinch gesture is the squeeze gesture. In various embodiments, a squeeze gesture is performed by applying contact pressure beyond a predefined threshold to one or more contact points located on opposite sides of the device. For example, in one embodiment, the gesture may be performed by holding the device in one hand, in a natural grip, and applying pressure to two opposite sides by squeezing. As an option, the squeeze gesture may incorporate "presses", similar to the finger press and pinch gestures.

[00558] The squeeze gesture is one of the easiest gestures to perform, and may be reserved for operations which are to be available system wide, independent of what application is running. In various embodiments, the squeeze gesture may be associated with commonly used operations. For example, in one embodiment, a double press squeeze gesture may be used to answer a phone call. In

another embodiment, a double press squeeze gesture may be used to indicate an affirmative response to any on screen query (i.e. accept proposed auto correction, accept proposed auto completion, activate "ok" button in dialog boxes, etc.). As an option, a complementary negative response gesture may be defined as well, a gesture such as the combination of a single or double tap on the top side while squeezing the left and right sides.

[00559] In another embodiment, applying a squeeze gesture for a predefined amount of time may be associated with a delete operation, to be performed upon any selected or active object. As an option, the delete operation may be accompanied by a "crumpling paper" animation routine, as well as a prompt for user confirmation. In one embodiment, a user may not use a squeeze gesture to confirm an operation triggered by a squeeze operation (i.e. to prevent accidental implementation, etc.).

[00560] Another class of pattern-based gestures are the "no contact" pressure-based gestures. In some embodiments, the touch sensitive interaction surfaces require an implement of interaction which has a certain degree of conductivity in order to register contact. This class of gestures may be implemented in such devices, which are also pressure-sensitive. In various embodiments, the "no contact" pressure-based gestures may be used to interact with the device in situations where direct contact is not possible (i.e. device is in case, device is in pocket, device is in purse, etc.).

[00561] In various embodiments, the "no contact" pressure-based gestures may include variations of the finger press, pinch, and squeeze gestures, in addition to others. In some embodiments, "no contact" pressure-based gestures may require that the pressures being exerted do not create a contact point (i.e. pressure is exerted, but touch contact is not registered). These gestures are well adapted to situations where contact is not feasible. For example, in one embodiment, a user may silence a ringing phone by performing a rapid, one-finger double press on an interaction surface while the device is in the user's pocket, purse, or any other flexible or semi-flexible vessel. In another embodiment, a user may perform a predefined pattern-based gesture to cause the most recently received communication (i.e. voice mail, email, SMS message, etc.) to be reported to the user through a Bluetooth audio device.

[00562] In various embodiments, gestures may be used to trigger a variety of activities.

[00563] Figure 24 shows a user interface 2400 for defining custom gestures, in accordance with one embodiment. As an option, the user interface 2400 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the user interface 2400 may be implemented in any desired environment. The aforementioned definitions may apply during the present description.

[00564] In various embodiments, gestures may be programmed by the user. In other embodiments, gestures may be learned by the device.

[00565] As shown, the user interface 2400 may be utilized to define a custom gesture. For example, in one embodiment, the user interface may include a gesture name and/or an iconic representation of the gesture. In another embodiment, the iconic representation may be automatically chosen by the system, depending upon defined gesture parameters. In yet another embodiment, the user interface may contain a plurality of buttons 2402 which allow a user to save, load, copy, and/or delete custom gestures. The user interface may also contain a list 2404 of all defined custom gestures. As an option, the custom gestures may be grouped by context within the list.

[00566] In various embodiments, the user interface 2400 may contain a button 2406 to allow the user to define a custom gesture. In one embodiment, selecting button 2406 may initiate a gesture recording session. In the context of the present description, a gesture recording session refers to a period of time wherein the device monitors and records all observable user and system input. In another embodiment, selecting button 2406 may present to the user an interface with instructions before initiating a gesture recording session. Instructions may include, but are not limited to, how to record the gesture, a list of all forms of input upon which a gesture may depend, how to end the recording, and/or any other information which may assist the user. In yet another embodiment, the user may be presented with a short countdown before the gesture recording session is initiated, to give the user time to prepare for the recording. As an option, the device may give some form of visual or auditory feedback to the user to indicate that the recording session has begun.

[00567] In various embodiments, a gesture recording session may be terminated by user input. For example, in one embodiment, a gesture recording session may be terminated by the user through a vocal command, recognized by the system. In another embodiment, a gesture recording session may be terminated by the user through an sound which exceeds a predefined volume. In yet another embodiment, a gesture recording session may be terminated by the user by performing a gesture. As an option, the termination gesture may be a reserved gesture.

[00568] In the context of the present description, a reserved gesture refers to a gesture which may not be reassigned by a user, application, or process. For example, in one embodiment, there may be a set of gestures, chosen for their simplicity, which are reserved for operations fundamental to the user experience (i.e. a gesture to cycle through active applications running in a multitasking environment, etc.).

[00569] In still another embodiment, a gesture recording session may be terminated automatically after a predefined amount of time has elapsed. As an option, in one embodiment the user may specify the amount of time before the recording session begins.

[00570] In one embodiment, after the termination of a gesture recording session, the user may be prompted to repeat the gesture one or more times. As an option, the user may not have to indicate when the gesture is complete after the first recording session. In another embodiment, the repeated performance of the gesture may be used to better define the gesture parameters. For example, in one embodiment, gesture aspects which do not appear in every performance of the gesture may be indicated to the user as potentially irrelevant. In another embodiment, the system may use each iteration to improve the recorded description of the gesture. For example, the system may calculate the probability of correct recognition, using methods previously discussed, after each performance. As an option, the user may be prompted to repeat the gesture until the calculated probability of correct recognition has exceeded a predefined threshold.

[00571] In various embodiments, the user interface 2400 may include a button 2408 to allow a user to view a depiction of the performance of the custom gesture as currently defined. For example, in one embodiment, selecting button 2408 may display an animated recreation of the gesture in the context of a wireframe model of the device. In another embodiment, different forms of user input may be represented by different colors (i.e. pressure is red, touch is blue, proximity is green, etc.). As an option, changes in contact pressure level may be represented by changes in the color representing pressure. In another embodiment, the device surfaces may be displayed flattened into a two dimensional plane. In still another embodiment, the gesture replay may also include one or more plots which depict the time evolution of various gesture inputs, such as contact pressure or proximity associated with individual contacts or implements of interaction.

[00572] In various embodiments, the user interface 2400 may include a list 2410 displaying all components of the currently defined gesture. For example, in one embodiment, list 2410 may be a nested hierarchical list, grouped by "expected implement of interaction" and input type (i.e. contact 1, contact 2, proximity 1, etc.). In another embodiment, list 2410 may visually indicate (i.e. italicized, colored, underlined, etc.) recorded gesture aspects which were determined to be potentially irrelevant to the gesture. In yet another embodiment, list 2410 may break down the input from each "expected implement of interaction" into basic input categories. Categories may include, but are not limited to, pressure, touch, surface identity, proximity, proximity location, and/or any other aspect or type of user input.

[00573] The user interface 2400 may be utilized to specifically define or modify aspects of a custom gesture. For example, in one embodiment, the user interface 2400 may include a button 2412 to edit a gesture aspect selected in list 2410. In another embodiment, selecting button 2412 may present an interface to the user which may allow them to review and alter associated gesture aspects. This method of defining the gesture may not be as intuitive as teaching the system the gesture through repeated performance, but it does allow much greater control over the gesture aspects.

[00574] In one embodiment, the user interface 2400 may include a plurality of buttons 2414 which allow a user to copy, create, and delete gesture aspects associated with the current gesture. In another embodiment, the creation of a new gesture aspect may prompt the user to specify the input type to create, and with which "expected implement of interaction" it should be associated. As an option, a user may create a new "expected implement of interaction".

[00575] In one embodiment, the user interface 2400 may include a collection of check boxes 2416 which allow a user to specify the context in which the custom gesture may be performed. The contexts may include, but are not limited to, universal (i.e. available at all times), text (i.e. active text field, on-screen keyboard visible, etc.), application-specific, home (i.e. application chooser, etc.), selection (i.e. an active selection of an object exists), and/or any other type of context.

[00576] When defining a custom gesture, the associated action may be established. As shown, user interface 2400 may be utilized to specify and configure the action to be associated with the present gesture. For example, in one embodiment, the user interface may include a collection of checkboxes 2418 representing different actions which may be associated with the custom gesture.

[00577] In one embodiment, the collection of actions 2418 may include a checkbox 2420 to indicate that the gesture may trigger the insertion of a text snippet, as defined in a nearby text field. In another embodiment, the user interface may include a collection of buttons 2422 which may be used to format the text snippet. As an option, the text snippet may be defined as plain text, without formatting.

[00578] In another embodiment, the collection of actions 2418 may include a checkbox 2424 to indicate that the gesture may cause an application to launch. The user interface 2400 may also include a button which allows the user to specify which application should be launched when the gesture is performed.

[00579] In another embodiment, the collection of actions 2418 may include a checkbox 2426 to indicate that the gesture may set the system volume to a specified level. As an option, the user may be able to specify whether the gesture sets the system volume or a ringer volume. The user interface

2400 may also include a slider which allows the user to specify the volume to be associated with the present gesture.

[00580] In another embodiment, the collection of actions 2418 may include a checkbox 2428 to indicate that the gesture may trigger the creation of a new email message. In yet another embodiment, the user interface 2400 may include a checkbox 2430 to indicate, if the gesture is performed while an object is selected, whether the selected object should be inserted into the new email message. Possible objects may include, but are not limited to, images, text, video, files, and/or any other selectable media, file, or other kind of object. In still another embodiment, the user interface 2400 may also include a checkbox 2432 to indicate that the new email message should be addressed to a particular contact. As an option, the user may be able to choose the email address from a list of the user's contacts.

[00581] In another embodiment, the collection of actions 2418 may include a checkbox 2434 to indicate that the gesture may trigger the creation of a new SMS message. In yet another embodiment, the user interface 2400 may include checkboxes 2436 and 2438 to indicate the inclusion of a selected object and/or specific destination for the message, similar to the "new email message" action previously described. As an option, if a specific recipient is not specified, the new SMS message may be directed to the most recent SMS message sender.

[00582] In another embodiment, the collection of actions 2418 may include a checkbox 2440 to indicate that the gesture may take advantage of functionality provided by third party applications. In various embodiments, developers of third party applications may be able to provide functionality hooks that may be implemented by other applications or the operating system. For example, in one embodiment, a social networking application may allow the user to associate the custom gesture with the creation of a new posting within the social network.

[00583] In other embodiments, possible actions which may be associated with a user defined gesture may include, but are not limited to, a favorite contact (i.e. gesture displays a pop-up interface with buttons representing different methods of communicating with the contact, including but not limited to telephone, email, SMS, social networks, etc.), a predefine energy saving profile, a predefined set of application preferences, and/or any often repeated activity.

[00584] The user interface 2400 may be utilized to determine whether the custom gesture may conflict with already established gestures. For example, in various embodiments, the user interface may include a list 2442 of conflicting gestures. In one embodiment, the list of conflicts may be made up of other custom gestures, as well as system defined gestures. In another embodiment, the list may also include application specific gestures.

[00585] In yet another embodiment, items in the conflict list may be formatted to indicate their severity. For example, conflicting reserved gestures may be highlighted in red, while conflicting gestures which only exist in a single application may be slightly greyed out. In various embodiments, the conflict list may be created using pattern recognition methods previously discussed, or other methods and algorithms capable of matching patterns and/or data.

[00586] The user interface 2400 may be utilized to test a custom gesture, in accordance with one embodiment. For example, in various embodiments, the user interface may include a button 2444 which presents the user with an interface which allows them to test the custom gesture as it is currently defined. In one embodiment, the gesture testing interface may provide the user with a plurality of forms of feedback. Feedback may include, but is not limited to, current contact pressure level associated with each contact point, current touch state associated with each contact point, probability of correct gesture recognition, current gesture time, a visual representation of previous contact points, and/or any other form of user feedback.

[00587] In one embodiment, user interface 2400 may include statistics collected as a result of the gesture testing process. These statistics may include, but are not limited to, number of tests run with the current gesture configuration, average probability of correct gesture recognition, best probability of correct gesture recognition, identity of next most likely identified gesture (i.e. next closest gesture), minimum gesture performance time, maximum gesture performance time, average gesture performance time, and/or any other statistic related to the testing process.

[00588] In some embodiments, user defined gestures may be recognized in any context they were intended for. In other embodiments, a user may have to perform a predefined activation gesture before using a custom gesture.

[00589] As a specific example of how custom gestures may be utilized, in one embodiment, a user may define a gesture which is comprised of a triple finger press on a top side, followed by a singer finger swipe across a back interaction surface. The user may associate this gesture with a favorite contact. Upon performing this gesture, the user may be presented with a window showing a picture of the contact in addition to buttons linked to their telephone number and email address. In this way, communication may be established with this contact, at any time, with nothing more than a gesture and a button press.

[00590] Figure 25 shows a user interface 2500 for providing quick access to favorite operations, in accordance with one embodiment. As an option, the user interface 2500 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s).

Of course, however, the user interface 2500 may be implemented in any desired environment. The aforementioned definitions may apply during the present description.

[00591] As shown, the user interface 2500 may be utilized to provide easy, quick access to a plurality of favorite operations, applications, contacts, documents, and/or other types of objects. In various embodiments, favorites panel 2502 may be displayed in response to a gesture, the selection of a hardware or software button, voice command, accelerometer input (i.e. shaking the device, flicking the users wrist, etc.), and/or any other form of user input. In one embodiment, once favorites panel 2502 is displayed, a user may select an item using a slide pad 2504 located on the side of the device.

[00592] In one embodiment, a user may configure which items are displayed in the favorites panel. In another embodiment, the favorites panel may be automatically populated by the device, based upon factors which may include, but are not limited to, historical usage, date of last use, frequency of use, popularity information obtained from a remote system, and/or any other factors.

[00593] Figure 26 shows a method 2600 for gesture differentiation, in accordance with one embodiment. As an option, the method 2600 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course, however, the method 2600 may be carried out in any desired environment. It should also be noted that the aforementioned definitions may apply during the present description.

[00594] As shown, potentially gesture related input is gathered. See operation 2602.

[00595] In various embodiments, there may exist a tiered approach to interpreting user input. For example, in one embodiment, it may first be determined whether there is any meaningful user input.

[00596] In various embodiments, each form of user input may have an associated threshold above which user interaction may rise before it may be deemed meaningful. Examples of such thresholds may include, but are not limited to, minimum threshold pressure level, minimum threshold proximity level, maximum context determination zone, and/or any other threshold meant to prevent acting on unintentional user interactions.

[00597] In one embodiment, upon detecting meaningful user input, it is then determined whether it is related to a basic user interaction (i.e. button press, basic application interaction, etc.). If the meaningful user input is not related to a basic user interaction, then it may potentially be related to a gesture. In one embodiment, that determination may result in the initiation of method 2600. In another embodiment, system and environmental information may be gathered, in addition to the meaningful user input.

[00598] Once potential gesture input has been received, it is determined if the gesture is possibly a generalized gesture. See determination 2604.

[00599] A generalized gesture is a gesture that includes input from multiple sources, including but not limited to multiple interaction surfaces. In one embodiment, the possibility of a generalized gesture may be determined by ascertaining the number of sources provided the meaningful input gathered in operation 2602.

[00600] If it is determined that the gesture is possibly a generalized gesture (i.e. there is meaningful input from more than one source), then possible gesture identities are deduced using gesture attributes, gesture components, and gesture notation. See operation 2606.

[00601] In various embodiments, the identification of a generalized gesture may begin with the identification of the component gestures. Component gestures may be identified by evaluating associated gesture attributes, as has been previously discussed. In one embodiment, once the component gestures have been identified, gesture notation may be used to narrow the field of potential gestures.

[00602] In one embodiment, a generalized gesture may be identified by first identifying the faces involved, then further limiting the possibilities by identifying characteristic gesture attributes in common, until the number of potential generalized gestures is either one, or cannot be further reduced. In another embodiment, a decision tree may be used to identify the generalized gesture.

[00603] If it is determined that the gesture is not a generalized gesture (i.e. there is meaningful input from only one source), then possible gesture identities are deduced using gesture attributes. See operation 2608.

[00604] In various embodiments, the same methods used to identify component gestures in operation 2606 may be used in this operation.

[00605] As shown, it is determined if there is a single possible gesture being performed. See determination 2610. In one embodiment, if there are no potential gestures, the user may be provided feedback indicating a failure to recognize the gesture. Feedback may be visual, aural, or both.

[00606] If there is more than one possible gesture being performed, then the gesture subject matter context is used to identify the gesture. See operation 2612.

[00607] In the context of the present description, gesture subject matter context refers to any subject matter which may be related to a gesture. Examples may include, but are not limited to, selected objects, objects displayed at or near the location of the gesture, and/or any other items, objects, or properties which may give context to a gesture.

[00608] In some embodiments, similar gestures may require the use of gesture subject matter context to differentiate. For example, in one embodiment, a spin gesture and virtual control knob gesture may be indistinguishable until it is determined whether there is a displayed control knob at the contact points.

[00609] After using the gesture subject matter context to identify the gesture, it is determined whether there is a single possible gesture being performed. See determination 2614.

[00610] If there is still more than one possible gesture being performed, then a default response is performed. See operation 2616.

[00611] In one embodiment, the default response to the inability to identify the gesture may be to do nothing, and stop applying method 2600. In another embodiment, the default response may be to restart method 2600, in the hope that sufficient additional user input may have been gathered that may assist in gesture differentiation.

[00612] In yet another embodiment, the default response to the inability to identify the gesture may be to prompt the user to clarify their recent input. For example, in one embodiment, the user may be prompted by a pop-up interface which allows the user to select from identified potential gestures, or indicate that none of the candidates are correct. Since such user interaction could possibly interrupt the performance of the gesture, the user may have to repeat the gesture after making an appropriate selection.

[00613] If the identity of the gesture being performed has been determined, it is then determined whether the gesture is meant to trigger some sort of transformation. See determination 2618. Examples of possible transformations include, but are not limited to, move, slide, scale, rotate, and/or any other spatial or geometric transformation.

[00614] If the gesture is meant to trigger a transformation, then the gesture reference is determined. See operation 2620.

[00615] In various embodiments, gestures which cause a transformation to occur may have an associated gesture reference. For example, in one embodiment, a spin gesture may have a gesture reference (i.e. axis of rotation). In various embodiments, a gesture reference may be determined using the type or specific identity of the gesture and/or gesture attributes (i.e. gesture orientation, gesture shape, etc.).

[00616] As shown, the intermediate operations associated with the identified gesture are performed. See operation 2622.

[00617] In the context of the present description, an intermediate gesture operation refers to operations associated with a gesture which may be executed before the gesture is done. For example,

a spin gesture which rotates a displayed object may cause rotation to occur and be displayed before the user has stopped performing the gesture. In this way, a user may receive feedback on their gesture before terminating the interaction. Not all gestures have associated intermediate operations.

[00618] In one embodiment, each execution of intermediate gesture operations may cause an update of the gesture attributes before execution begins. In this way, the feedback given to the user performing the operation is responsive to their performance.

[00619] In another embodiment, each execution of intermediate gesture operations may trigger a display update (i.e. rendering, etc.). As an option, the display update may be localized to the portions of the display affected by the gesture operations, and may be more frequent than display updates for other user interface elements.

[00620] The intermediate operations are continuously performed unless it is determined that the gesture has ended. See determination 2624.

[00621] In various embodiments, a gesture may be ended by ending one or more user inputs. For example, in one embodiment, a spin gesture may be ended by breaking contact with one or two interaction surfaces. In another embodiment, a proximity-based gesture may be ended by reducing at least one proximity below a predefined threshold. In yet another embodiment, a pressure-based gesture may be ended by reducing the contact pressure level associated with one or more contact points below a predefined threshold level.

[00622] In various embodiments, a gesture may be ended by performing a different gesture. In one embodiment, the performance of a new gesture may be detected by changes observed in one or more gesture attributes. As an option, the changes may have to exceed a predefined threshold before identification of a new gesture is attempted. In some embodiments, a gesture may not necessarily be able to end all other gestures.

[00623] Once it has been determined that the gesture has ended, the final operations associated with the identified gesture are performed. See operation 2626.

[00624] In various embodiments, gestures may be associated with one or more final operations. In the context of the present description, a final operation refers to an operation which is executed when a triggering gesture has ended. For example, in one embodiment, a gesture which triggers the display of a pop-up menu and allows a user to cycle through menu items may have as a final operation the selection of the current menu item and removal of the pop-up menu.

[00625] Figure 27 shows a 3D layered user interface 2700 having a clipboard layer, in accordance with one embodiment. As an option, the user interface 2700 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of course,

however, the user interface 2700 may be implemented in any desired environment. The aforementioned definitions may apply during the present description.

[00626] In the context of the present description, a clipboard layer refers to a display layer in a 3D layered user interface that is used to store one or more selectable objects upon which relocation/replication operations may be performed. Relocation/replication operations may include, but are not limited to, copying, pasting, sending to specified application, inserting into a new message (i.e. email, SMS, social network posting, etc.), and/or any other operation which may be performed on a selectable object. Selectable objects may include, but are not limited to, images, text (plain, rich, hypertext, etc.), video clips, sound clips, files, and/or any other type of object.

[00627] In various embodiments, a 3D layered user interface with a clipboard layer may insert the clipboard layer immediately after the active display layer. For example, see Figure 27.

[00628] As shown, user interface 2700 is comprised of two layers, an active layer 2702 and a clipboard layer 2704. These layers are depicted in a staggered arrangement, to illustrate the depth; it should be noted that in various embodiments, the layers would be aligned. In one embodiment, user interface 2700 may include additional layers. In another embodiment, active layer 2702 may contain one or more display elements, one or more of which either is, or contains, a selectable object.

[00629] In various embodiments, an object may be selected before it may be placed on the clipboard layer. Objects may be selected using any of the methods in the present description, or any other methods or procedures for indicating a selection. In one embodiment, a screen capture may be placed on the clipboard layer without having to be selected.

[00630] Once there is an active selection, the selected object may be moved or copied to the clipboard layer. In various embodiments, the clipboard layer may be activated before an object may be moved or copied to it. In one embodiment, the clipboard layer may be activated through selecting an icon located in the status bar, or elsewhere on the display.

[00631] In various embodiments, the clipboard layer may be activated by performing a gesture. For example, in one embodiment, the clipboard layer may be activated with a 1-6 pinch slide gesture, where the user "pulls" the clipboard layer into view from one edge of the display. In various other embodiments, the clipboard layer may only be active while a gesture is being performed, with the gesture's final operation being hiding the clipboard layer. For example, in one embodiment, the clipboard layer may be activated after a squeeze gesture (i.e. a double-press squeeze gesture, etc.) is initiated, and remains active until the contact pressures fall below a threshold level, ending the gesture.

[00632] In various embodiments, an activated clipboard layer is placed directly after the active display layer (i.e. the layer which contains the selection, etc.). In various embodiments, the activation of a clipboard layer may change one or more visual properties of the active display layer. For example, in one embodiment, the active display layer may become translucent, allowing the user to see the contents of the clipboard layer. In some embodiments, the degree of translucency may be a function of a user input. For example, in one embodiment, the active display layer may become more translucent as the user increases a contact pressure (i.e. a contact pressure associated with an activating gesture, backtouch pressure, etc.). In one embodiment, the active selection in the active display layer may be less translucent than the rest of the active display layer.

[00633] In various embodiments, once the clipboard layer is activated, objects may be copied or moved to and from the clipboard layer as a result of user input. For example, in one embodiment, an object may be cut (i.e. removed from the active display layer and placed on the clipboard layer) by performing a 1-6 pinch gesture, where the contact pressure on the front interaction surface is greater than the contact pressure on the back interaction surface. This provides the user with the sensation of pushing the selected object through the active display layer, into the clipboard layer.

[00634] In one embodiment, a selected object may be copied from the active display layer by performing a press gesture on the front interaction surface, where the user applies a contact pressure level on the selected object that exceeds a predefined threshold. See, for example, Figure 27. In another embodiment, the user may be provided with one or more visual indications that the object has been copied to the clipboard layer.

[00635] As shown in Figure 27, a user has performed a press gesture by applying sufficient contact pressure on contact area 2706, situated on selected object 2708 which is located in the active display layer 2702. The press gesture triggered a copy operation, placing a copy 2710 of the selected object to the clipboard layer 2704.

[00636] In one embodiment, a clipboard layer may only hold one object. Cutting or copying a second object may replace the first clipboard object. In another embodiment, a clipboard layer may contain multiple objects.

[00637] In one embodiment, an object may be copied from the clipboard layer and pasted into the active display layer by performing a press gesture on a back interaction surface, behind the object. This provides the user with the sensation of pushing a copy of the object up from the clipboard layer to the active display layer. As an option, the object may remain in the clipboard layer after the copy operation.

[00638] In one embodiment, an object may be cut from the clipboard layer and pasted into the active display layer by performing a 1-6 pinch gesture, where the contact pressure on the back interaction surface is greater than the contact pressure on the front interaction surface. This provides the user with the sensation of pulling the clipboard object up to the active display layer. As an option, the object may be removed from the clipboard layer after the cut operation.

[00639] In various embodiments, a clipboard layer may contain multiple objects. In one embodiment, the clipboard layer may operated as a first-in-last-out type container, such that when a user causes a new object to be placed on the clipboard layer, previous objects get incremented in order. In such an embodiment, repeated paste operations from the clipboard to the active display layer may eventually transfer all clipboard objects to the active display layer, while repeated copy operations from the clipboard to the active display layer may create multiple copies of the active clipboard object.

[00640] In the context of the present description, an active clipboard object refers to the clipboard object which is visible in an activated clipboard layer. In various embodiments, the default active clipboard object is the last object placed in the clipboard layer. In one embodiment, a user may cycle through various clipboard objects until the desired object is visible. In another embodiment, the clipboard layer may only display objects which are able to be copied or pasted into the current active display layer (i.e. a video clip may not be displayed in the clipboard layer, even though it has been copied, if the active display layer is a text-only environment).

[00641] In various embodiments, a user may remove an object from an activated clipboard layer by selecting an icon associated with deletion. See, for example, icon 2712 in Figure 27. As an option, the user may be prompted to confirm this operation before removing the object from the clipboard.

[00642] In one embodiment, the user may move all clipboard objects to the active display layer by performing a predefined gesture. In another embodiment, a user may select certain objects to always be available in the clipboard layer. Such objects may include, but are not limited to, email signatures, text snippets, emoticons, avatars, digital signatures, and/or any other often used object.

[00643] Of course, in various other embodiments, these clipboard layer actions (i.e. copy, cut, paste, etc.) may be triggered through any form of user input including, but not limited to, user interface controls, gestures, voice commands, and/or any other form of user input.

[00644] Figure 28 shows a 3D layered user interface 2800 having an operation layer, in accordance with one embodiment. As an option, the user interface 2800 may be implemented in the context of the architecture and environment of the previous Figures or any subsequent Figure(s). Of

course, however, the user interface 2800 may be implemented in any desired environment. The aforementioned definitions may apply during the present description.

[00645] In the context of the present description, an operation layer refers to a display layer in a 3D layered user interface that may be used to apply operations on display elements located in display layers beneath the operation layer. Operations may include, but are not limited to, image manipulations, data detection, image recognition, OCR, movie filters, sound filters, display modifications, and/or any other type of operation which may be applied to one or more display elements, or portions thereof.

[00646] In various embodiments, a 3D layered user interface with an operation layer may insert the clipboard layer immediately above the active display layer. For example, see Figure 28.

[00647] As shown, user interface 2800 is comprised of two layers, an operation layer 2802 and one or more display layers 2804. These layers are depicted in a staggered arrangement, to illustrate the depth; it should be noted that in various embodiments, the layers would be aligned. In one embodiment, user interface 2800 may include additional layers. In another embodiment, display layer 2804 may contain one or more display elements, such as graphic 2806.

[00648] In various embodiments, an operation layer may be activated by performing a gesture. For example, in one embodiment, an operation layer may be activated with a 1-6 pinch slide gesture, where the user "pulls" the operation layer into view from one edge of the display. In various other embodiments, an operation layer may only be active while a gesture is being performed, with the gesture's final operation being hiding the operation layer. For example, in one embodiment, the operation layer may be activated after a squeeze gesture (i.e. a triple-press squeeze gesture, etc.) is initiated, and remains active until the contact pressures fall below a threshold level, ending the gesture.

[00649] In various embodiments, an operation layer may have an operation window which defines the boundaries within which the operation may be applied. See, for example, operation window 2808 in Figure 28.

[00650] In one embodiment, a user may resize the operation window. In another embodiment, the operation window may be automatically scaled, translated, and/or reshaped to fit a display element which is in or near the user focus. In yet another embodiment, an operation layer may include a button which enlarges the operation window to fit the entire display.

[00651] In various embodiments, an operation window may be able to perform a plurality of operations. In some embodiments, operations may be divided into subject matter categories. In one embodiment, a user may select an operation by first selecting a subject matter category, then

selecting an operation from a list. In various embodiments, once an operation has been selected by the user, it is applied to the contents of the operation window.

[00652] In various embodiments, possible subject matter categories may include, but are not limited to, image, text, video, audio, display, and/or any other category of subject matter. Possible image operations may include, but are not limited to, color operations (i.e. desaturate, replace color, saturate, etc.), changes in color space (i.e. grayscale, sepia, custom 2-tone space, etc.), processing effects (i.e. halftone, pixelate, posterize, etc.), distortions (i.e. twirl, warp, motion blur, etc.), enhancements (i.e. sharpen, blur, image repair, remove red eye, etc.), and/or any other possible image operation.

[00653] One example of a text operation may include data extractors. In the context of the present description, a data extractor refers to logic which parses text data, identifying information fragments which can trigger further action. For example, in one embodiment, a data extractor operation may highlight all email addresses in the text inside the operation window. As an option, touching or otherwise selecting a highlighted email address may create a new email message to that address. Other examples of information fragments may include, but are not limited to, phone numbers, contact names, dates, times, addresses, appointments, web addresses, and/or any other information fragment which may be used in a related action. Other examples of text operations may include, but are not limited to, foreign language translation, profanity removal, optical character recognition, and/or any other text operation.

[00654] In various embodiments, possible video operations may include, but are not limited to, color adjustment, resolution reduction, sound volume adjustment, text overlay, graphics overlay, and/or any other possible video operation. In one embodiment, image operations may also be applied to video.

[00655] In various embodiments, possible audio operations may include, but are not limited to, volume normalization (i.e. softening loud portions, amplifying soft portions), application of equalizer settings, audio effects (i.e. echo, envelope, reverberation, etc.), and/or any other possible audio operation. In one embodiment, audio operations may also be applied to video.

[00656] In the context of the present description, a display operation refers to an operation which affects one or more display properties for the display region delineated by the operation window. For example, in one embodiment, a display operation may include adjustment of backlight intensity within the operation window. Other possible display operations may include, but are not limited to, application of power saving backlight profiles (i.e. highlighting only areas of interest, etc.),

activation/deactivation of display layer types (i.e. only using e-ink within operation window, etc.), modifying 3D depth cues within operation window, and/or any other possible display operation.

[00657] As a specific example of an operation layer in use, see Figure 28. As shown, a user has selected the "Image" subject matter category from a plurality of categories 2810, and the "Invert" operation from a plurality of operations 2812. As a result, an "Invert" operation has been applied to the contents of operation window 2808.

[00658] In one embodiment, a user may apply multiple operations within a single operation window. As an option, the operations may come from different subject matter categories. In another embodiment, certain operations may only be available if certain conditions are satisfied, such as the operation window spanning entire display.

[00659] In various embodiments, once the user has selected one or more operations, and has adjusted the operation window to their liking, they may choose to apply the operation. In one embodiment, application of the operation may be elected by selecting a button. See, for example, button 2814.

[00660] Upon application, in one embodiment, the operation may modify all the content within the operation window. In another embodiment, application of the operations may create a modified copy of the content within the operation window. In still other embodiments, the user may be prompted to choose between modifying the original and creating a copy. In one embodiment, certain operations perform non-destructive modifications, such as backlighting modifications. In another embodiment, some operations may not make permanent changes, but rather are only useful within the operation layer (i.e. certain text operations, etc.).

[00661] In one embodiment, the selected operation(s) may be cancelled and the operation layer hidden by selecting a button. See, for example, button 2816.

[00662] In various embodiments, operations may be provided by the operating system. In another embodiment, operations may also be provided by third party developers through applications. As an option, these applications may run in the background of a multitasking environment.

[00663] The various embodiments set forth herein may be implemented in a variety of devices including, but not limited to, consumer devices, phones, cell phones, internet phones, music players, video players, cameras, social interaction devices, radios, TVs, watches, personal communication devices, electronic wallets, smart jewelry, personal computers, tablets, laptop computers, embedded systems, electronic glasses, and/or any other device that includes one or more sensors or inputs. Possible inputs may include, but are not limited to, keyboard, mouse, touchscreen(s), touchpad(s), interaction surfaces, a joystick, touchwheel, touchknob, touchbutton, touchball, trackball, scroll

wheel, thumb-mouse, switch, button, wheel, knob, ball, pedal, voice recognition, audio command, audio prompt, gaze control, eye tracking, head position sensing, facial and/or gestural and/or postural expression recognition, and/or other inputs and combinations of these. Possible sensors may include, but are not limited to, range sensors, scanners, magnetometers, GPS receivers, accelerometers, cameras, depth sensors, light-field cameras, ambient light sensors, pressure sensors, infra-red (IR) sensors, UV sensors, touch and/or proximity sensor(s), grasp sensors, material sensors, chemical sensors, physical sensors, electrical sensors, biological sensors, weight sensors, force sensors, mass sensors, gas sensors, vapor sensors, particle sensors, wireless sensors, RF and other electromagnetic sensors, and/or other sensors and combinations of these.

[00664] In various embodiments, the device may include one or more different forms of displays and/or other outputs including, but not limited to, physical or other actuators, motors, tactile feedback or other tactile output, weight or mass feedback, force feedback or other force outputs, mechanical outputs, audio outputs, alarms, horns, bells, indicators, dials, meters, barcodes and/or other display patterns, vibrations, ultrasonic outputs, wireless and RF outputs, optical and light outputs, avatars, visual outputs, multiscreen displays, multilayer displays, 3D displays, holographic projections and outputs, laser displays and other laser outputs, projection systems, heads-up displays, and/or other outputs or combinations of these.

[00665] In various embodiments, the device may support one or more types of applications including, but not limited to, search applications, contacts and/or friends applications, messaging applications, telephone applications, video conferencing applications, e-mail applications, communications applications, voice recognition applications, instant messaging (IM) applications, blog and/or blogging applications, photographic applications, shopping applications, payment applications, digital camera applications, digital video camera applications, web browsing and browser applications, digital music player applications, digital video player applications, cloud applications, office productivity applications, and/or other types of applications or combinations or multiple instances of these.

[00666] In other embodiments, different applications on the device may use one or more interface devices that may be physical interface devices or virtual interface devices including, but not limited to, touchscreens, touchpads, soft inputs, hard inputs, keyboards, buttons, knobs, sliders, switches, and/or any other kind of interface device.

[00667] In various embodiments, the device may have a common physical architecture (i.e. display, touchscreen, etc.) such that the device may be used with different applications with one or

more common user interfaces with one or more common properties (i.e. easy to use, simple, intuitive, transparent, etc.).

[00668] In various embodiments, user interfaces may include one or more physical interface devices (i.e. keyboard, joysticks, buttons, sliders, switches, knobs, other hard inputs, etc.) and/or one or more virtual or soft interface devices (i.e. soft keyboard, programmable buttons, UI sliders, UI knobs, check boxes, text fields, other soft inputs, etc.).

[00669] In various embodiments, the device may implement one or more types of keyboard (i.e. soft keyboard, physical keyboard, virtual keyboard, keypad, etc.). In one embodiment, the keyboard(s) may include standard keyboard arrangements (i.e. QWERTY configurations, etc.), and/or non-standard arrangements and/or symbols on the keys (i.e. soft keys, buttons, pixels, displayed icons etc.). In another embodiment, the keyboard(s) may include a reduced number of symbols (i.e. letters, icons, soft keys, etc.) compared to the number of keys on a conventional physical keyboard. In yet another embodiment, one or more alternative keyboards may make it easier for users to select one or more symbols in the keyboard, and thus, one or more corresponding representations (i.e. letter, number, special symbol, graphics, emoticon, abbreviation, slang, acronym, etc.). In still another embodiment, one or more keyboards and their associated contents and/or layouts may be modified. For example, in one embodiment, one or more displayed symbols on the keyboard may be modified in accordance with application, application state, device state, settings (i.e. language, etc.), and/or user actions.

[00670] In various embodiments, one or more keyboards may be customized to one or more applications and/or users. For example, in one embodiment, one or more keyboard embodiments may be customized to one or more users based on factors including, but not limited to, application states, stored application history, web cookies, a word usage history (i.e. lexicography, slang, individual usage, etc.), language, country, and/or any other factor. In another embodiment, one or more keyboards may be modified to reduce the probability of user error when selecting one or more keys when using the soft keyboards.

[00671] In various embodiments, the device may have multiple functions or roles including, but not limited to, telephone, video conferencing, e-mail, instant messaging, blogging, digital photography, digital video, web browsing, digital music playing, social interaction, shopping, searching, and/or any other function or role. As an option, instructions for performing the device functions may be included in a computer readable storage medium, or as a computer program product configured for execution by one or more processors.

[00672] In various optional embodiments, the features, capabilities, and/or technology, etc. of the tablets, mobile devices, computing devices, networks, hardware, and/or software, etc. disclosed in the following patents/applications may or may not be incorporated into any of the embodiments disclosed herein: US7479949; US7748634; US20060017692; US20100188268; US20110145692; US7954101; US20070103454; US20100210329; US20070091825; US20060013219; US7916166; US20090213205; US20070296805; US20100205148; US20100188473; US7441196; US7894641; US7966578; US7479949; US Provisional Application NO. 61/470,336, filed 03-31-2011, titled "SYSTEM, METHOD, AND COMPUTER PROGRAM PRODUCT FOR UTILIZING IMAGE RECOGNITION TO PERFORM AN ACTION"; US Provisional Application NO. 61/470,391, filed 03-31-2011, titled "SYSTEM, METHOD, AND COMPUTER PROGRAM PRODUCT FOR ENABLING A PERIPHERAL DEVICE TO UTILIZE FUNCTIONALITY ASSOCIATED WITH A MOBILE DEVICE"; and US Provisional Application NO. 61/569,213, filed 12-09-2011, titled "SYSTEM, METHOD, AND COMPUTER PROGRAM PRODUCT FOR MODIFYING CONTENT." Each of the foregoing patents/applications are hereby incorporated by reference in their entirety for all purposes.

[00673] (1) U.S. patent application Ser. No. 10/188,182 (US 2003-0076306 A1), "Touch Pad For Handheld Device," filed Jul. 1, 2002; (2) U.S. patent application Ser. No. 10/722,948 (US 2005-0110768 A1), "Touch Pad For Handheld Device," filed Nov. 25, 2003; (3) U.S. patent application Ser. No. 10/643,256 (US 2005-0052425 A1), "Movable Touch Pad With Added Functionality," filed Aug. 18, 2003; (4) U.S. patent application Ser. No. 10/654,108, "Ambidextrous Mouse," filed Sep. 2, 2003; (5) U.S. patent application Ser. No. 10/840,862 (US 2006-0097991 A1), "Multipoint Touchscreen," filed May 6, 2004; (6) U.S. patent application Ser. No. 10/903,964 (US 2006-0026521 A1), "Gestures For Touch Sensitive Input Devices," filed Jul. 30, 2004; (7) U.S. patent application Ser. No. 11/038,590 (US 2006-0026535 A1), "Mode-Based Graphical User Interfaces For Touch Sensitive Input Devices" filed Jan. 18, 2005; (8) U.S. patent application Ser. No. 11/057,050 (US 2006-0181517 A1), "Display Actuator," filed Feb. 11, 2005; (9) U.S. Provisional Patent Application No. 60/658,777, "Multi-Functional Hand-Held Device," filed Mar. 4, 2005; (10) U.S. patent application Ser. No. 11/367,749 (US 2006-0197753 A1), "Multi-Functional Hand-Held Device," filed Mar. 3, 2006; and (11) U.S. patent application Ser. No. 29/281,695, "Icons, Graphical User Interfaces, and Animated Graphical User Interfaces For a Display Screen or Portion Thereof," filed Jun. 28, 2007. All of these applications are incorporated by reference herein in their entirety.

[00674] The soft keyboard embodiments may include standard (QWERTY) and/or non-standard configurations of symbols on the displayed icons of the keyboard, such as those described in U.S.

patent application Ser. Nos. 11/459,606 (US 2007-0152978 A1), "Keyboards For Portable Electronic Devices," filed Jul. 24, 2006, and 11/459,615 (US 2007-0152980 A1), "Touch Screen Keyboards For Portable Electronic Devices," filed Jul. 24, 2006, the contents of which are hereby incorporated by reference in their entirety.

[00675] A quick press of the push button may disengage a lock of the touch screen or begin a process that uses gestures on the touch screen to unlock the device, as described in U.S. patent application Ser. No. 11/322,549 (US 2007-0150842 A1), "Unlocking a Device by Performing Gestures on an Unlock Image," filed Dec. 23, 2005, which is hereby incorporated by reference in its entirety.

[00676] A touch-sensitive display in some embodiments of the touch screen may be analogous to the multi-touch sensitive tablets described in the following U.S. patents: U.S. Pat. Nos. 6,323,846 (Westerman et al.), 6,570,557 (Westerman et al.), and/or 6,677,932 (Westerman), and/or U.S. Patent Publication 2002/0015024A1, each of which is hereby incorporated by reference in its entirety.

[00677] A touch-sensitive display in some embodiments of the touch screen may be as described in the following applications: (1) U.S. patent application Ser. No. 11/381,313 (US 2007-0257890 A1), "Multipoint Touch Surface Controller," filed May 2, 2006; (2) U.S. patent application Ser. No. 10/840,862 (US 2006-0097991 A1), "Multipoint Touchscreen," filed May 6, 2004; (3) U.S. patent application Ser. No. 10/903,964 (US 2006-0026521 A1), "Gestures For Touch Sensitive Input Devices," filed Jul. 30, 2004; (4) U.S. patent application Ser. No. 11/048,264 (US 2006-0026536 A1), "Gestures For Touch Sensitive Input Devices," filed Jan. 31, 2005; (5) U.S. patent application Ser. No. 11/038,590 (US 2006-0026535 A1), "Mode-Based Graphical User Interfaces For Touch Sensitive Input Devices," filed Jan. 18, 2005; (6) U.S. patent application Ser. No. 11/228,758 (US 2006-0033724 A1), "Virtual Input Device Placement On A Touch Screen User Interface," filed Sep. 16, 2005; (7) U.S. patent application Ser. No. 11/228,700 (US 2006-0053387 A1), "Operation Of A Computer With A Touch Screen Interface," filed Sep. 16, 2005; (8) U.S. patent application Ser. No. 11/228,737 (US 2006-0085757 A1), "Activating Virtual Keys Of A Touch-Screen Virtual Keyboard," filed Sep. 16, 2005; and (9) U.S. patent application Ser. No. 11/367,749 (US 2006-0197753 A1), "Multi-Functional Hand-Held Device," filed Mar. 3, 2006. All of these applications are incorporated by reference herein in their entirety.

[00678] The proximity sensor may perform as described in U.S. patent application Ser. Nos. 11/241,839 (US 2006-0161871 A1), "Proximity Detector In Handheld Device"; 11/240,788 (US 2006-0161870 A1), "Proximity Detector In Handheld Device"; 11/620,702 (US 2008-0167834 A1), "Using Ambient Light Sensor To Augment Proximity Sensor Output"; 11/586,862 (US 2007-

0075965 A1), "Automated Response To And Sensing Of User Activity In Portable Devices"; and 11/638,251 (US 2008-0140868 A1), "Methods And Systems For Automatic Configuration Of Peripherals," which are hereby incorporated by reference in their entirety.

[00679] The accelerometer may perform as described in U.S. Patent Publication No. 20050190059, "Acceleration-based Theft Detection System for Portable Electronic Devices," and U.S. Patent Publication No. 20060017692, "Methods And Apparatuses For Operating A Portable Device Based On An Accelerometer," both of which are which are incorporated by reference herein in their entirety.

[00680] Additional description of the online video application can be found in U.S. Provisional Patent Application No. 60/936,562, "Portable Multifunction Device, Method, and Graphical User Interface for Playing Online Videos," filed Jun. 20, 2007, and U.S. patent application Ser. No. 11/968,067 (US 2008-0320391 A1), "Portable Multifunction Device, Method, and Graphical User Interface for Playing Online Videos," filed Dec. 31, 2007, the content of which is hereby incorporated by reference in its entirety.

[00681] Processes that use gestures on the touch screen to unlock the device are described in U.S. patent application Ser. Nos. 11/322,549 (US 2007-0150842 A1), "Unlocking A Device By Performing Gestures On An Unlock Image," filed Dec. 23, 2005, and 11/322,550 (US 2007-0150826 A1), "Indication Of Progress Towards Satisfaction Of A User Input Condition," filed Dec. 23, 2005, which are hereby incorporated by reference in their entirety.

[00682] In some embodiments, a user may rearrange the icons in UI, e.g., using processes described in U.S. patent application Ser. No. 11/459,602 (US 2007-0157089 A1), "Portable Electronic Device With Interface Reconfiguration Mode," filed Jul. 24, 2006, which is hereby incorporated by reference in its entirety.

[00683] In some embodiments, UI includes a gauge (not shown) that displays an updated account usage metric for an account associated with usage of the device (e.g., a cellular phone account), as described in U.S. patent application Ser. No. 11/322,552 (US 2007-0149252 A1), "Account Information Display For Portable Communication Device," filed Dec. 23, 2005, which is hereby incorporated by reference in its entirety.

[00684] Additional description of insertion marker positioning can be found in U.S. patent application Ser. No. 11/553,436 (US 2008-0259040 A1), "Method, System, And Graphical User Interface For Positioning An Insertion Marker In A Touch Screen Display," filed Oct. 26, 2006, and U.S. Provisional Patent Application No. 60/947,382, "Portable Multifunction Device, Method, and Graphical User Interface for Adjusting an Insertion Point Marker," filed Jun. 29, 2007, and U.S.

patent application Ser. No. 11/923,453 (US 2008-0165142 A1), "Portable Multifunction Device, Method, and Graphical User Interface for Adjusting an Insertion Point Marker," filed Oct. 24, 2007, the contents of which are hereby incorporated by reference herein in their entirety.

[00685] Additional description of instant messaging on portable electronic devices can be found in U.S. Provisional Patent Application Nos. 60/883,819, "Portable Electronic Device For Instant Messaging," filed Jan. 7, 2007, and 60/946,969, "Portable Electronic Device For Instant Messaging," filed Jun. 28, 2007, and U.S. patent application Ser. No. 11/848,208 (US 2008-0055269 A1), "Portable Electronic Device for Instant Messaging," filed Aug. 30, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00686] Additional description of deletion gestures on portable electronic devices can be found in U.S. Provisional Patent Application Nos. 60/883,814, "Deletion Gestures On A Portable Multifunction Device," filed Jan. 7, 2007 and 60/936,755, "Deletion Gestures On A Portable Multifunction Device," filed Jun. 22, 2007, and U.S. patent application Ser. No. 11/850,642 (US 2008-0094371 A1), "Deletion Gestures on a Portable Multifunction Device," filed Sep. 5, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00687] As described in U.S. patent application Ser. Nos. 11/322,547 (US 2007-0150830 A1), "Scrolling List With Floating Adjacent Index Symbols," filed Dec. 23, 2005; 11/322,551 (US 2007-0146337 A1), "Continuous Scrolling List With Acceleration," filed Dec. 23, 2005; and 11/322,553 (US 2007-0132789 A1), "List Scrolling In Response To Moving Contact Over List Of Index Symbols," filed Dec. 23, 2005, which are hereby incorporated by reference in their entirety, the user may scroll through the contact list using vertically upward and/or vertically downward gestures 814 on the touch screen.

[00688] Additional descriptions of word suggestion can be found in U.S. patent application Ser. No. 11/620,641 (US 2008-0167858 A1), "Method, System, And Graphical User Interface For Providing Word Recommendations for Text Input," filed Jan. 5, 2007) and U.S. patent application Ser. No. 11/620,642 (US 2008-0168366 A1), "Method, System, And Graphical User Interface For Providing Word Recommendations," filed Jan. 5, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00689] Additional description of image management can be found in U.S. Provisional Patent Application Nos. 60/883,785, "Portable Electronic Device For Photo Management," filed Jan. 6, 2007, and 60/947,118, "Portable Electronic Device For Photo Management," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/848,210 (US 2008-0052945 A1), "Portable Electronic Device

For Photo Management," filed Aug. 30, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00690] Additional description of a video player and manager can be found in U.S. Provisional Patent Application Nos. 60/883,784, "Video Manager For Portable Multifunction Device," filed Jan. 6, 2007, and 60/946,973, "Video Manager For Portable Multifunction Device," filed Jun. 28, 2007, and U.S. patent application Ser. No. 11/850,008 (US 2008-0055272 A1), "Video Manager For Portable Multifunction Device," filed Sep. 4, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00691] Additional description of configuring and displaying widgets can be found in U.S. Provisional Patent Application No. 60/946,975, "Portable Multifunction Device, Method, and Graphical User Interface for Configuring and Displaying Widgets," filed Jun. 28, 2007, and U.S. patent application Ser. No. 11/850,010 (US 2008-0082930 A1), "Portable Multifunction Device, Method, and Graphical User Interface for Configuring and Displaying Widgets," filed Sep. 4, 2007, the content of which is hereby incorporated by reference in its entirety.

[00692] As described in U.S. patent application Ser. No. 11/322,547 (US 2007-0150830 A1), "Scrolling List With Floating Adjacent Index Symbols," filed Dec. 23, 2005, which is hereby incorporated by reference in its entirety, the user may scroll through the contact list using vertically upward and/or vertically downward gestures 2602 on the touch screen.

[00693] Additional description of the reordering of user-configurable lists can be found in U.S. Provisional Patent Application No. 60/883,808, "System And Method For Managing Lists," filed Jan. 7, 2007, and U.S. patent application Ser. No. 11/770,725 (US 2008-0165136 A1), "System and Method for Managing Lists," filed Jun. 28, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00694] Additional description of missed call management can be found in U.S. Provisional Patent Application No. 60/883,782, "Telephone Call Management For A Portable Multifunction Device," filed Jan. 6, 2007, and U.S. patent application Ser. No. 11/769,694 (US 2008-0057926 A1), "Missed Telephone Call Management for a Portable Multifunction Device," filed Jun. 27, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00695] Additional description of location-based dialing can be found in U.S. Provisional Patent Application No. 60/883,800, "Method, Device, And Graphical User Interface For Location-Based Dialing," filed Jan. 7, 2007, and U.S. patent application Ser. No. 11/769,692 (US 2008-0167083 A1), "Method, Device, and Graphical User Interface for Location-Based Dialing," filed Jun. 27, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00696] Additional description of conference calling can be found in U.S. Provisional Patent Application No. 60/947,133, "Portable Multifunction Device, Method, and Graphical User Interface for Conference Calling," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/960,673 (US 2008-0168361 A1), "Portable Multifunction Device, Method, and Graphical User Interface for Conference Calling," filed Dec. 19, 2007, the content of which is hereby incorporated by reference in its entirety.

[00697] Additional description of application switching can be found in U.S. Provisional Patent Application No. 60/883,809, "Portable Electronic Device Supporting Application Switching," filed Jan. 7, 2007, and U.S. patent application Ser. No. 11/969,908 (US 2008-0168379 A1) , "Portable Electronic Device Supporting Application Switching," filed Jan. 6, 2008, the content of which is hereby incorporated by reference in its entirety.

[00698] Additional description of user interfaces for handling incoming calls can be found in U.S. Provisional Patent Application No. 60/883,783, "Incoming Telephone Call Management For A Portable Multifunction Device," filed Jan. 6, 2007, and U.S. patent application Ser. No. 11/769,695 (US 2008-0055263 A1), "Incoming Telephone Call Management For A Portable Multifunction Device," filed Jun. 27, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00699] Additional description of the voicemail system can be found in U.S. Provisional Patent Application No. 60/883,799, "Voicemail Manager For Portable Multifunction Device," filed Jan. 7, 2007; U.S. patent application Ser. No. 11/770,720 (US 2008-0055264 A1), "Voicemail Manager for Portable Multifunction Device," filed Jun. 28, 2007; and 60/947,348, "Voicemail Set-Up on a Portable Multifunction Device," filed Jun. 29, 2007; and U.S. patent application Ser. No. 11/961,716 (US 2008-0168353 A1), "Voicemail Set-Up on a Portable Multifunction Device," filed Dec. 20, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00700] Edit icon that when activated (e.g., by a finger tap on the icon) initiates display of a user interface for deleting emails (e.g., as described in U.S. Provisional Patent Application Nos. 60/883,814, "Deletion Gestures On A Portable Multifunction Device," filed Jan. 7, 2007, and 60/936,755, "Deletion Gestures On A Portable Multifunction Device," filed Jun. 22, 2007, and U.S. patent application Ser. No. 11/850,642 (US 2008-0094371 A1), "Deletion Gestures On A Portable Multifunction Device," filed Sep. 5, 2007, the contents of which are hereby incorporated by reference in their entirety).

[00701] In some embodiments, in response to detecting a horizontal swipe gesture on a particular email message in a the list of emails messages, a process for deleting the particular email message is

initiated (e.g., as described in U.S. Provisional Patent Application Nos. 60/883,814, "Deletion Gestures On A Portable Multifunction Device," filed Jan. 7, 2007, and 60/936,755, "Deletion Gestures On A Portable Multifunction Device," filed Jun. 22, 2007, and U.S. patent application Ser. No. 11/850,642 (US 2008-0094371 A1), "Deletion Gestures On A Portable Multifunction Device," filed Sep. 5, 2007, the contents of which are hereby incorporated by reference in their entirety).

[00702] Additional description of an email client can be found in U.S. Provisional Patent Application No. 60/883,807, "Email Client For A Portable Multifunction Device," filed Jan. 7, 2007, and U.S. patent application Ser. No. 11/850,630 (US 2008-0094369 A1), "Email Client For A Portable Multifunction Device," filed Sep. 5, 2007, the content of which is hereby incorporated by reference in its entirety.

[00703] Methods for efficiently fetching email messages can be found in U.S. Provisional Patent Application No. 60/947,395, "Email Fetching System and Method in a Portable Electronic Device," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/968,070 (US 2009-0006570 A1), "Email Fetching System and Method in a Portable Electronic Device," filed Dec. 31, 2007, the content of which is hereby incorporated by reference in its entirety.

[00704] Methods for automatically selecting email ports and email security can be found in U.S. Provisional Patent Application No. 60/947,396, "Port Discovery and Message Delivery in a Portable Electronic Device," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/968,076 (US 2009-0006644 A1), "Port Discovery and Message Delivery in a Portable Electronic Device," filed Dec. 31, 2007, the content of which is hereby incorporated by reference in its entirety.

[00705] Additional description of displaying structured electronic documents (e.g., web pages) can be found in U.S. Provisional Patent Application No. 60/946,715, "Portable Electronic Device, Method, and Graphical User Interface for Displaying Structured Electronic Documents," filed Jun. 27, 2007, and U.S. patent application Ser. No. 11/850,013 (US 2008-0094368 A1), "Portable Electronic Device, Method, and Graphical User Interface for Displaying Structured Electronic Documents," filed Sep. 4, 2007, the content of which is hereby incorporated by reference in its entirety.

[00706] Additional description of adding windows to an application can be found in U.S. patent application Ser. No. 11/620,647 (US 2008-0168401 A1), "Method, System, And Graphical User Interface For Viewing Multiple Application Windows," filed Jan. 5, 2007, the content of which is hereby incorporated by reference in its entirety.

[00707] Additional description of displaying inline multimedia content can be found in U.S. Provisional Patent Application No. 60/947,155, "Portable Electronic Device, Method, and Graphical

User Interface for Displaying Inline Multimedia Content," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/961,773 (US 2008-0165148 A1), "Portable Electronic Device, Method, and Graphical User Interface for Displaying Inline Multimedia Content," filed Dec. 20, 2007, the content of which is hereby incorporated by reference in its entirety.

[00708] Additional description of interacting with user input elements can be found in U.S. Provisional Patent Application No. 60/947,127, "Portable Multifunction Device, Method, and Graphical User Interface for Interacting with User Input Elements in Displayed Content," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/960,394 (US 2008-0165143 A1), "Portable Multifunction Device, Method, and Graphical User Interface for Interacting with User Input Elements in Displayed Content," filed Dec. 19, 2007, the content of which is hereby incorporated by reference in its entirety.

[00709] Additional description of displaying and activating hyperlinks using interfaces can be found in U.S. patent application Ser. No. 11/620,644 (US 2008-0165133 A1), "Method, System, And Graphical User Interface For Displaying Hyperlink Information," filed Jan. 5, 2007, and in U.S. patent application Ser. No. 11/620,646 (US 2008-0259041 A1), "Method, System, And Graphical User Interface For Activating Hyperlinks," filed Jan. 5, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00710] Additional description of translating displayed content can be found in U.S. Provisional Patent Application No. 60/946,976, "Portable Multifunction Device, Method, and Graphical User Interface for Translating Displayed Content," filed Jun. 28, 2007, and U.S. patent application Ser. No. 11/960,675 (US 2008-0168405 A1), "Portable Multifunction Device, Method, and Graphical User Interface for Translating Displayed Content," filed Dec. 19, 2007, the content of which is hereby incorporated by reference in its entirety.

[00711] Additional description of "rubber band-like" scrolling and translation behavior can be found in U.S. Provisional Patent Application Nos. 60/883,801, "List Scrolling And Document Translation On A Touch-Screen Display," filed Jan. 7, 2007; 60/945,858, "List Scrolling and Document Translation on a Touch-Screen Display," filed Jun. 22, 2007, and 60/946,971, "List Scrolling and Document Translation on a Touch-Screen Display," filed Jun. 28, 2007, and U.S. patent application Ser. No. 11/956,969 (US 2008-0168404 A1), "List Scrolling and Document Translation, Scaling, and Rotation on a Touch-Screen Display," filed Dec. 14, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00712] Additional description of scrolling is described in U.S. patent application Ser. Nos. 11/322,547 (US 2007-0150830 A1), "Scrolling List With Floating Adjacent Index Symbols," filed

Dec. 23, 2005; 11/322,551 (US 2007-0146337 A1), "Continuous Scrolling List With Acceleration," filed Dec. 23, 2005; and 11/322,553 (US 2007-0132789 A1), "List Scrolling In Response To Moving Contact Over List Of Index Symbols," filed Dec. 23, 2005, which are hereby incorporated by reference in their entirety.

[00713] Additional description of user interface object reconfiguration can be found in U.S. Provisional Patent Application No. 60/937,990, "Portable Multifunction Device, Method, and Graphical User Interface Supporting User Navigations of Graphical Objects on a Touch Screen Display," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/969,809 (US 2008-0165153 A1), "Portable Multifunction Device, Method, and Graphical User Interface Supporting User Navigations of Graphical Objects on a Touch Screen Display," filed Jan. 4, 2008, the content of which is hereby incorporated by reference in its entirety.

[00714] U.S. Provisional Patent Application No. 60/936,562, "Portable Multifunction Device, Method, and Graphical User Interface for Playing Online Videos," filed Jun. 20, 2007, and U.S. patent application Ser. No. 11/968,067 (US 2008-0320391 A1), "Portable Multifunction Device, Method, and Graphical User Interface for Playing Online Videos," filed Dec. 31, 2007, the content of which is hereby incorporated by reference in its entirety, describes a way that major online video content categories can be rearranged by a user to correspond to the user's preferred (favorite) categories. The teachings in that application are also applicable here to rearranging major music and/or video categories.

[00715] Cover flow mode and other image modes are described in U.S. Provisional Patent Application No. 60/843,832, "Techniques And Systems For Browsing Media Content," filed Sep. 11, 2006; U.S. patent application Ser. No. 11/519,460 (US 2008-0066016 A1), "Media Manager With Integrated Browsers," filed Sep. 11, 2006; and U.S. Provisional Patent Application No. 60/878,746 "Electronic Device With Image Based Browsing," filed Jan. 5, 2007, which are hereby incorporated by reference in their entirety.

[00716] Additional description of mode changes based on device orientation can be found in U.S. Provisional Patent Application No. 60/947,300, "Modal Change Based on Orientation of a Portable Multifunction Device," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/969,800 (US 2008-0165152 A1), "Modal Change Based on Orientation of a Portable Multifunction Device," filed Jan. 4, 2008, the content of which is hereby incorporated by reference in its entirety.

[00717] Additional description of portrait-landscape rotation heuristics can be found in U.S. Provisional Patent Application No. 60/947,132, "Portrait-Landscape Rotation Heuristics for a Portable Multifunction Device," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/960,671

(US 2008-0165144 A1), "Portrait-Landscape Rotation Heuristics for a Portable Multifunction Device," filed Dec. 19, 2007, the content of which is hereby incorporated by reference in its entirety.

[00718] Additional description of adaptive user interface displays can be found in U.S. Provisional Patent Application No. 60/937,992, "Portable Multifunction Device, Method, and Graphical User Interface for Displaying User Interface Objects Adaptively," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/961,760 (US 2008-0165147 A1), "Portable Multifunction Device, Method, and Graphical User Interface for Displaying User Interface Objects Adaptively," filed Dec. 20, 2007, the content of which is hereby incorporated by reference in its entirety.

[00719] Additional description of artwork can be found in U.S. Provisional Patent Application No. 60/883,818, "Creating Digital Artwork Based On Content File Metadata," filed Jan. 7, 2007, and U.S. patent application Ser. No. 11/960,674 (US 2008-0168365 A1), "Creating Digital Artwork Based On Content File Metadata," filed Dec. 19, 2007, the content of which is hereby incorporated by reference in its entirety.

[00720] Additional description of positioning a slider icon can be found in U.S. Provisional Patent Application No. 60/947,304, "Positioning a Slider Icon on a Portable Multifunction Device," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/968,064 (US 2008-0168395 A1), "Positioning a Slider Icon on a Portable Multifunction Device," filed Dec. 31, 2007, the content of which is hereby incorporated by reference in its entirety.

[00721] Additional description of word suggestion can be found in U.S. patent application Ser. No. 11/620,641 (US 2008-0167858 A1), "Method And System For Providing Word Recommendations For Text Input," filed Jan. 5, 2007, and U.S. patent application Ser. No. 11/620,642 (US 2008-0168366 A1), "Method, System, And Graphical User Interface For Providing Word Recommendations," filed Jan. 5, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00722] Additional description of calendars can be found in U.S. Provisional Patent Application No. 60/883,820, "System And Method For Viewing And Managing Calendar Entries," filed Jan. 7, 2007, and U.S. patent application Ser. No. 11/969,786 (US 2008-0165151 A1), "System and Method for Viewing And Managing Calendar Entries," filed Jan. 4, 2008, the content of which is hereby incorporated by reference in its entirety.

[00723] Additional description of inputting date and time information can be found in U.S. Provisional Patent Application No. 60/947,146, "System, Method, and Graphical User Interface for Inputting Date and Time Information on a Portable Multifunction Device," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/968,051 (US 2008-0165149 A1), "System, Method, and

Graphical User Interface for Inputting Date and Time Information on a Portable Multifunction Device," filed Dec. 31, 2007, the content of which is hereby incorporated by reference in its entirety.

[00724] Additional description of user created widgets can be found in U.S. Provisional Patent Application Nos. 60/883,805, "Web Clip Widgets On A Portable Multifunction Device," filed Jan. 7, 2007, and 60/946,712, "Web Clip Widgets on a Portable Multifunction Device," filed Jun. 27, 2007, and U.S. patent application Ser. No. 11/850,011 (US 2008-0055273 A1), "Web Clip Widgets On a Portable Multifunction Device," filed Sep. 4, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00725] Additional description of providing maps and directions can be found in U.S. Provisional Patent Application No. 60/936,725, "Portable Multifunction Device, Method, and Graphical User Interface for Providing Maps and Directions," filed Jun. 22, 2007, and U.S. patent application Ser. No. 11/969,211 (US 2008-0168396 A1), "Portable Multifunction Device, Method, and Graphical User Interface for Providing Maps and Directions," filed Jan. 3, 2008, the content of which is hereby incorporated by reference in its entirety.

[00726] Additional description of displaying notification information for missed communications can be found in U.S. Provisional Patent Application No. 60/883,804, "System And Method For Displaying Communication Notifications," filed Jan. 7, 2007 and U.S. patent application Ser. No. 11/770,718 (US 2008-0220752 A1), "Portable Multifunction Device, Method, and Graphical User Interface for Managing Communications Received While in a Locked State," filed Jun. 28, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00727] Additional description of methods for silencing a portable device can be found in U.S. Provisional Patent Application No. 60/883,802, "Portable Electronic Device With Alert Silencing," filed Jan. 7, 2007 and U.S. patent application Ser. No. 11/770,727 (US 2008-0165022 A1), "Portable Electronic Device with Alert Silencing," filed Jun. 28, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00728] Additional description of methods for turning off a portable device can be found in U.S. Provisional Patent Application No. 60/883,786, "Power-Off Methods For Portable Electronic Devices," filed Jan. 6, 2007, and U.S. patent application Ser. No. 11/770,722 (US 2008-0168290 A1), "Power-Off Methods For Portable Electronic Devices," filed Jun. 28, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00729] Additional description of determining a cursor position from a finger contact can be found in U.S. Provisional Patent Application No. 60/946,716, "Methods for Determining a Cursor Position from a Finger Contact with a Touch Screen Display," filed Jun. 27, 2007, and U.S. patent

application Ser. No. 11/850,015 (US 2008-0094356 A1), "Methods for Determining a Cursor Position from a Finger Contact with a Touch Screen Display," filed Sep. 4, 2007, the content of which is hereby incorporated by reference in its entirety.

[00730] Additional description of the horizontal and vertical bars can be found in U.S. Provisional Patent Application No. 60/947,386, "Portable Electronic Device, Method, and Graphical User Interface for Displaying Electronic Documents and Lists," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/968,059 (US 2008-0168349 A1), "Portable Electronic Device, Method, and Graphical User Interface for Displaying Electronic Documents and Lists," filed Dec. 31, 2007, the content of which is hereby incorporated by reference in its entirety.

[00731] Additional description of gestures can be found in U.S. Provisional Patent Application Nos. 60/883,817, "Portable Electronic Device Performing Similar Operations For Different Gestures," filed Jan. 7, 2007, and 60/946,970, "Screen Rotation Gestures on a Portable Multifunction Device," filed Jun. 28, 2007, and U.S. patent application Ser. Nos. 11/850,638 (US 2008-0094370 A1), "Portable Electronic Device Performing Similar Operations For Different Gestures," filed Sep. 5, 2007, and 11/960,667 (US 2008-0211778 A1), "Screen Rotation Gestures on a Portable Multifunction Device," filed Dec. 19, 2007, the contents of which are hereby incorporated by reference in their entirety.

[00732] Additional description of interpreting a finger gesture can be found in U.S. Provisional Patent Application No. 60/946,977, "Portable Multifunction Device, Method, and Graphical User Interface for Interpreting a Finger Gesture on a Touch Screen Display," filed Jun. 28, 2007, and U.S. patent application Ser. No. 11/969,796 (US 2008-0165160 A1), "Portable Multifunction Device, Method, and Graphical User Interface for Interpreting a Finger Gesture on a Touch Screen Display," filed Jan. 4, 2008, the content of which is hereby incorporated by reference in its entirety.

[00733] Additional description of interpreting a finger swipe gesture can be found in U.S. Provisional Patent Application No. 60/947,140, "Portable Multifunction Device, Method, and Graphical User Interface for Interpreting a Finger Swipe Gesture," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/961,700 (US 2008-0165145 A1), "Portable Multifunction Device, Method, and Graphical User Interface for Interpreting a Finger Swipe Gesture," filed Dec. 20, 2007, the content of which is hereby incorporated by reference in its entirety.

[00734] Additional description of heuristics can be found in U.S. Provisional Patent Application No. 60/937,991, "Touch Screen Device, Method, and Graphical User Interface for Determining Commands by Applying Heuristics," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/850,635 (US 2008-0122796 A1), "Touch Screen Device, Method, and Graphical User Interface

for Determining Commands by Applying Heuristics," filed Sep. 5, 2007, the content of which is hereby incorporated by reference in its entirety.

[00735] Additional description of soft keyboards can be found in U.S. Provisional Patent Application No. 60/946,714, "Portable Multifunction Device with Soft Keyboards," filed Jun. 27, 2007, and U.S. patent application Ser. No. 11/961,663 (US 2008-0098331 A1), "Portable Multifunction Device with Soft Keyboards," filed Dec. 20, 2007, the content of which is hereby incorporated by reference in its entirety.

[00736] Additional description of keyboards can be found in U.S. Provisional Patent Application No. 60/883,806, "Soft Keyboard Display For A Portable Multifunction Device," filed Jan. 7, 2007, and U.S. patent application Ser. No. 11/850,641 (US 2008-0082934 A1), "Soft Keyboard Display For A Portable Multifunction Device," filed Sep. 5, 2007, the content of which is hereby incorporated by reference in its entirety.

[00737] Additional description of airplane mode indicators can be found in U.S. Provisional Patent Application No. 60/947,315, "Airplane Mode Indicator on a Portable Multifunction Device," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/961,743 (US 2008-0165146 A1), "Airplane Mode Indicator on a Portable Multifunction Device," filed Dec. 20, 2007, the content of which is hereby incorporated by reference in its entirety.

[00738] Additional description of dimming techniques can be found in U.S. Provisional Patent Application No. 60/883,821, "Portable Electronic Device With Auto-Dim Timers," filed Jan. 7, 2007, and U.S. patent application Ser. No. 11/960,677 (US 2008-0218535 A1), "Portable Electronic Device With Auto-Dim Timers," filed Dec. 19, 2007, the content of which is hereby incorporated by reference in its entirety.

[00739] Additional description of settings-related techniques can be found in U.S. Provisional Patent Application No. 60/883,812, "Portable Electronic Device With A Global Setting User Interface," filed Jan. 7, 2007, and U.S. patent application Ser. No. 11/960,669 (US 2008-0222545 A1), "Portable Electronic Device With A Global Setting User Interface," filed Dec. 19, 2007, the content of which is hereby incorporated by reference in its entirety.

[00740] In accordance with various embodiments, a toolbox window is contemplated to have the functionality similar to that set forth in U.S. Pat. No. 7,600,193 to Gunderson entitled "A METHOD OF TRACKING DUAL MODE DATA OBJECTS USING RELATED THUMBNAILS AND TOOL ICONS IN A PALETTE WINDOW," the disclosure of which is wholly incorporated by reference herein.

[00741] U.S. Patent Application titled "Video Conferencing System Transcoder", Ser. No. 11/252,238 (US 2006-0087553 A1), which was filed Oct. 17, 2005, whose inventors are Michael L. Kenoyer and Michael V. Jenkins, is hereby incorporated by reference in its entirety as though fully and completely set forth herein.

[00742] Similarly, the conference may be a videoconference, and the videoconference may be established according to any of a variety of methods, e.g., the one described in patent application Ser. No. 11/252,238 (US 2006-0087553 A1), which was incorporated by reference above.

[00743] A proximity sensor may perform as described in U.S. patent application Ser. No. 11/241,839 (US 2006-0161871 A1), "Proximity Detector In Handheld Device," filed Sep. 30, 2005; Ser. No. 11/240,788 (US 2006-0161870 A1), "Proximity Detector In Handheld Device," filed Sep. 30, 2005; Ser. No. 11/620,702 (US 2008-0167834 A1), "Using Ambient Light Sensor To Augment Proximity Sensor Output"; Ser. No. 11/586,862 (US 2007-0075965 A1), "Automated Response To And Sensing Of User Activity In Portable Devices," filed Oct. 24, 2006; and Ser. No. 11/638,251 (US 2008-0140868 A1), "Methods And Systems For Automatic Configuration Of Peripherals," which are hereby incorporated by reference in their entirety.

[00744] In some embodiments, a user may rearrange the icons in UI, e.g., using processes described in U.S. patent application Ser. No. 11/459,602 (US 2007-0157089 A1), "Portable Electronic Device With Interface Reconfiguration Mode," filed Jul. 24, 2006, which is hereby incorporated by reference in its entirety. For example, a user may move application icons in and out of tray 408 using finger gestures.

[00745] While various embodiments have been described above, it should be understood that they have been presented by way of example only, and not limitation. Thus, the breadth and scope of a preferred embodiment should not be limited by any of the above-described exemplary embodiments, but should be defined only in accordance with the following claims and their equivalents.

CLAIMS

1. An electronic device, comprising:

a display;

one or more processors;

memory; and

one or more programs, wherein the one or more programs are stored in the memory and configured to be executed by the one or more processors, the one or more programs including instructions for:

displaying a plurality of user interface elements on the display including a first user interface element and a second user interface element;

detecting a first contact moving across the display; and,

while the first contact is detected moving across the display:

moving the first user interface element in a first direction on the display at a first speed; and

moving the second user interface element on the display at a second speed greater than the first speed.

2. The electronic device of Claim 1, wherein the electronic device is configured such that the plurality of user interface elements are displayed on the display such that the second user interface element is disposed above the first user interface element and the second user interface element at least partially exposes the first user interface element, where the electronic device includes a watch.

3. The electronic device of Claim 2, wherein the electronic device is configured such that the second speed increases relative to the first speed as the first contact moves.

4. The electronic device of Claim 2, wherein the electronic device is configured such that the first contact is detected on the first user interface element, and the first contact is detected moving at the first speed.

5. The electronic device of Claim 2, wherein the electronic device is configured such that the first contact is detected on the first user interface element, and the second user interface element is

displayed to move farther away from the first contact as the first contact is detected moving across the display.

6. The electronic device of Claim 2, wherein the electronic device is configured such that the first contact is detected on the second user interface element, and the first contact is detected moving at the second speed.

7. The electronic device of Claim 2, wherein the electronic device is configured such that the first contact is detected on a portion of a user interface that does not include the first user interface element nor the second user interface element.

8. The electronic device of Claim 7, wherein the electronic device is configured such that the second user interface element is offset from the first user interface element, and the offset is increased as a result of the second user interface element moving at the second speed greater than the first speed.

9. The electronic device of Claim 2, wherein the electronic device is configured such that the plurality of user interface elements includes a third user interface element, and while the first contact is detected moving across the display: the third user interface element is moved in the first direction on the display at a third speed less than the first speed.

10. The electronic device of Claim 2, wherein the first contact includes a first-orientation gesture detected on a particular user interface element including at least one of the first user interface element or the second user interface element, wherein the one or more programs include instructions for:

detecting a second-orientation gesture on the particular user interface element; and

in response to the detection of the second-orientation gesture on the particular user interface element, performing an operation.

11. The electronic device of Claim 10, wherein the electronic device is configured such that the operation includes at least one of a delete operation or a close operation.

12. The electronic device of Claim 2, wherein the first contact is detected on a particular user interface element including at least one of the first user interface element or the second user interface element, wherein the one or more programs include instructions for:

detecting a second contact on the particular user interface element; and

based on detecting the second contact on the particular user interface element and further based on a pressure of the second contact, pulsing the particular user interface element.

13. The electronic device of Claim 2, wherein the electronic device is configured such that the movement of the second user interface element at the second speed greater than the first speed of the movement of the first user interface element, increases a speed with which the first user interface element is exposed for user inspection and selection, for decreasing an amount of time required for a user to inspect and select the first user interface element.

14. The electronic device of Claim 2, wherein the electronic device is configured such that the movement of the second user interface element at the second speed greater than the first speed of the movement of the first user interface element, increases a speed with which the first user interface element is exposed for user inspection and selection, for decreasing an amount of time required for a user to inspect and select the first user interface element, which reduces power consumption by the electronic device.

15. The electronic device of Claim 14, wherein the electronic device is configured such that the movement of the second user interface element at the second speed greater than the first speed of the movement of the first user interface element, solves a technical problem involving an amount of processing and power resources required during operation of the electronic device.

16. The electronic device of Claim 2, wherein the electronic device is configured such that the user interface elements include representations of different applications in a multitasking environment.

17. The electronic device of Claim 2, wherein the electronic device is configured such that the second user interface element is offset from the first user interface element in the first direction.

18. The electronic device of Claim 2, wherein the electronic device is configured such that the first contact is detected as moving across the display in the first direction.

19. The electronic device of Claim 2, wherein at least one of:

the first user interface element includes a first user interface representation;

the first user interface element includes a first object;

the first user interface element includes a first layer;

the first user interface element includes a first window an adjacent object;

the second user interface element includes a second user interface representation;

the second user interface element includes a second object;

the second user interface element includes a second layer;

the second user interface element is moved on the display in the first direction at the second speed greater than the first speed;

the second user interface element is moved on the display in a second direction at the second speed greater than the first speed;

the second user interface element includes a second window an adjacent object;

the second user interface element appears to move faster than the first user interface element;

the second user interface element actually moves faster than the first user interface element;

the second user interface element moves faster than the first user interface element, by appearing to do so;

the first user interface element includes a representation of at least one of a web browser application interface, a messaging application interface, a calendar application interface, or a navigation application interface;

the first user interface element includes content of at least one of a web browser application interface, a messaging application interface, a calendar application interface, or a navigation application interface;

the second user interface element includes a representation of at least one of a web browser application interface, a messaging application interface, a calendar application interface, or a navigation application interface;

the second user interface element includes content of at least one of a web browser application interface, a messaging application interface, a calendar application interface, or a navigation application interface;

at least one of the first user interface element or the second user interface element includes a display element;

at least one of the first user interface element or the second user interface element includes a region of the display allotted to an identifiable visual object;

at least one of the first user interface element or the second user interface element includes a three-dimensional element;

at least one of the first user interface element or the second user interface element includes a three-dimensional display element;

at least one of the first user interface element or the second user interface element includes a virtual display layer;

at least one of the first user interface element or the second user interface element is part of a virtual display layer;

the first user interface element and the second user interface element are manipulatable using separate interaction surfaces;

the first user interface element is manipulatable using a back interaction surface and the second user interface element is manipulatable using a front interaction surface;

the first user interface element and the second user interface element are manipulatable using the same interaction surface;

the first contact is at a location of the first user interface element on the display;

the first contact includes a swipe gesture;

the first contact is a swipe gesture;

the first contact is detected moving across an entirety of the display;

the first contact is detected moving across only a portion of the display;

the movement of at least one of the first user interface element or the second user interface element occurs during an entirety of the movement of the first contact;

the movement of at least one of the first user interface element or the second user interface element occurs during only a portion of the movement of the first contact;

the first user interface element includes a first screen of layered content, and the second user interface element includes a second screen of layered content;

the first user interface element is part of a first screen of layered content, and the second user interface element is part of a second screen of layered content;

the first speed is a depth-based apparent rate;

the second speed is a depth-based apparent rate;

the first speed is in accordance with a speed of the first contact on the display;

the first user interface element is moved at the first speed and the second user interface element is moved at the second speed, for providing a three-dimensional depth cue;

the first user interface element is moved at the first speed and the second user interface element is moved at the second speed, in order give an appearance of depth;

the first user interface element and the second user interface element are included in staggered layers; or

the first user interface element and the second user interface element are included in staggered layers.

20. An electronic device, comprising:

a display;

one or more processors;

memory; and

one or more programs, wherein the one or more programs are stored in the memory and configured to be executed by the one or more processors, the one or more programs including instructions means for:

displaying a plurality of user interface elements on the display including a first user interface element and a second user interface element;

detecting a first contact moving across the display; and,

while the first contact is detected moving across the display:

moving the first user interface element in a first direction on the display at a first speed; and

moving the second user interface element on the display at a second speed greater than the first speed.

ABSTRACT

In one embodiment, an apparatus and associated method are provided, comprising: a display; one or more processors; memory; and one or more programs, wherein the one or more programs are stored in the memory and configured to be executed by the one or more processors, the one or more programs including instructions for: displaying a plurality of user interface elements on the display including a first user interface element and a second user interface element; detecting a first contact moving across the display; and, while the first contact is detected moving across the display: moving the first user interface element in a first direction on the display at a first speed; and moving the second user interface element on the display at a second speed greater than the first speed.

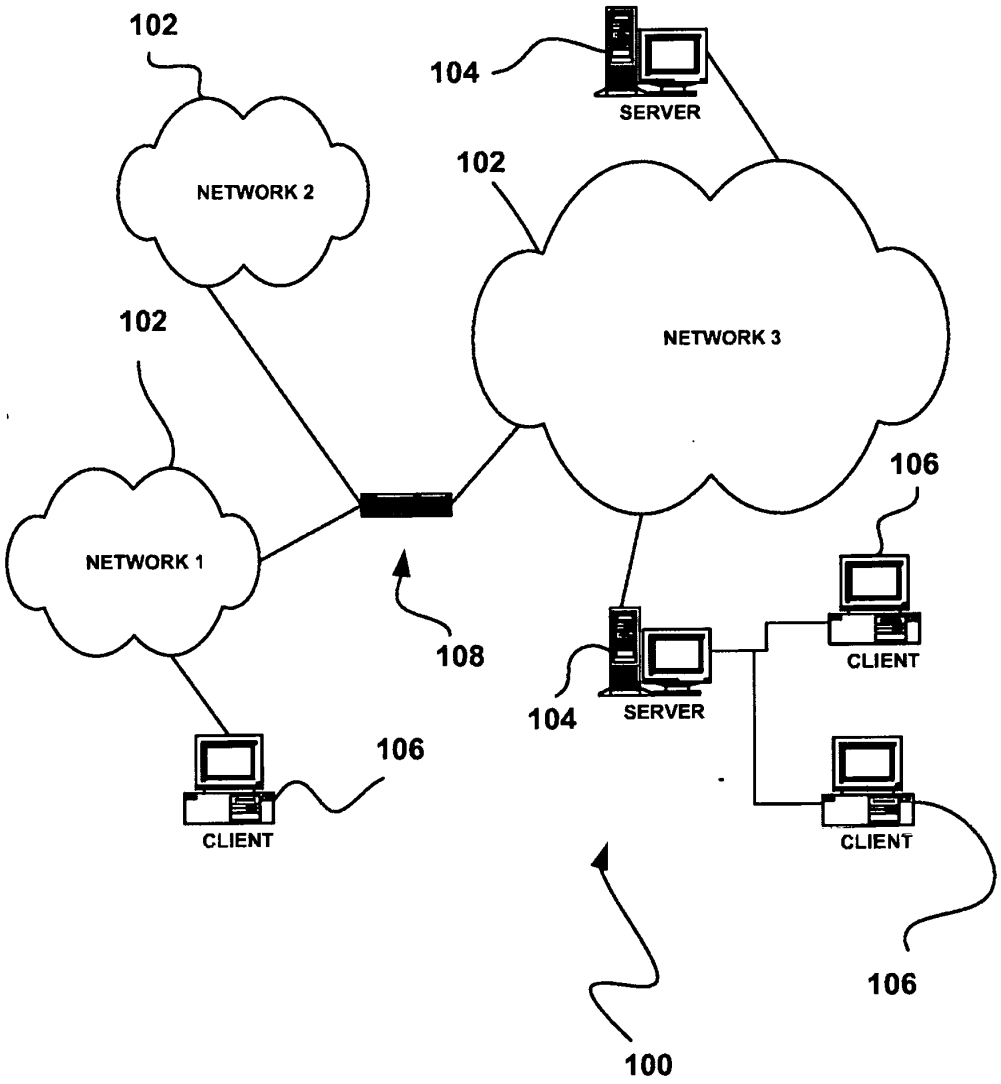

102
104
SERVER
NETWORK 2
102
NETWORK 3
102
106
NETWORK 1
108
104
SERVER
CLIENT
106
CLIENT
CLIENT
106
100

FIGURE 1

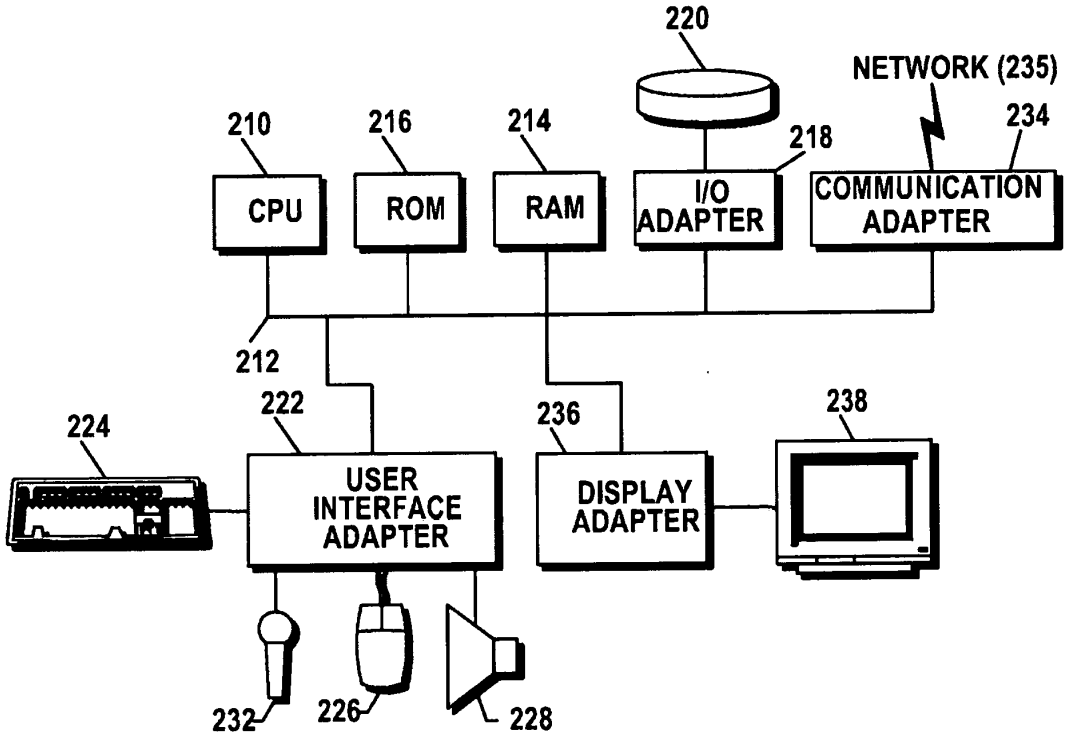

220
NETWORK (235)
210
216
214
218
234
CPU
ROM
RAM
I/O ADAPTER
COMMUNICATION ADAPTER
212
222
236
238
224
USER INTERFACE ADAPTER
DISPLAY ADAPTER
232
226
228

FIGURE 2

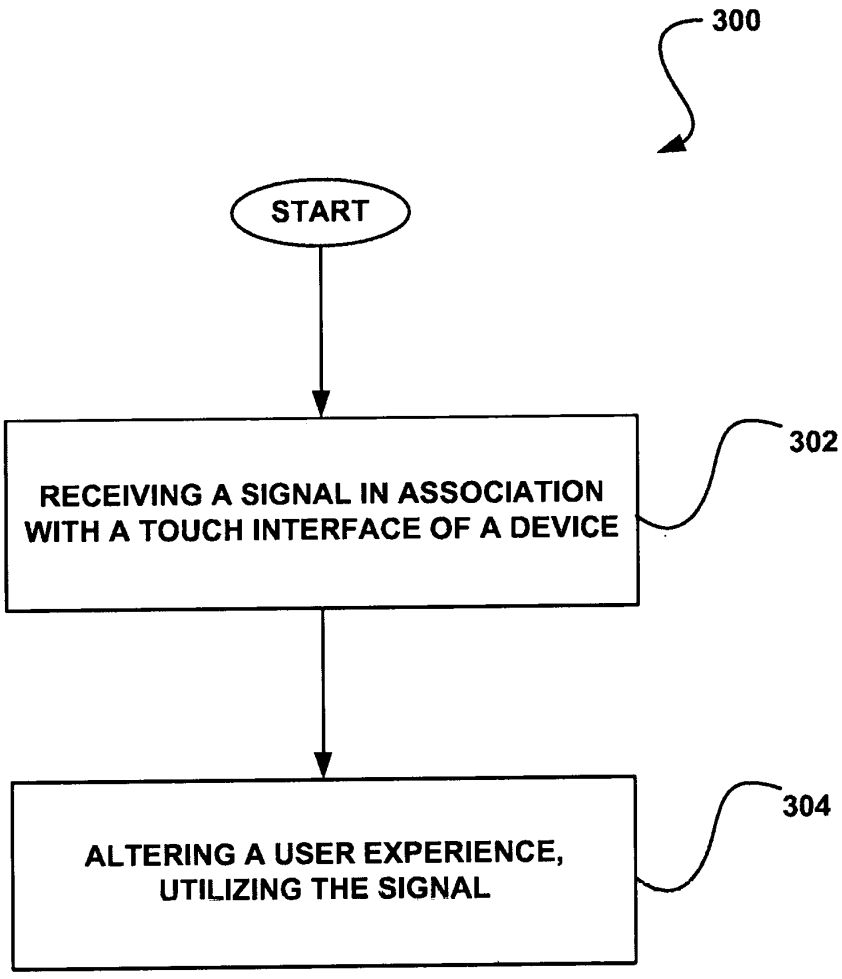

300
START
RECEIVING A SIGNAL IN ASSOCIATION WITH A TOUCH INTERFACE OF A DEVICE
302
ALTERING A USER EXPERIENCE, UTILIZING THE SIGNAL
304

FIGURE 3

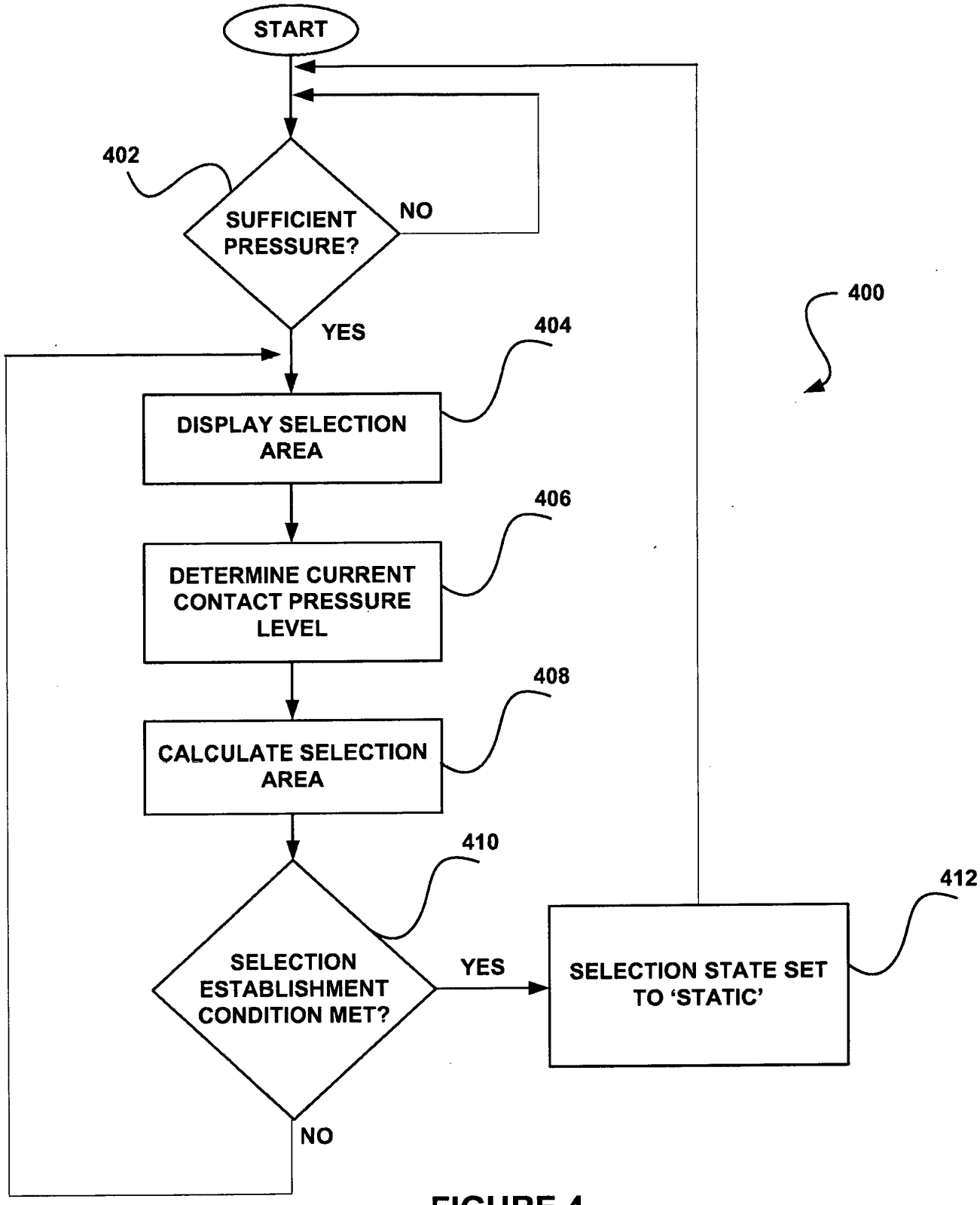

START
402
SUFFICIENT PRESSURE?
NO
YES
400
404
DISPLAY SELECTION AREA
406
DETERMINE CURRENT CONTACT PRESSURE LEVEL
408
CALCULATE SELECTION AREA
410
SELECTION ESTABLISHMENT CONDITION MET?
YES
412
SELECTION STATE SET TO 'STATIC'
NO

FIGURE 4

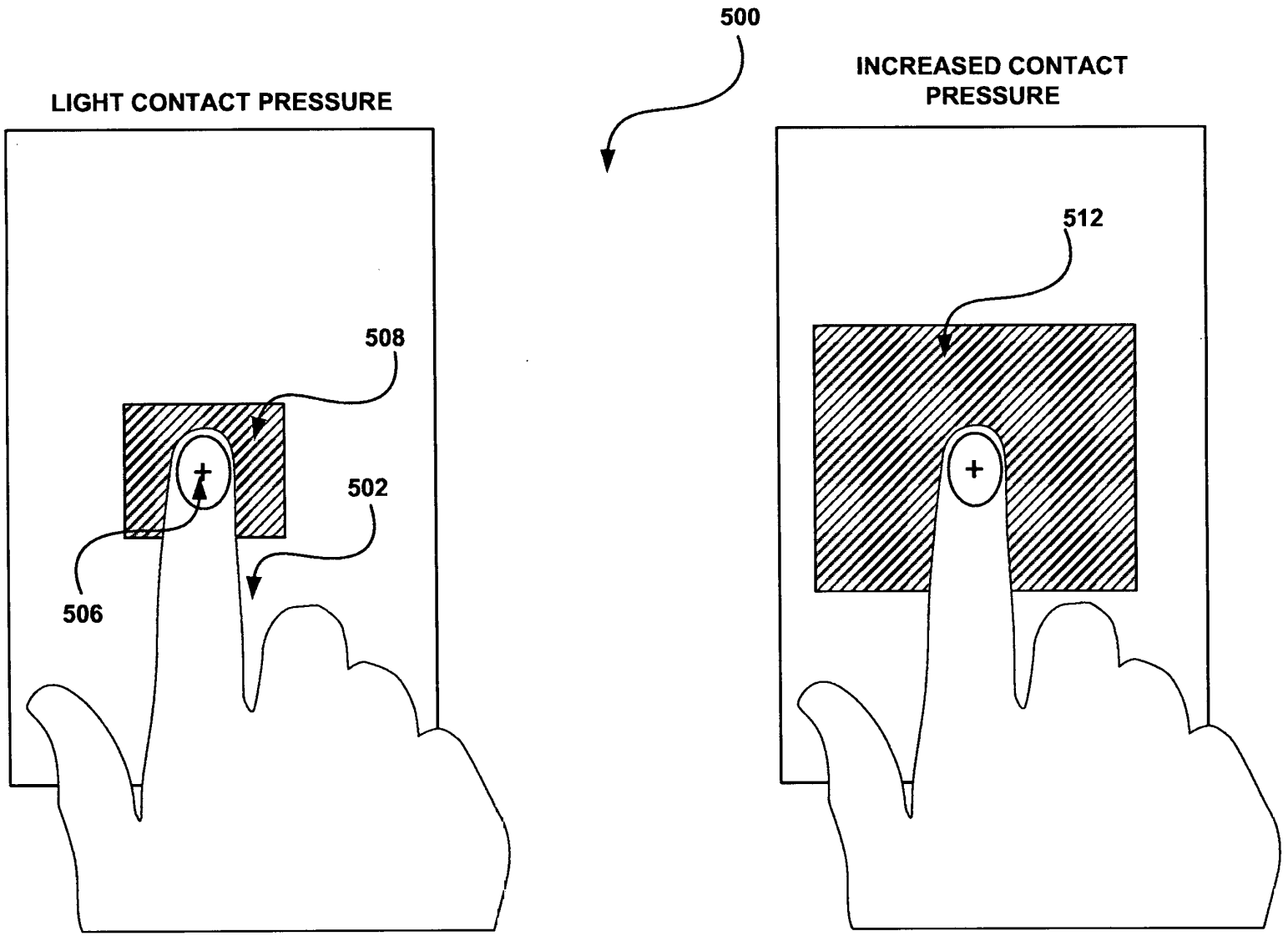

500
LIGHT CONTACT PRESSURE
INCREASED CONTACT PRESSURE
508
502
506
512

FIGURE 5

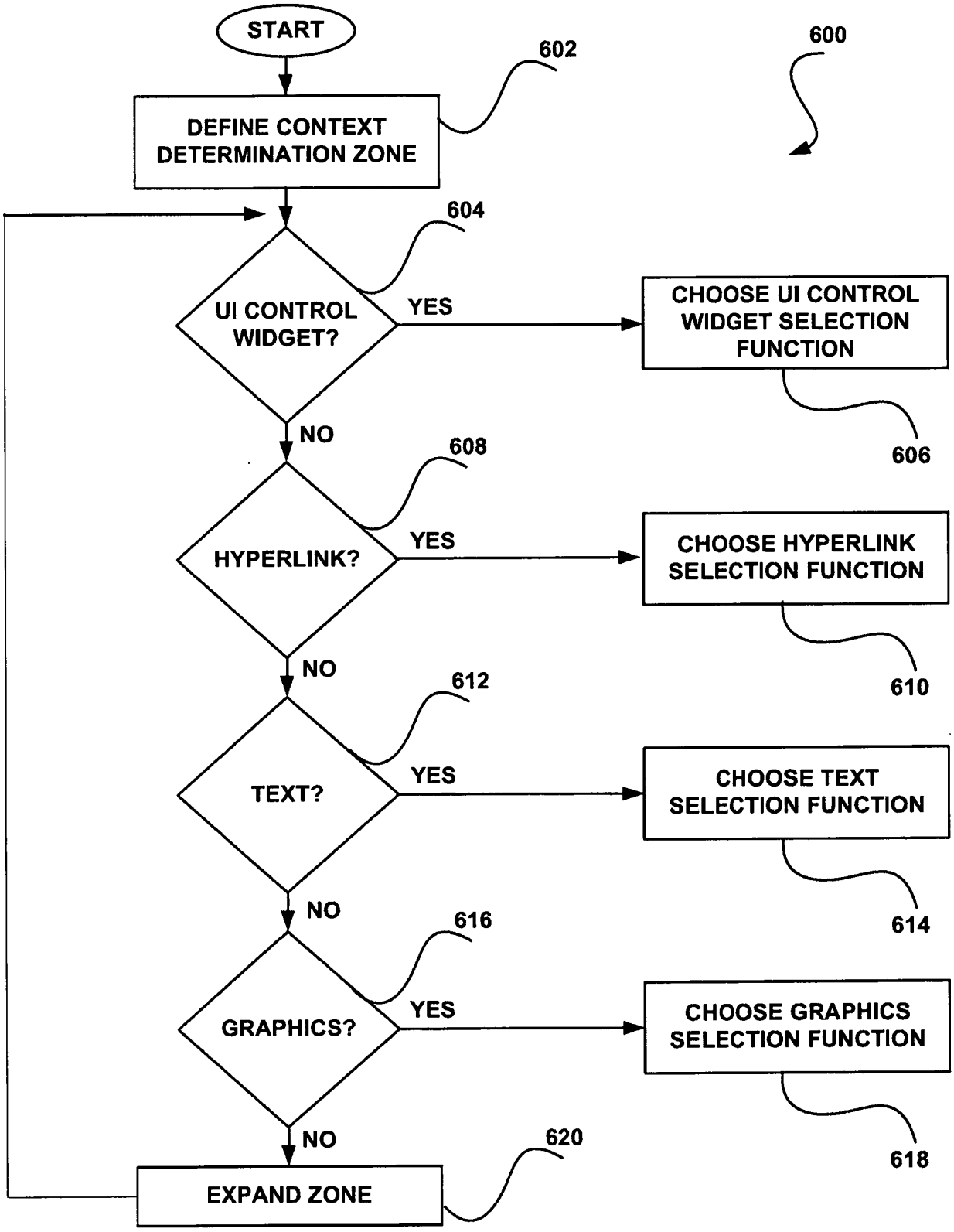

START
600
602
DEFINE CONTEXT DETERMINATION ZONE
604
UI CONTROL WIDGET?
YES
CHOOSE UI CONTROL WIDGET SELECTION FUNCTION
606
NO
608
HYPERLINK?
YES
CHOOSE HYPERLINK SELECTION FUNCTION
610
NO
612
TEXT?
YES
CHOOSE TEXT SELECTION FUNCTION
614
NO
616
GRAPHICS?
YES
CHOOSE GRAPHICS SELECTION FUNCTION
618
NO
620
EXPAND ZONE

FIGURE 6

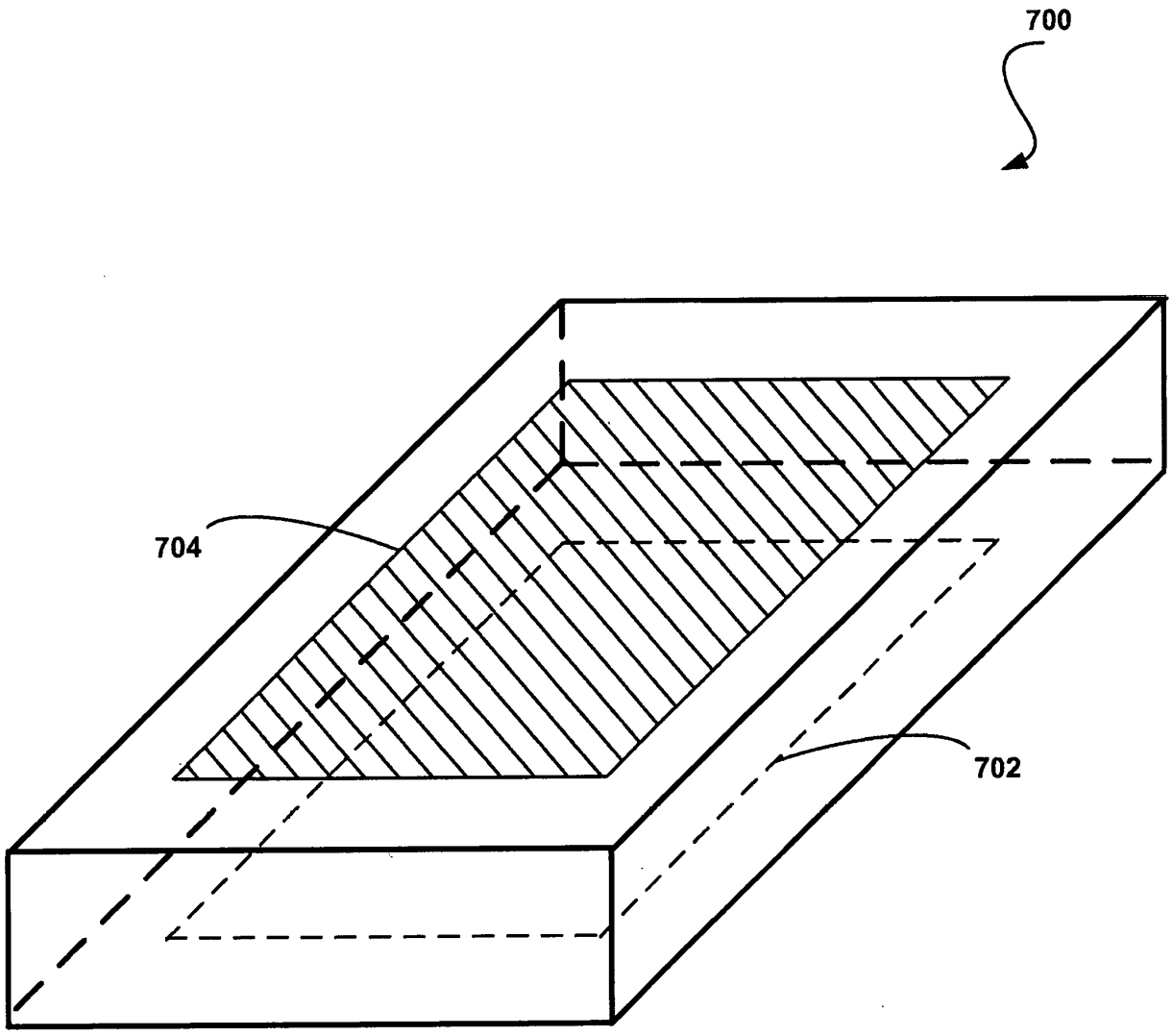


FIGURE 7

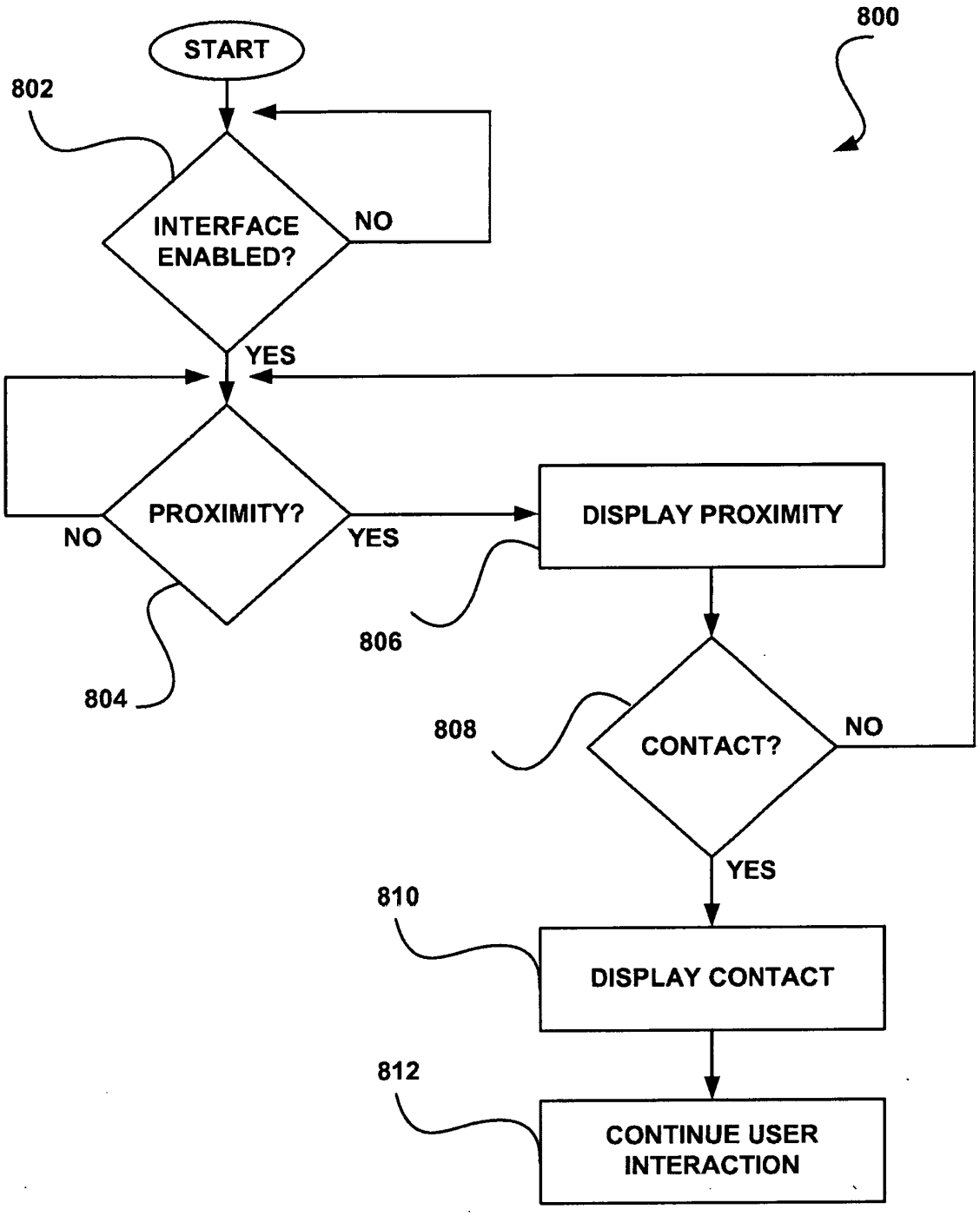

800
START
802
INTERFACE ENABLED?
NO
YES
PROXIMITY?
NO
YES
804
DISPLAY PROXIMITY
806
808
CONTACT?
NO
YES
810
DISPLAY CONTACT
812
CONTINUE USER INTERACTION

FIGURE 8

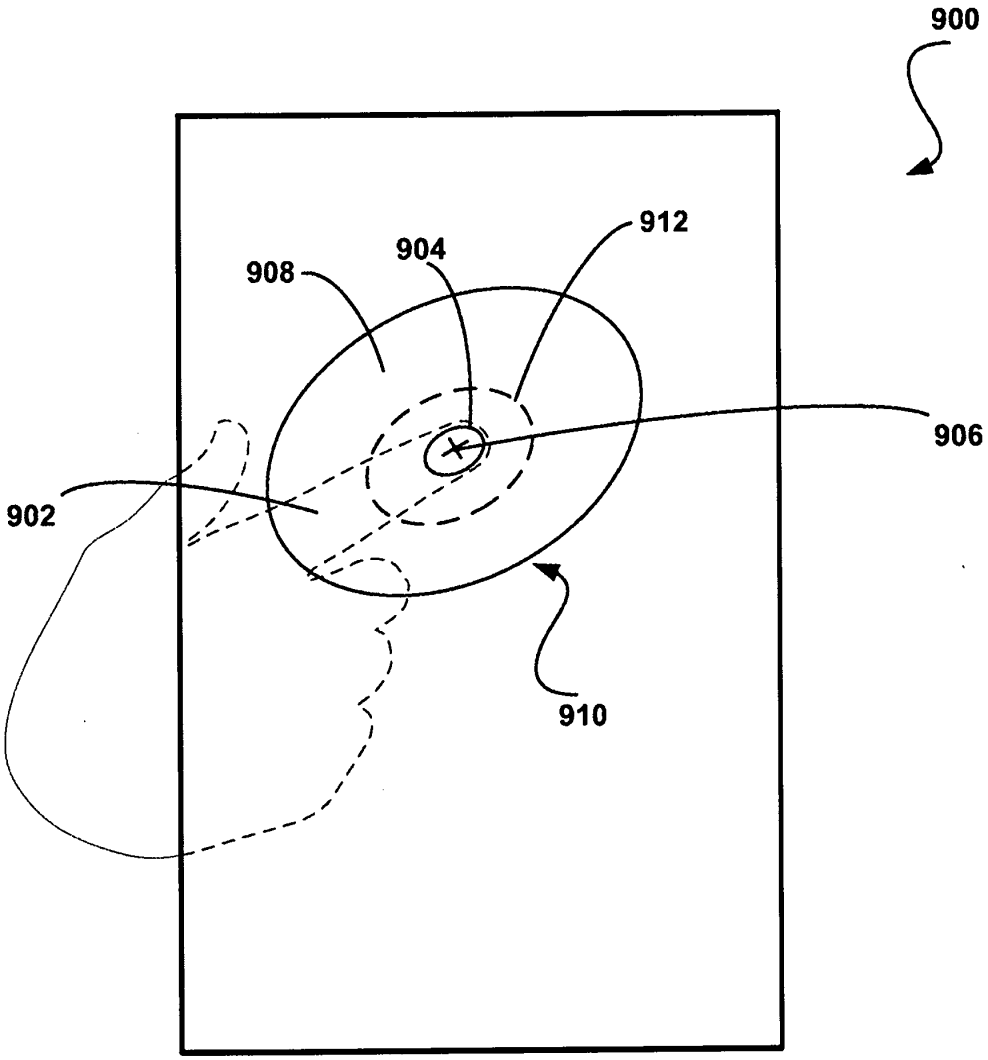


FIGURE 9

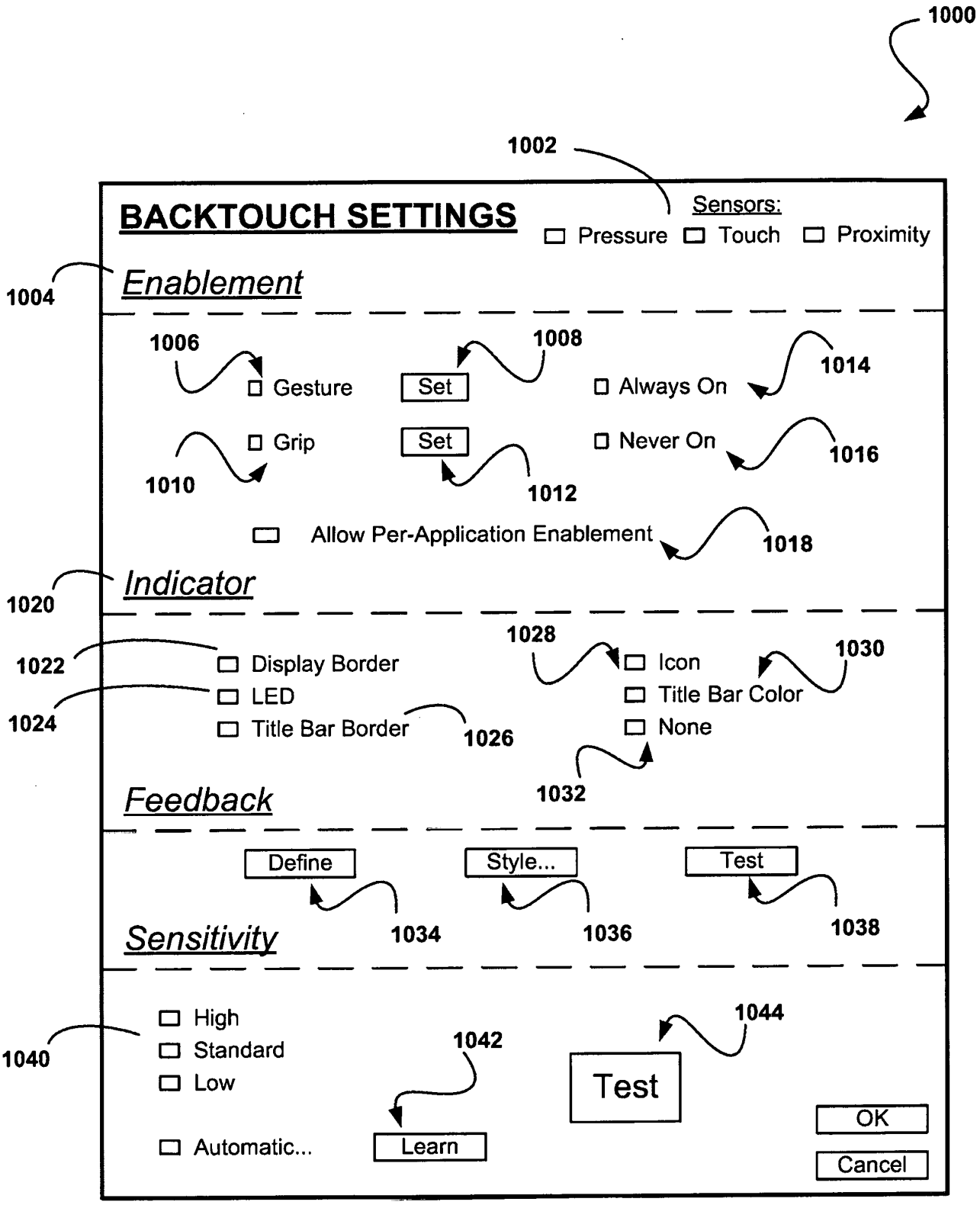

1000
1002
BACKTOUCH SETTINGS
Sensors:
Pressure
Touch
Proximity
1004
Enablement
1006
Gesture
Set
1008
Always On
1014
Grip
Set
Never On
1016
1010
1012
Allow Per-Application Enablement
1018
1020
Indicator
1022
Display Border
1028
Icon
1030
1024
LED
Title Bar Color
Title Bar Border
1026
None
1032
Feedback
Define
Style...
Test
1034
1036
1038
Sensitivity
1040
High
Standard
Low
1042
1044
Test
Automatic...
Learn
OK
Cancel

FIGURE 10

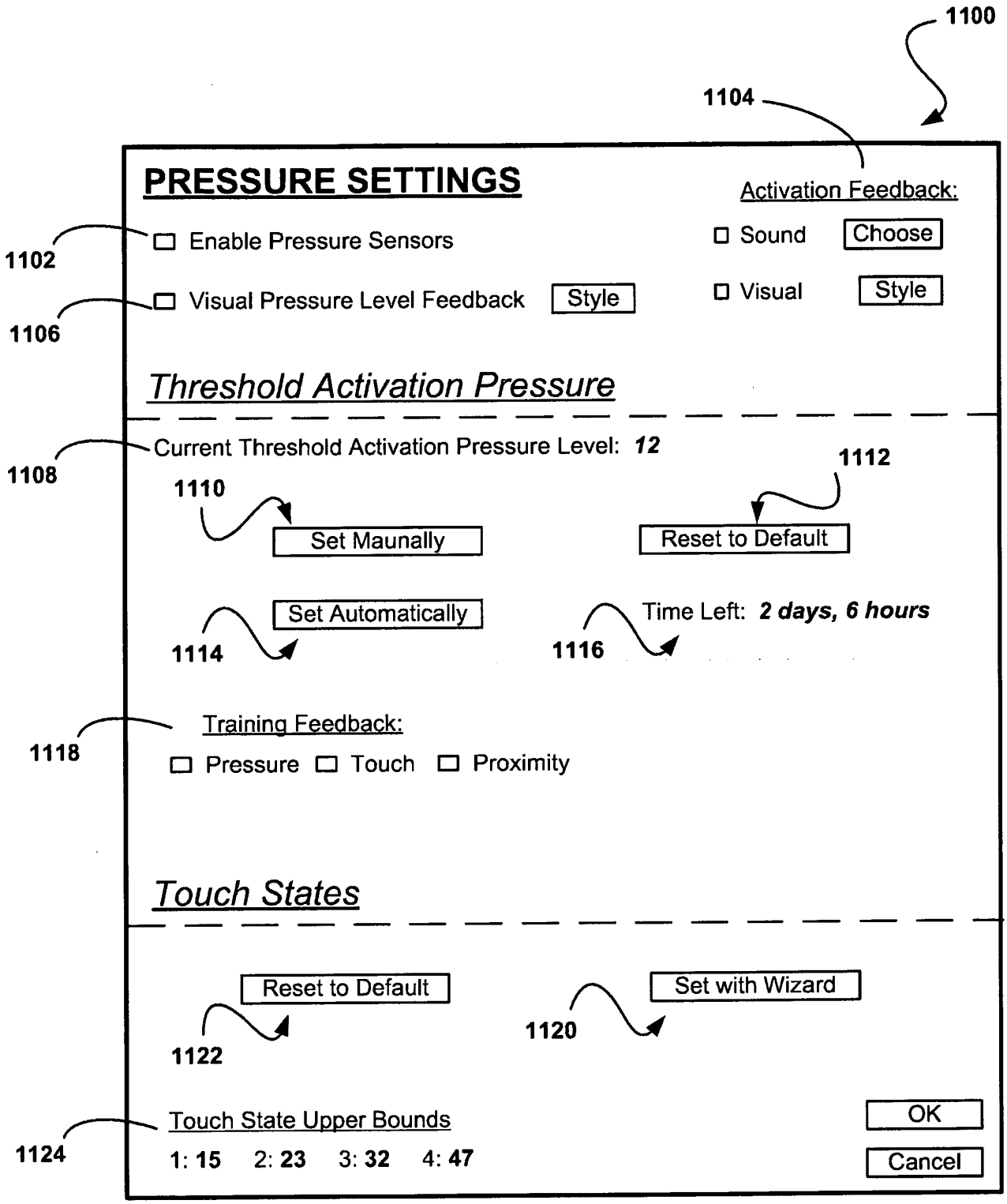

1100
1104
PRESSURE SETTINGS
Activation Feedback:
1102
Enable Pressure Sensors
Sound
Choose
1106
Visual Pressure Level Feedback
Style
Visual
Style
Threshold Activation Pressure
1108
Current Threshold Activation Pressure Level: 12
1112
1110
Set Maunally
Reset to Default
Set Automatically
1114
Time Left: 2 days, 6 hours
1116
1118
Training Feedback:
Pressure
Touch
Proximity
Touch States
Reset to Default
Set with Wizard
1122
1120
1124
Touch State Upper Bounds
1: 15 2: 23 3: 32 4: 47
OK
Cancel

FIGURE 11

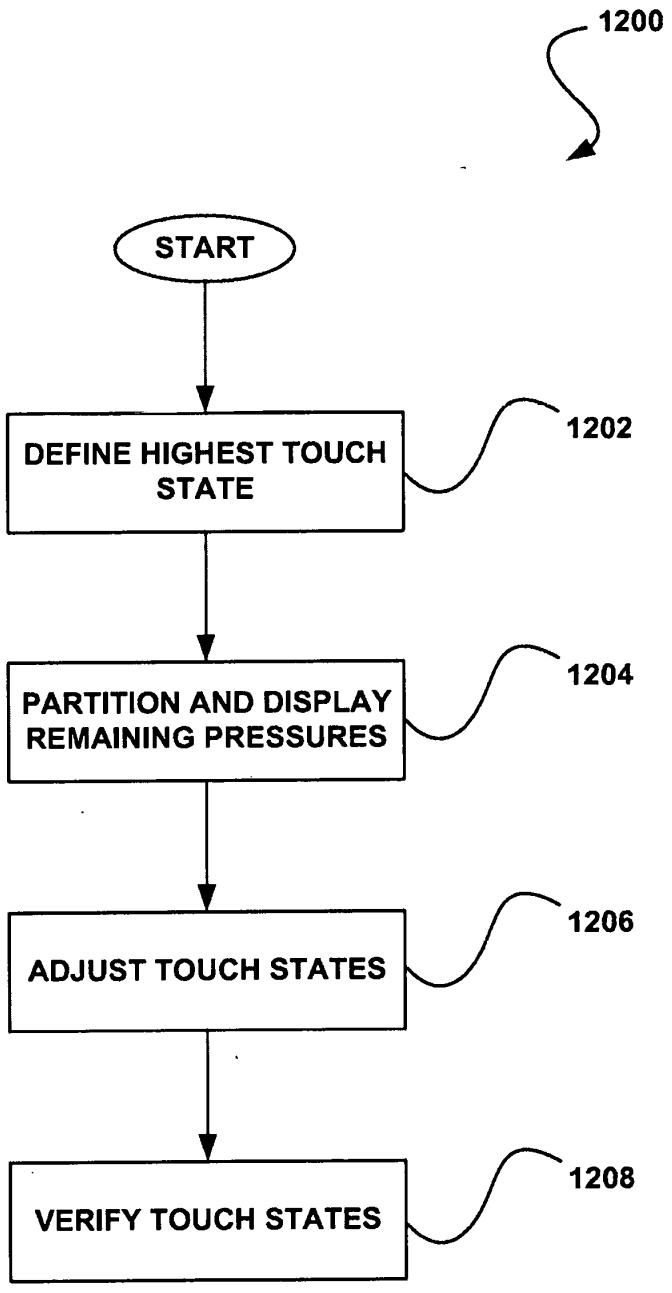

1200
START
DEFINE HIGHEST TOUCH STATE
1202
PARTITION AND DISPLAY REMAINING PRESSURES
1204
ADJUST TOUCH STATES
1206
VERIFY TOUCH STATES
1208

FIGURE 12

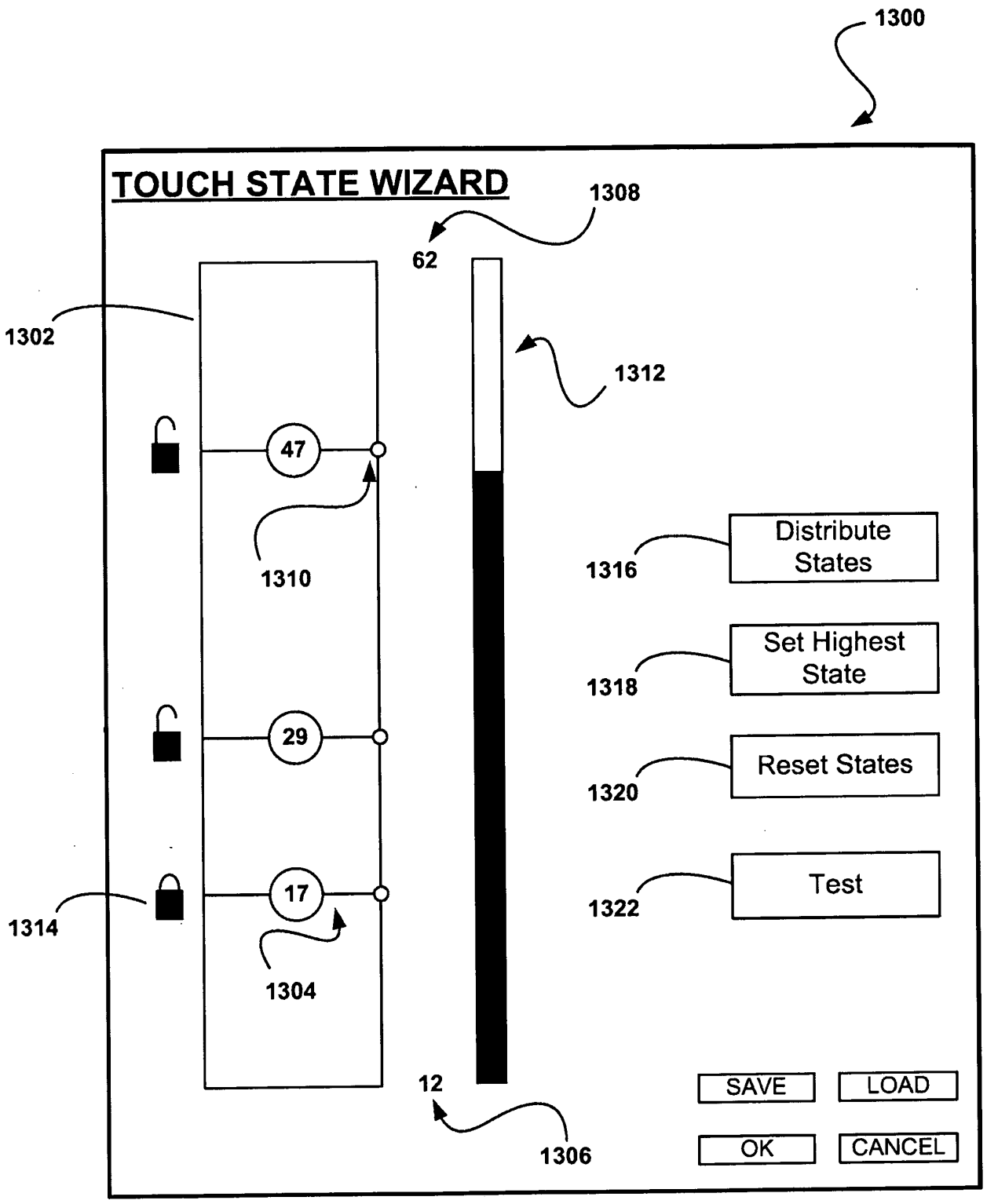

1300
TOUCH STATE WIZARD
1308
62
1302
1312
47
1310
Distribute States
1316
Set Highest State
1318
29
Reset States
1320
Test
1322
17
1314
1304
12
1306
SAVE
LOAD
OK
CANCEL

FIGURE 13

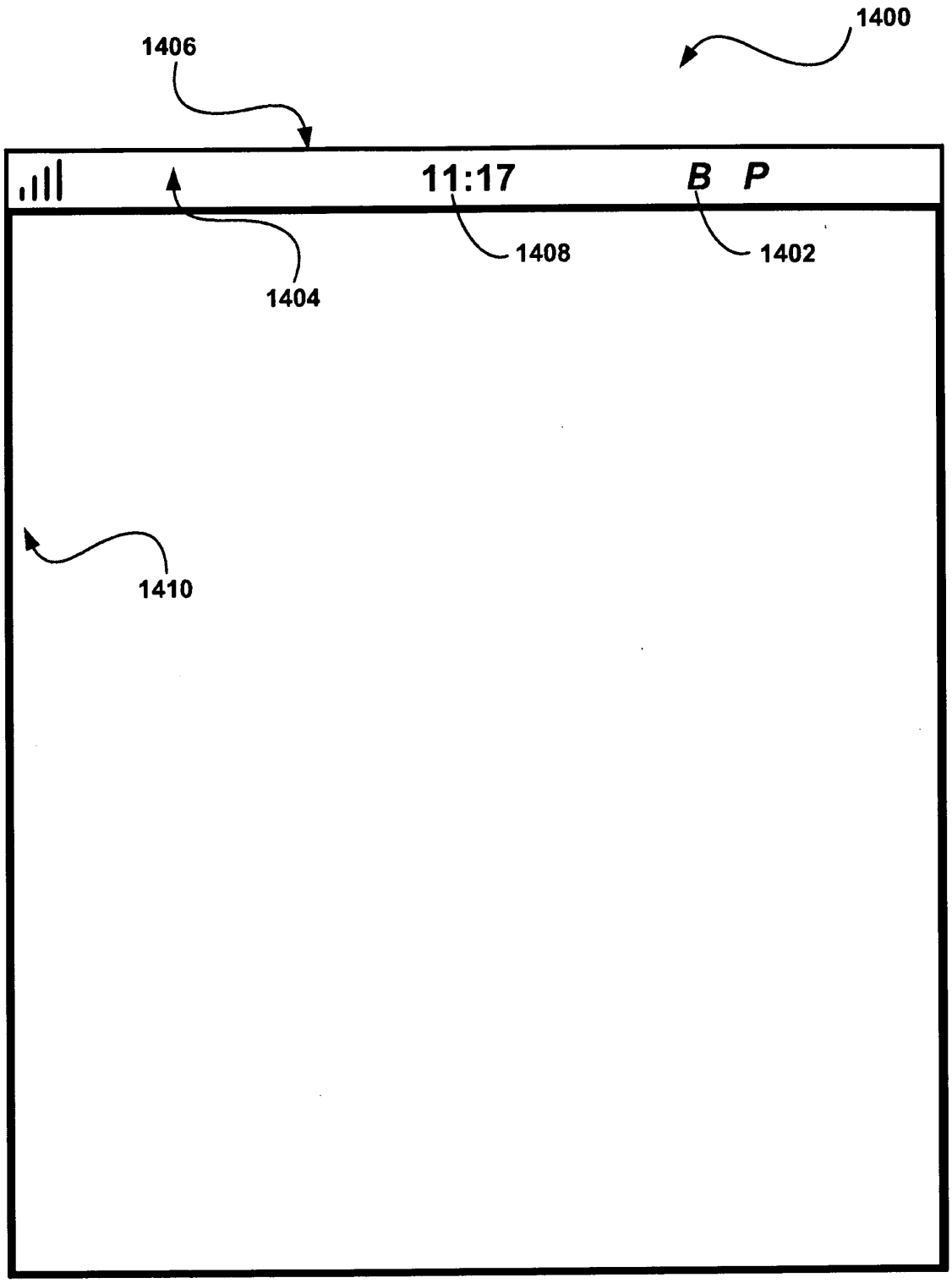


FIGURE 14

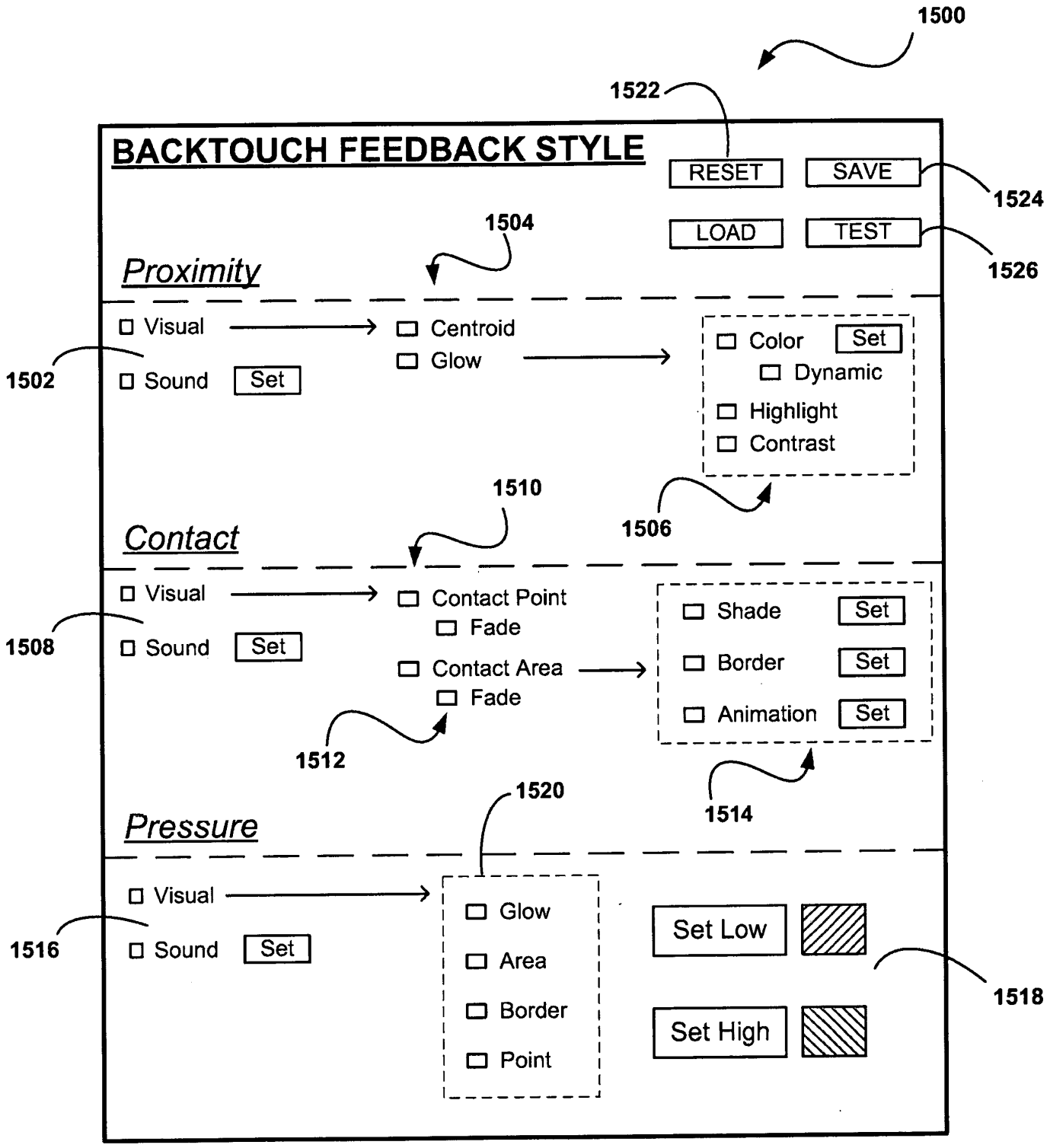

1500
1522
BACKTOUCH FEEDBACK STYLE
RESET
SAVE
1524
LOAD
TEST
1526
1504
Proximity
Visual
Centroid
Glow
Color
Set
Dynamic
Highlight
Contrast
1502
Sound
Set
1506
1510
Contact
Visual
Contact Point
Fade
Contact Area
Fade
Shade
Set
Border
Set
Animation
Set
1508
Sound
Set
1512
1514
1520
Pressure
Visual
Glow
Area
Border
Point
Set Low
Set High
1516
Sound
Set
1518

FIGURE 15

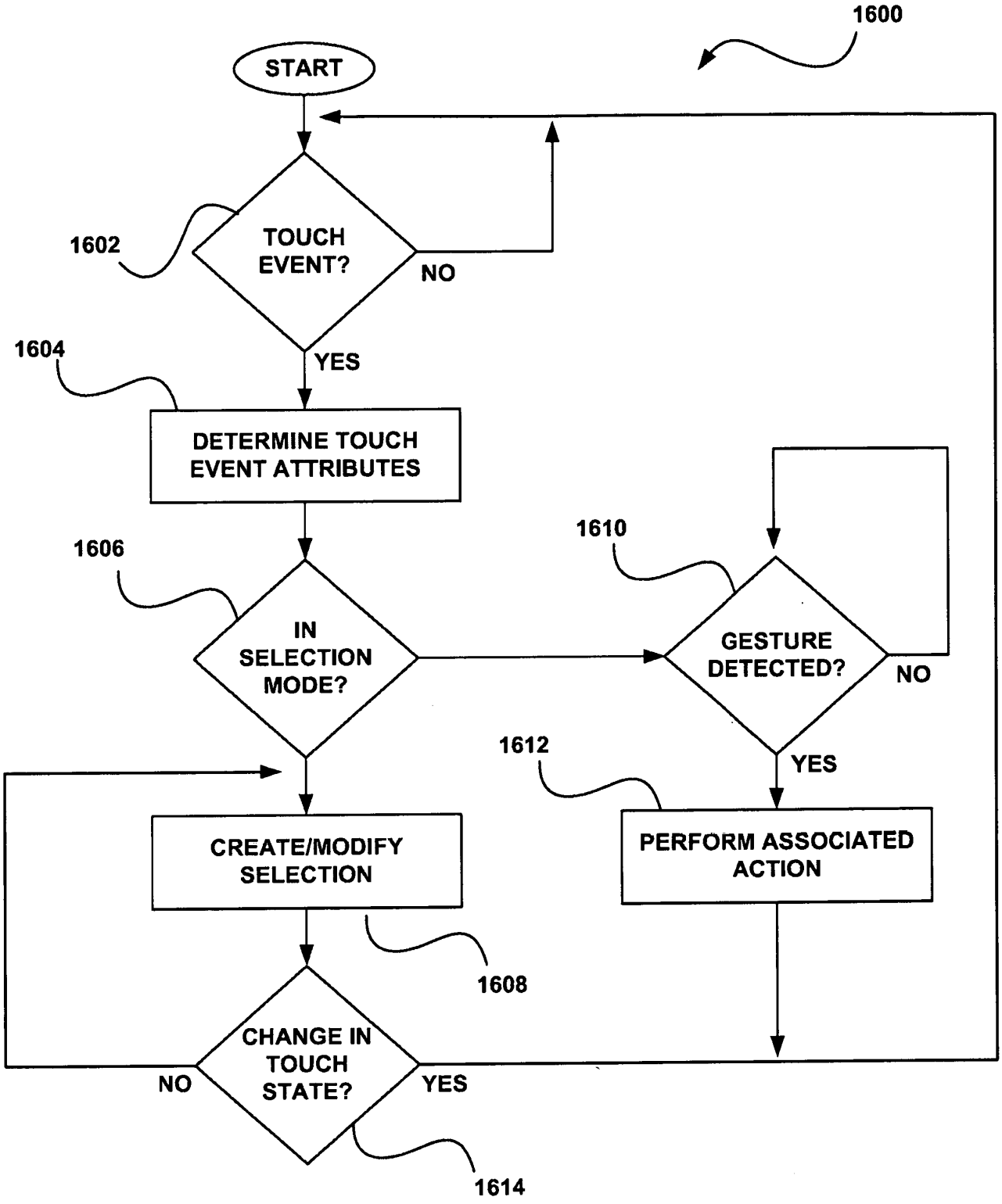

1600
START
1602
TOUCH EVENT?
NO
YES
1604
DETERMINE TOUCH EVENT ATTRIBUTES
1606
IN SELECTION MODE?
1610
GESTURE DETECTED?
NO
YES
1612
PERFORM ASSOCIATED ACTION
CREATE/MODIFY SELECTION
1608
CHANGE IN TOUCH STATE?
NO
YES
1614

FIGURE 16

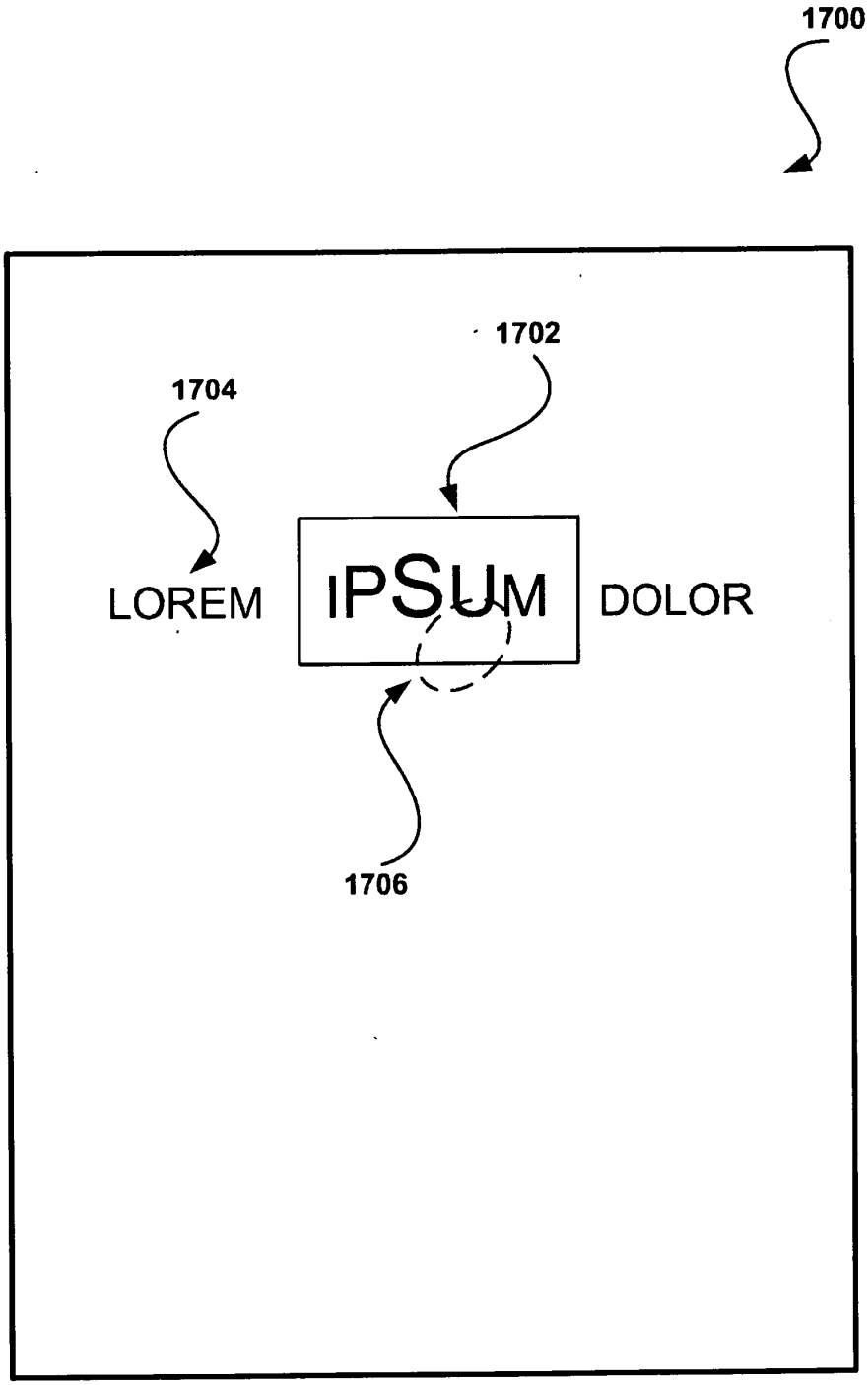


FIGURE 17

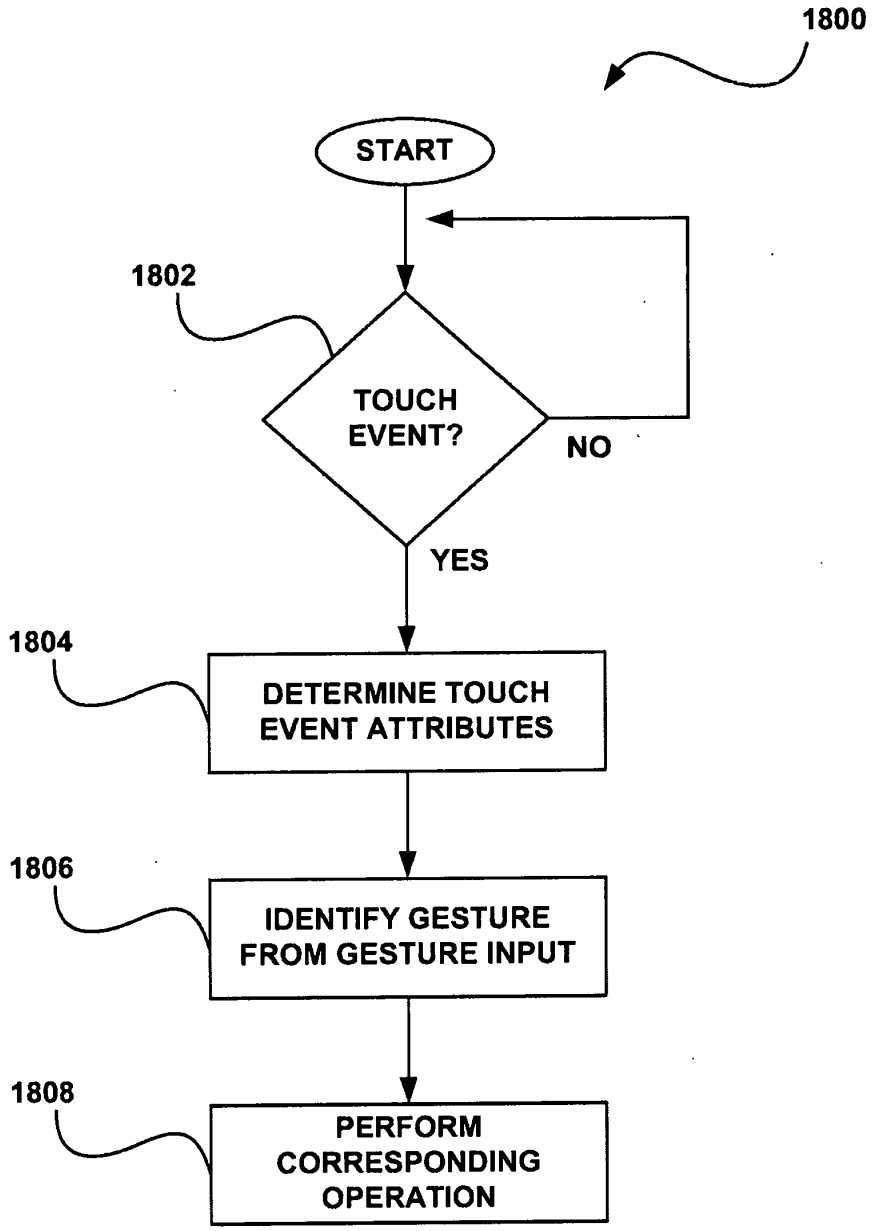

1800
START
1802
TOUCH EVENT?
NO
YES
1804
DETERMINE TOUCH EVENT ATTRIBUTES
1806
IDENTIFY GESTURE FROM GESTURE INPUT
1808
PERFORM CORRESPONDING OPERATION

FIGURE 18

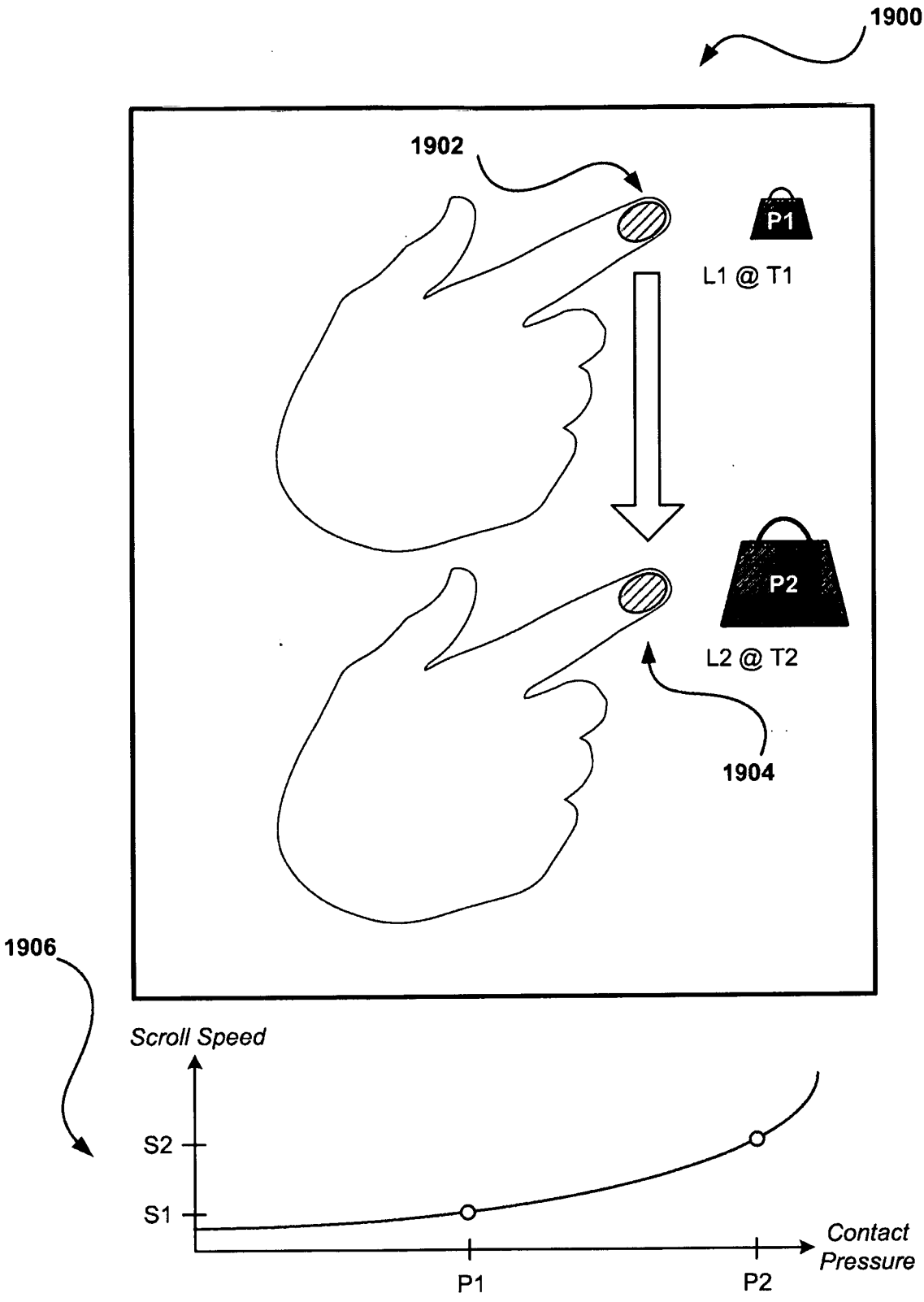

1900
1902
P1
L1 @ T1
P2
L2 @ T2
1904
1906
Scroll Speed
S2
S1
P1
P2
Contact Pressure

FIGURE 19

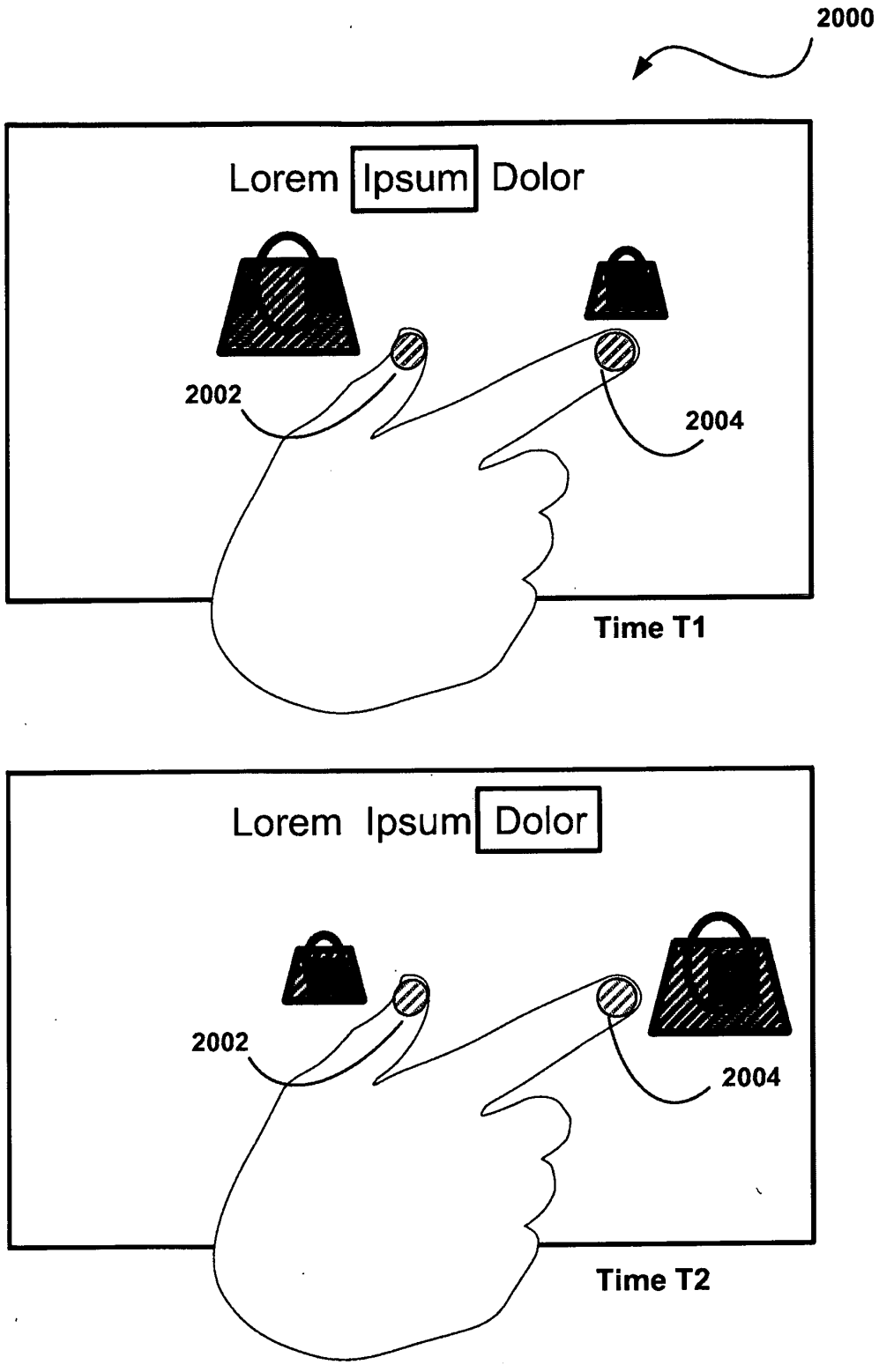

2000
Lorem Ipsum Dolor
2002
2004
Time T1
Lorem Ipsum Dolor
2002
2004
Time T2

FIGURE 20

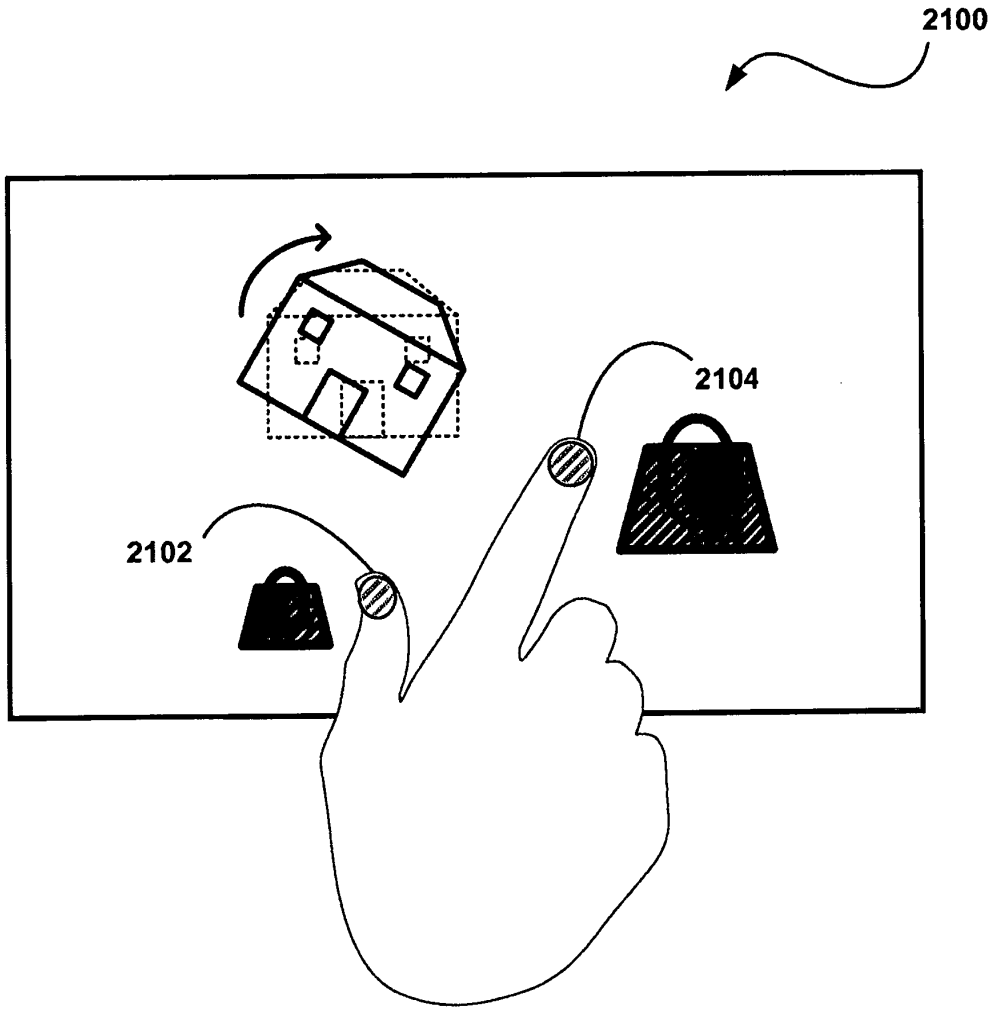


FIGURE 21

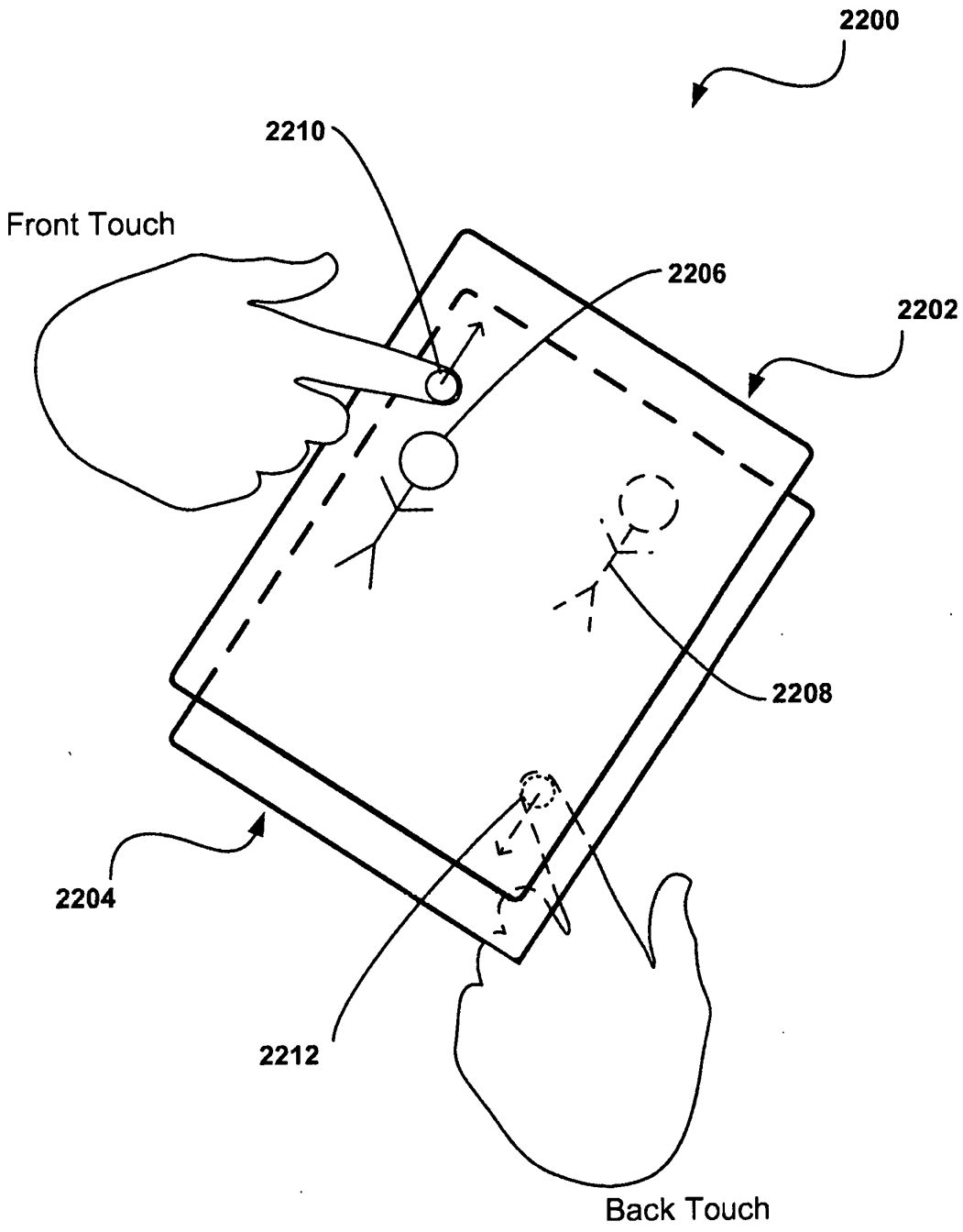


FIGURE 22

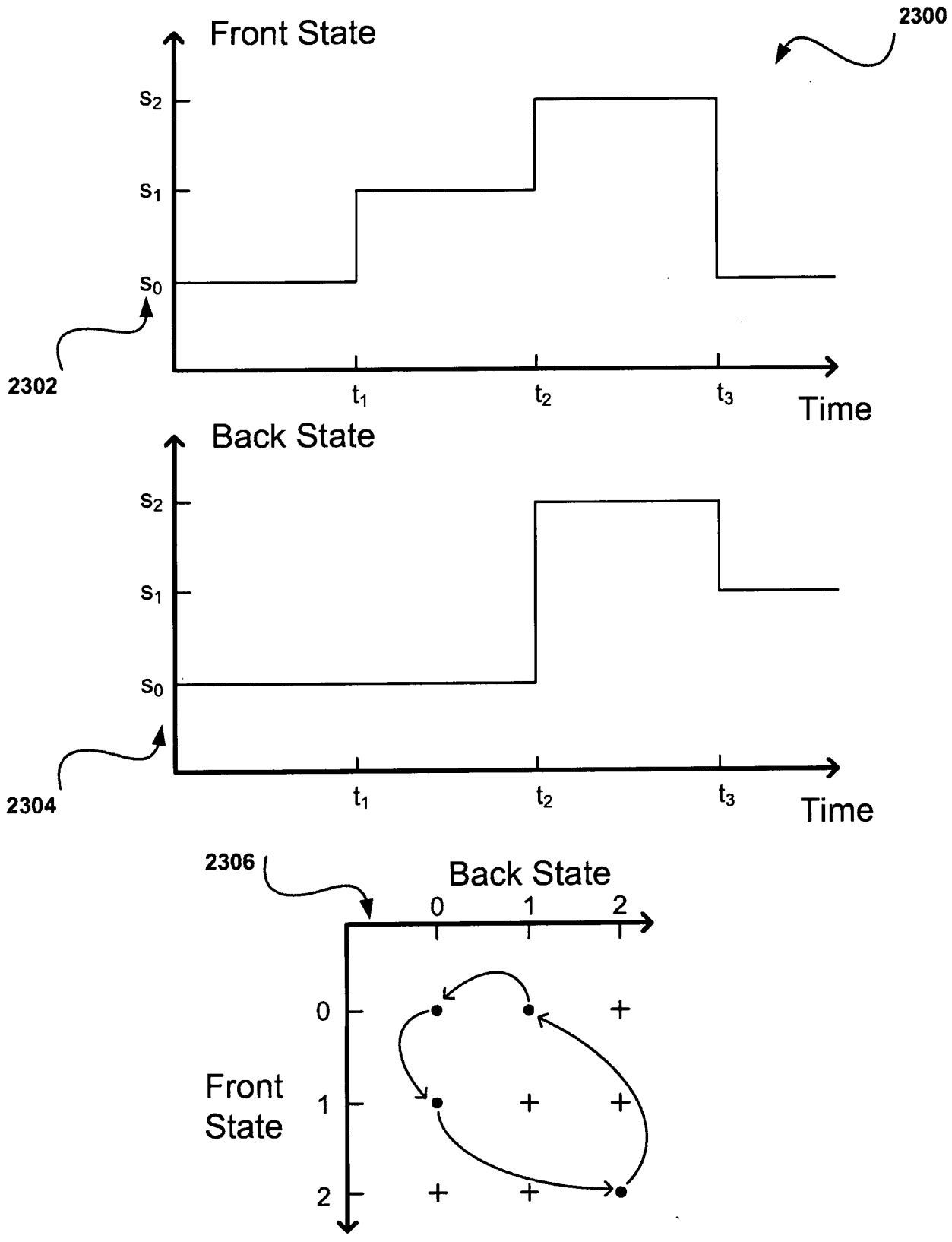

2300
Front State
s_2
s_1
s_0
2302
t_1
t_2
t_3
Time
Back State
s_2
s_1
s_0
2304
t_1
t_2
t_3
Time
2306
Back State
0
1
2
0
1
2
Front State
+
+
+
+
+

FIGURE 23

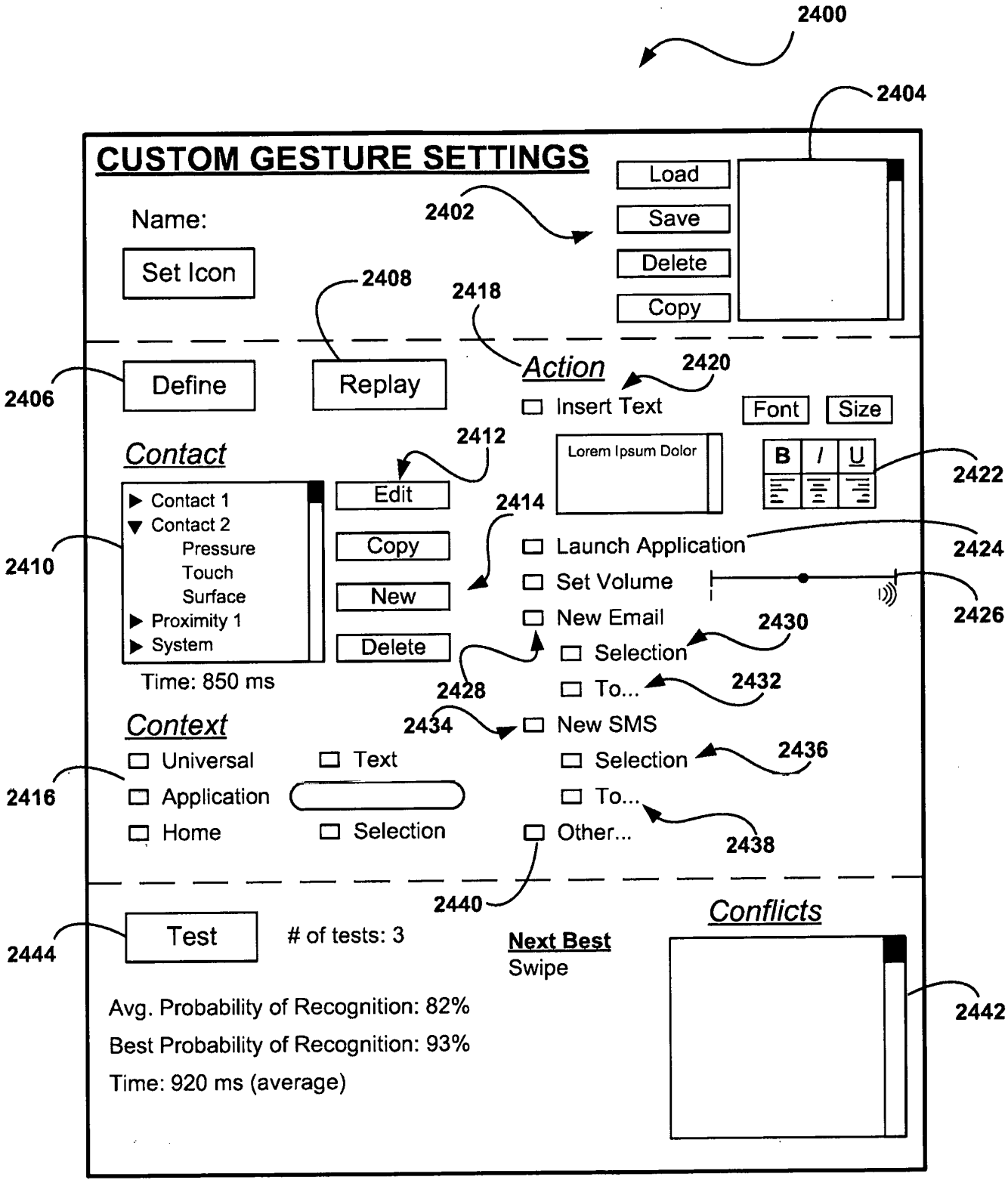

2400
2404
CUSTOM GESTURE SETTINGS
Load
Save
Delete
Copy
Name:
2402
Set Icon
2408
2418
Define
Replay
Action
2420
2406
Insert Text
Font
Size
Contact
2412
Lorem Ipsum Dolor
B
I
U
2422
Edit
2414
Contact 1
Contact 2
Pressure
Touch
Surface
Proximity 1
System
Copy
New
Delete
2410
Launch Application
2424
Set Volume
2426
New Email
2430
Selection
To...
2432
Time: 850 ms
2428
2434
Context
New SMS
Universal
Text
Selection
2436
2416
Application
To...
Home
Selection
Other...
2438
2440
Conflicts
2444
Test
of tests: 3
Next Best
Swipe
2442
Avg. Probability of Recognition: 82%
Best Probability of Recognition: 93%
Time: 920 ms (average)

FIGURE 24

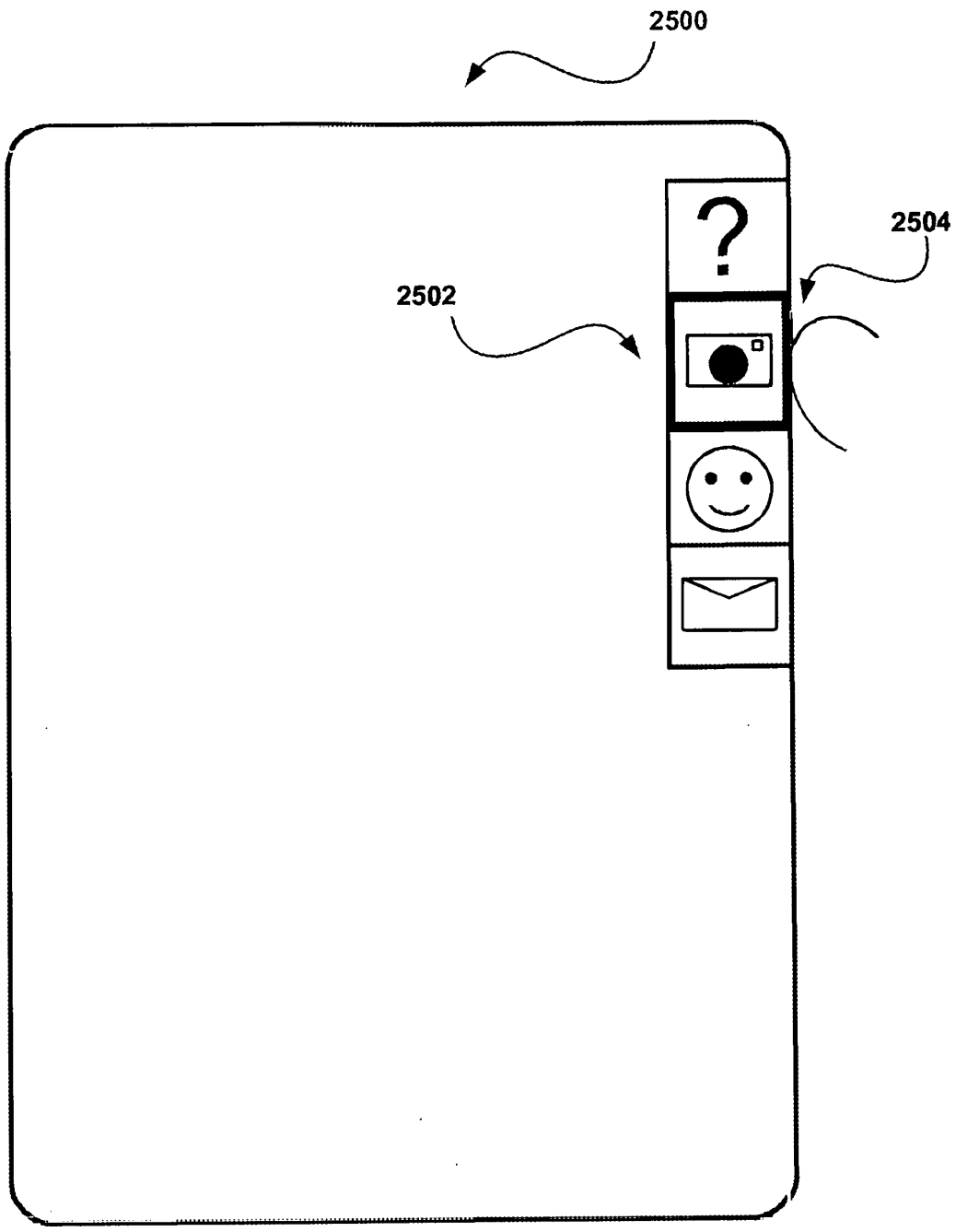


FIGURE 25

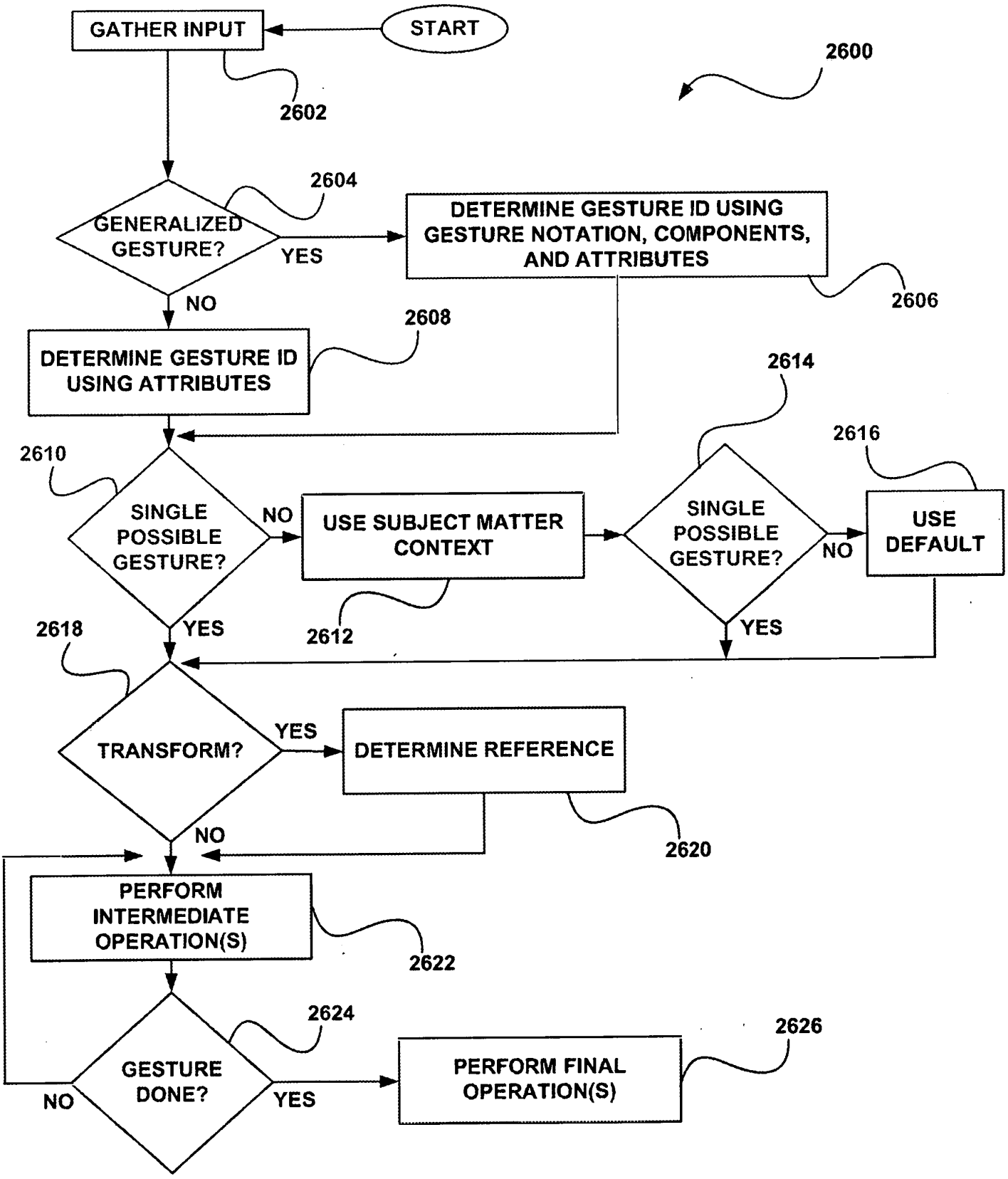

START
GATHER INPUT
2602
2600
2604
GENERALIZED GESTURE?
YES
NO
DETERMINE GESTURE ID USING GESTURE NOTATION, COMPONENTS, AND ATTRIBUTES
2606
2608
DETERMINE GESTURE ID USING ATTRIBUTES
2614
2616
2610
SINGLE POSSIBLE GESTURE?
NO
USE SUBJECT MATTER CONTEXT
SINGLE POSSIBLE GESTURE?
NO
USE DEFAULT
2612
YES
YES
2618
TRANSFORM?
YES
DETERMINE REFERENCE
2620
NO
PERFORM INTERMEDIATE OPERATION(S)
2622
2624
GESTURE DONE?
NO
YES
PERFORM FINAL OPERATION(S)
2626

FIGURE 26

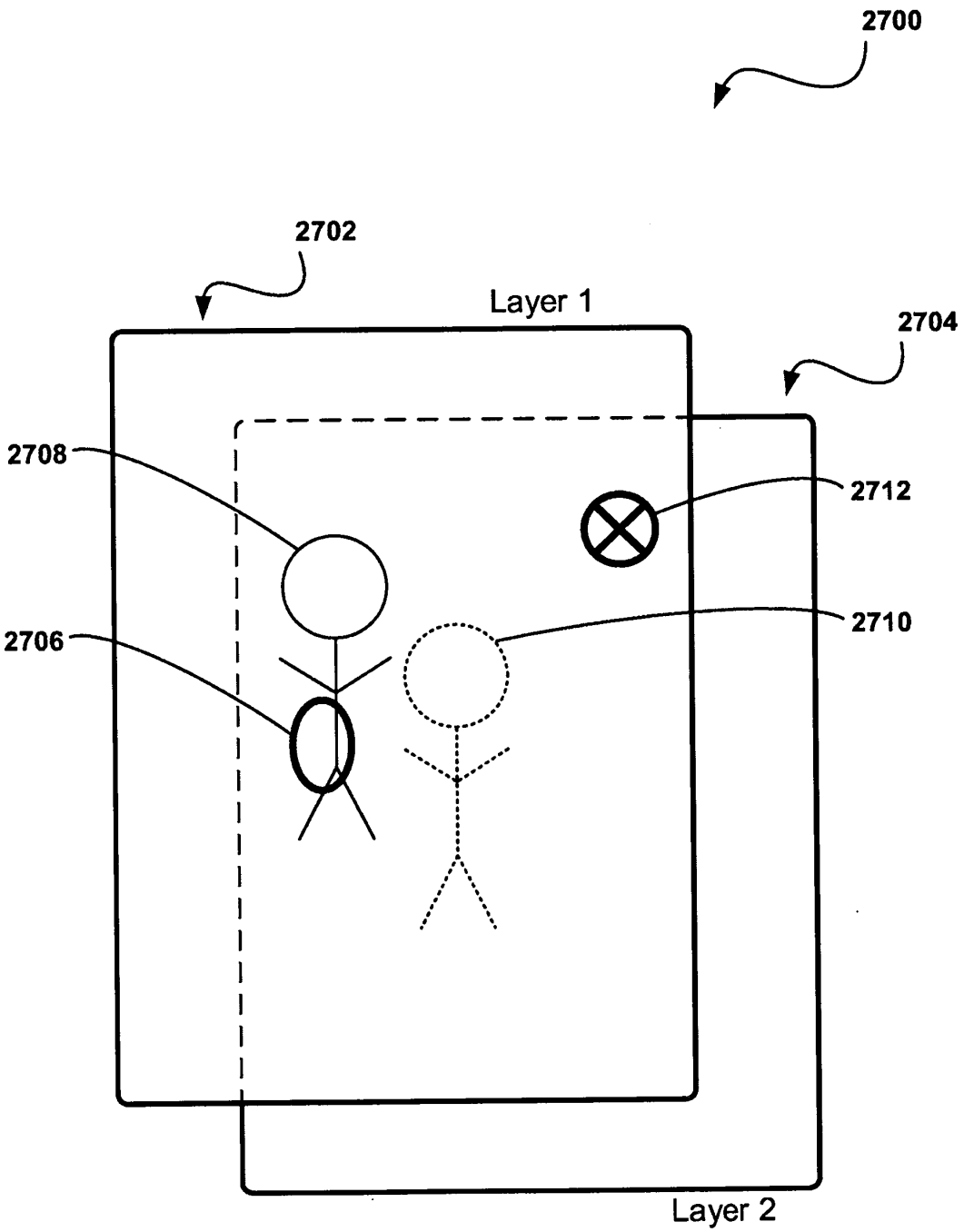


FIGURE 27

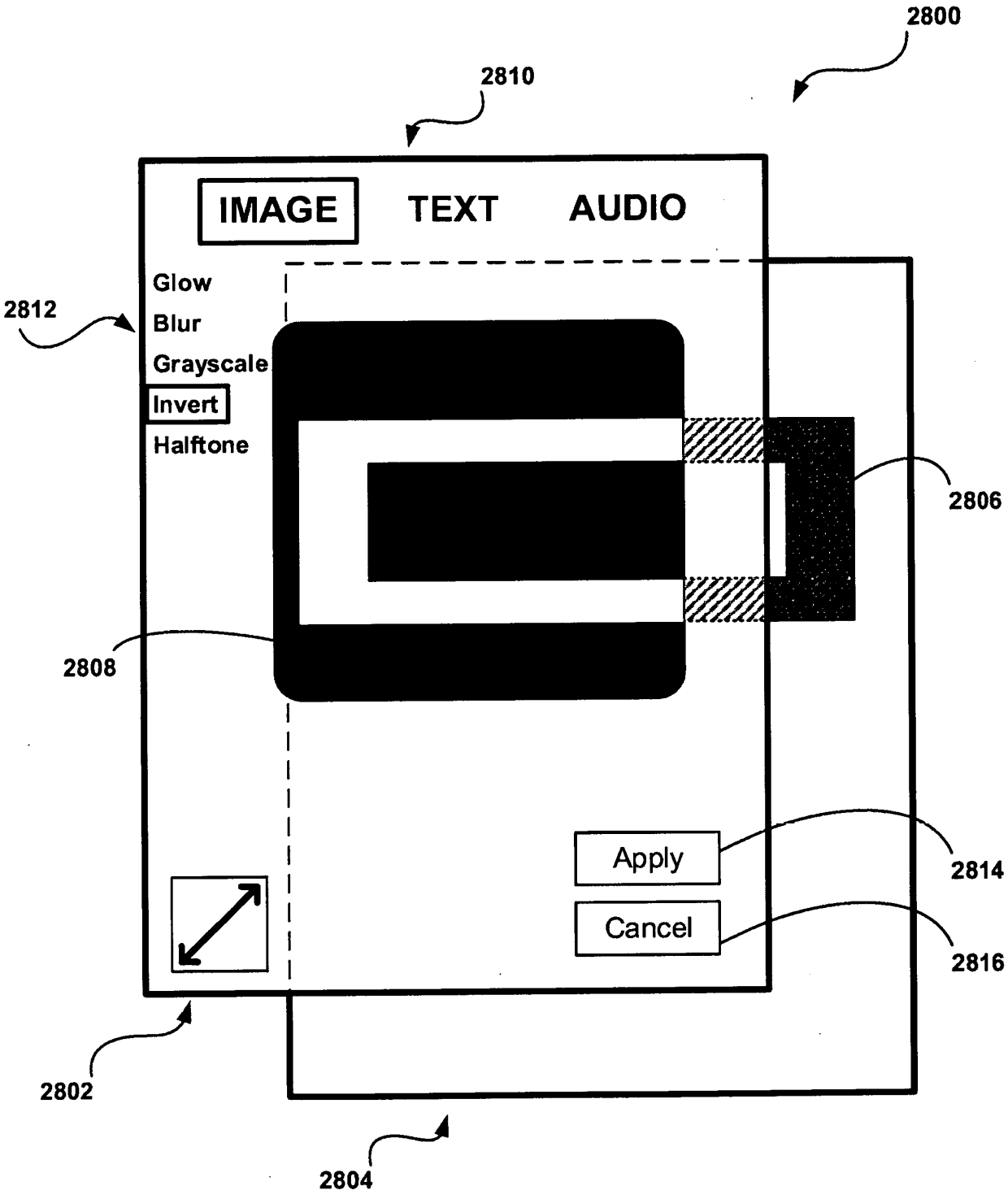

2800
2810
IMAGE
TEXT
AUDIO
2812
Glow
Blur
Grayscale
Invert
Halftone
2806
2808
Apply
2814
Cancel
2816
2802
2804

FIGURE 28

Electronic Acknowledgement Receipt	
EFS ID:	37787335
Application Number:	16687649
International Application Number:	
Confirmation Number:	6079
Title of Invention:	DEVICES, METHODS, AND GRAPHICAL USER INTERFACES FOR MANIPULATING USER INTERFACE OBJECTS WITH VISUAL AND/OR HAPTIC FEEDBACK
First Named Inventor/Applicant Name:	Michael S. Smith
Customer Number:	92045
Filer:	Patrick Edgar Caldwell
Filer Authorized By:	
Attorney Docket Number:	SMITH070AY
Receipt Date:	18-NOV-2019
Filing Date:	
Time Stamp:	22:49:30
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$3055
RAM confirmation Number	E2019AHM50297548
Deposit Account	505939
Authorized User	Patrick Caldwell
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees)	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	SMITH070AY_ADS_vF_18-Nov-2019.pdf	1874058 9717ce762094c244d89271e56d950ba312885702	no	9
Warnings:					
Information:					
2		SMITH070AY_Application_vF_18-Nov-2019.pdf	760781 87961f40bf595182c03c2f9bcdf5fad0bf46a47f	yes	139

Multipart Description/PDF files in .zip description

Document Description	Start	End
Abstract	139	139
Claims	133	138
Specification	1	132

Warnings:					
Information:					
3	Drawings-only black and white line drawings	SMITH070AY_Drawings_vF_18-Nov-2019.pdf	2936970 79aacbf2c775cfe027794ed63a48dca2e135542d	no	28
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4	Information Disclosure Statement (IDS) Form (SB08)	SMITH070AY_IDS_20191118_1_OF_6_vF.pdf	1062798 7a70c5e98218618b5725d7ac25df3d9f47c26629	no	37
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Information:					
5	Information Disclosure Statement (IDS) Form (SB08)	SMITH070AY_IDS_20191118_2_OF_6_vF.pdf	1061734 e769086024234ba0d11268f2d9b3101b4071e36a	no	36

Warnings:					
Information:					
6	Information Disclosure Statement (IDS) Form (SB08)	SMITH070AY_IDS_20191118_3_OF_6_vF.pdf	1059319 f933c9de8f8db59c60d150f1246b44151036ba65	no	35
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7	Information Disclosure Statement (IDS) Form (SB08)	SMITH070AY_IDS_20191118_4_OF_6_vF.pdf	1062632 7c82a68a10a11978632a549173504f427f6d051f	no	36
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8	Information Disclosure Statement (IDS) Form (SB08)	SMITH070AY_IDS_20191118_5_OF_6_vF.pdf	1061433 bcd2f9bfa289681d0de05fb9b7583df22e5bb017	no	32
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9	Information Disclosure Statement (IDS) Form (SB08)	SMITH070AY_IDS_20191118_6_OF_6_vF.pdf	1055659 170a934863ae4192a90bffd9b6f6e236e8098725	no	7
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Information:					
A U.S. Patent Number Citation or a U.S. Publication Number Citation is required in the Information Disclosure Statement (IDS) form for autoloading of data into USPTO systems. You may remove the form to add the required data in order to correct the Informational Message if you are citing U.S. References. If you chose not to include U.S. References, the image of the form will be processed and be made available within the Image File Wrapper (IFW) system. However, no data will be extracted from this form. Any additional data such as Foreign Patent Documents or Non Patent Literature will be manually reviewed and keyed into USPTO systems.					
10	Power of Attorney	SMITH070AY_POA_vF_18-Nov-2019.pdf	95105 727b4c88dbe0b963751516f41fe590552381952f	no	1
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11	TrackOne Request	SMITH070AY_ReqForPrioritizedExam_vF_18-Nov-2019.pdf	96256 ece0101b214a6783276a78b2add00cee21073092	no	2
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Information:					

12	Oath or Declaration filed	SMITH070AY-AI_Declaration_vF_18-Nov-2019.pdf	79100 39735ae620cf34bc514a4f90b4b0f809f66d1911	no	1
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13	Non Patent Literature	007-Akhshabi-Experimental-Evaluation.pdf	1020842 c04af0b7cd278be4f3d9a9722d930729068ed8e6	no	12
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14	Non Patent Literature	001-02731708.pdf	162392 e36c2f89554b9b573169171e81ef2a503a3bb1d3	no	4
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Information:					
15	Non Patent Literature	002-12625381.pdf	219827 0b9a320fdfa31f7f7442d89e00e0fc1e0e24c573	no	3
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Information:					
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Information:					
17	Non Patent Literature	004-13416731.pdf	1178429 bc6aea50ed6d2dba878029013eae0d91a8626186	no	18
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Information:					
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19	Non Patent Literature	006-3D-Packing-Newsletter.pdf	3193113 6cee0170be6d9a87b80fdc440b1a158620bfec98	no	16
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20	Non Patent Literature	008-ALTERA-Using-Pre-Emphasis.pdf	817786 557e0d8a814f8964da070c83dc10f6c841b56046	no	11
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Information:					
21	Non Patent Literature	009-AMD-BIOS-and-Kernel.pdf	18836075 590fe1a64702b8f1d619d6f0bd251a4a6c3a6f17	no	403
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Information:					
22	Non Patent Literature	010-AMP-DDR2-DIMM-25-Degree.pdf	39326 12cf5917c45bd19316a4819292ea473ce69ce056	no	1
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Information:					
23	Non Patent Literature	011-AMP-DDR2-DIMM-Socket.pdf	41620 d0c389b45285f3d011d3727101842c3db33da46d	no	1
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24	Non Patent Literature	012-ANALUI-Signal-Integrity.pdf	8001221 86284737990f87886924597c855fd0f9d649d885	no	194
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25	Non Patent Literature	013-ARM-The-ARM-Architecture.pdf	9264897 1104f6eb54ab7d8ffa2323716ebd1eb8a7f7a1ec	no	43
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Information:					

26	Non Patent Literature	014-ARORA-Sensing-by-the-people.pdf	2919790 71fa248131bbe84b1cbb845505057c906cd cd646	no	48
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27	Non Patent Literature	015-AVISSAR-Heterogeneous-Memory.pdf	993359 4eeccb4ccbd075381257794b761d535c002 01a5f	no	10
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Information:					
28	Non Patent Literature	016-BAHAR-Mobile-Phone-Based.pdf	942753 18ebb598fa0fd7ea7e2e5e0dbaac14233e5c 43ef	no	8
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29	Non Patent Literature	017-BAKER-Power-Behind-Resistive-Touch.pdf	673065 ed2c76b4772b9b6b585d0fe162490298cb4 9cbd9	no	9
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31	Non Patent Literature	019-BALASUBRAMANIAN-Energy-Consumption.pdf	1628759 625f3424a1bcd33fec39f9c7852b6913b359 3f2a	no	14
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Information:					
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Information:					

33	Non Patent Literature	021-BARR-Translation-Caching.pdf	1269989 06a5791a47417eda39d1603154a603c94d657cb1	no	12
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34	Non Patent Literature	022-BEN-YEHUDA-The-Turtles-Project.pdf	4374456 6536fd8590bd9d215f7e1912530ab583462750d1	no	92
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35	Non Patent Literature	023-BHARDWAJ-A-Choices-Hypervisor.pdf	259044 3822fdd04f7aad53a360c1f5176692053e087e76	no	5
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36	Non Patent Literature	024-BICKFORD-Rootkits-on-Smart-Phones.pdf	838995 54286396230c5f020c56d6b4a1237184dfb8473a	no	6
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Information:					
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39	Non Patent Literature	027-BORNSTEIN-ANDROID-Dalvik-VM-Internals-optimized.pdf	2455312 f85d1b9cb5b97ce83183c3e6a0e8dccefae34dd1	no	58
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40	Non Patent Literature	028-BRASH-Extensions-to-the-ARM-v-7-A.pdf	18069498 5fb80f0d206fe762a9762abaa488218a8d47f0b1	no	172
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41	Non Patent Literature	029-Brueck_US7818444_CoC.pdf	21654 6bfe2eeffdc952a83bb1448c29dd5e70bcf2b915	no	1
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42	Non Patent Literature	030-BUCHALI-Fast-Eye-Monitor.pdf	174017 e953d73379c95e9dfc31ce76e4cf5ecf79995f5e	no	4
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43	Non Patent Literature	031-BUCKWALTER-Deterministic-Jitter.pdf	9069132 3421341da5ea4679fe5df3f9d1797fec5eb3f038	no	220
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44	Non Patent Literature	032-BUNGALE-ARM-Virtualization.pdf	1864400 f010d9c4b7479180ecbdcac1c9fa5fcc6d1f7929	no	16
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Information:					
45	Non Patent Literature	033-BURDACH-Physical-Memory-Forensics.pdf	17122565 74d96ddef646aeff01ebe410abdfac2b1d4b3bc9	no	53
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46	Non Patent Literature	034-CARROLL-An-Analysis-of-Power.pdf	1322860 3f20ec613241de78ec30ea44ef554a06eac1cbb2	no	14
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47	Non Patent Literature	035-CASIEZ-RubberEdge.pdf	177292 b413f0227f149ac7e529ac85561c95b53a844275	no	1
Warnings:					
Information:					
48	Non Patent Literature	036-cellphone-hardware-apps.pdf	1021664 279fd0d9614136ce4a4d2b2fff4f8aef93bc0175	no	24
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Information:					
49	Non Patent Literature	037-CHANDRAMOULI-A-BROADBAND.pdf	2449241 71888556d3f87c9097799cbd2793b2eb07ef633db	no	52
Warnings:					
Information:					
50	Non Patent Literature	038-CHANDRASEKARAN-Hardware-assisted.pdf	909853 cda5c149667eda1e03f829092b60a6f6dfb93b91	no	8
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51	Non Patent Literature	039-CHAPMAN-MagiXen.pdf	1283190 718ef1079016fad551c123335270a448fb15765a	no	15
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The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

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Signature	/Patrick Caldwell/	Date (YYYY-MM-DD)	2019-11-18
Name/Print	Patrick Caldwell	Registration Number	44580

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	17	20090066660	A1	2009-03-12	Ure	
	18	20090067256	A1	2009-03-12	Bhattacharyya et al.	
	19	20090072662	A1	2009-03-19	Sadler et al.	
	20	20090073138	A1	2009-03-19	Lee et al.	
	21	20090085225	A1	2009-04-02	Park	
	22	20090085608	A1	2009-04-02	Alzheimer	
	23	20090086420	A1	2009-04-02	Stockham et al.	
	24	20090090950	A1	2009-04-09	Forbes et al.	
	25	20090091536	A1	2009-04-09	Callaghan	
	26	20090091962	A1	2009-04-09	Chung et al.	
	27	20090103675	A1	2009-04-23	Moghaddam et al.	

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	28	20090127668	A1	2009-05-21	Choi	
	29	20090128991	A1	2009-05-21	Mauritzson	
	30	20090140985	A1	2009-06-04	Liu	
	31	20090143652	A1	2009-06-04	Warburton et al.	
	32	20090153340	A1	2009-06-18	Pinder et al.	
	33	20090158152	A1	2009-06-18	Kodimer et al.	
	34	20090160781	A1	2009-06-25	Henderson et al.	
	35	20090166846	A1	2009-07-02	Pratt et al.	
	36	20090179780	A1	2009-07-16	Tambe	
	37	20090180257	A1	2009-07-16	Park et al.	
	38	20090184921	A1	2009-07-23	Scott et al.	

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	39	20090197394	A1	2009-08-06	Parekh	
	40	20090206431	A1	2009-08-20	Bolken et al.	
	41	20090213066	A1	2009-08-27	Hardacker et al.	
	42	2009022256	A1	2009-01-22	Fitzgerald	
	43	20090224822	A1	2009-09-10	Alzheimer et al.	
	44	20090225053	A1	2009-09-10	HU	
	45	20090237970	A1	2009-09-24	Chung	
	46	20090255705	A1	2009-10-15	Pratt	
	47	20090256807	A1	2009-10-15	Nurmi	
	48	20090259806	A1	2009-10-15	Kilzer et al.	
	49	20090261457	A1	2009-10-22	Pratt	

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	50	20090271731	A1	2009-10-29	Lin et al.	
	51	20090285031	A1	2009-11-19	Rajan et al.	
	52	20090289912	A1	2009-11-26	Chen et al.	
	53	20090295747	A1	2009-12-03	Hsieh et al.	
	54	20090296341	A1	2009-12-03	ELDERSHAW	
	55	20090300314	A1	2009-12-03	LaBerge et al.	
	56	20090300444	A1	2009-12-03	Jeddeloh	
	57	20090302484	A1	2009-12-10	Lee et al.	
	58	20090309142	A1	2009-12-17	Akram	
	59	20090315741	A1	2009-12-24	Kim	
	60	20090319703	A1	2009-12-24	Chung	

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	61	20090321861	A1	2009-12-31	Oliver et al.	
	62	20090321947	A1	2009-12-31	Pratt	
	63	20090323206	A1	2009-12-31	Oliver et al.	
	64	20090327979	A1	2009-12-31	Haverinen et al.	
	65	2009036176	A1	2009-02-05	Ure	
	66	2009046110	A1	2009-02-19	Sadler et al.	
	67	2009051659	A1	2009-02-26	Mickelborough	
	68	2009058829	A1	2009-03-05	Kim et al.	
	69	2009066660	A1	2009-03-12	Ure	
	70	2009073138	A1	2009-03-19	Lee et al.	
	71	2009083665	A1	2009-03-26	Anttila et al.	

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	72	2009085881	A1	2009-04-02	Keam	
	73	2009086420	A1	2009-04-02	Stockham et al.	
	74	2009091536	A1	2009-04-09	Callaghan	
	75	2009143652	A1	2009-06-04	Warburton et al.	
	76	2009158152	A1	2009-06-18	Kodimer et al.	
	77	2009160781	A1	2009-06-25	Henderson et al.	
	78	2009213066	A1	2009-08-27	Hardacker et al.	
	79	2009225053	A1	2009-09-10	Hu	
	80	2009231290	A1	2009-09-17	Chen	
	81	2009271731	A1	2009-10-29	Lin et al.	
	82	2009289912	A1	2009-11-26	Chen et al.	

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	83	2009295747	A1	2009-12-03	Hsieh et al.	
	84	20100005390	A1	2010-01-07	Bong	
	85	20100017872	A1	2010-01-21	Goertz et al.	
	86	20100020039	A1	2010-01-28	Ricks et al.	
	87	20100026640	A1	2010-02-04	Kim et al.	
	88	20100035656	A1	2010-02-11	Pan	
	89	20100039393	A1	2010-02-18	Pratt et al.	
	90	20100045612	A1	2010-02-25	Mölne	
	91	20100052880	A1	2010-03-04	Laitinen et al.	
	92	20100053103	A1	2010-03-04	NO et al.	
	93	20100053116	A1	2010-03-04	Daverman et al.	

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	94	20100053532	A1	2010-03-04	LAI	
	95	2010005390	A1	2010-01-07	Bong	
	96	20100066764	A1	2010-03-18	Refai	
	97	20100077829	A1	2010-04-01	Batista et al.	
	98	20100079398	A1	2010-04-01	Shen et al.	
	99	20100085500	A1	2010-04-08	Kim	
	100	20100090973	A1	2010-04-15	Algreatly	
	101	20100097347	A1	2010-04-22	Lin	
	102	20100110748	A1	2010-05-06	Best	
	103	20100117959	A1	2010-05-13	Hong et al.	
	104	20100134429	A1	2010-06-03	You et al.	

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	105	20100134448	A1	2010-06-03	Park et al.	
	106	20100149101	A1	2010-06-17	Guo et al.	
	107	20100149124	A1	2010-06-17	Kim et al.	
	108	20100149129	A1	2010-06-17	Homma et al.	
	109	20100156814	A1	2010-06-24	Weber et al.	
	110	20100156818	A1	2010-06-24	Burrough et al.	
	111	20100156823	A1	2010-06-24	Paleczny et al.	
	112	20100164745	A1	2010-07-01	Migos et al.	
	113	20100164884	A1	2010-07-01	Chiu et al.	
	114	20100171711	A1	2010-07-08	Mak-Fan et al.	
	115	20100177057	A1	2010-07-15	Flint et al.	

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	116	2010017872	A1	2010-01-21	Goertz et al.	
	117	20100188353	A1	2010-07-29	Yoon et al.	
	118	20100188365	A1	2010-07-29	Tamaki et al.	
	119	20100194709	A1	2010-08-05	Tamaki et al.	
	120	2010020039	A1	2010-01-28	Ricks et al.	
	121	20100201651	A1	2010-08-12	Baucom et al.	
	122	20100206560	A1	2010-08-19	Atencio	
	123	20100207900	A1	2010-08-19	Kung et al.	
	124	20100208082	A1	2010-08-19	Buchner et al.	
	125	20100214239	A1	2010-08-26	Wu	
	126	20100214499	A1	2010-08-26	Sanelle et al.	

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	127	20100220065	A1	2010-09-02	Ma	
	128	20100222735	A1	2010-09-02	Plahey et al.	
	129	20100225608	A1	2010-09-09	ZHOU et al.	
	130	20100240390	A1	2010-09-23	Russ et al.	
	131	20100241984	A1	2010-09-23	Nurmi et al.	
	132	20100245282	A1	2010-09-30	Lai	
	133	20100257304	A1	2010-10-07	Rajan et al.	
	134	20100259490	A1	2010-10-14	Lee	
	135	2010026640	A1	2010-02-04	Kim et al.	
	136	20100271888	A1	2010-10-28	Rajan et al.	
	137	20100277432	A1	2010-11-04	Tsai	

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	138	20100281280	A1	2010-11-04	Rajan et al.	
	139	20100293460	A1	2010-11-18	Budelli	
	140	20100302281	A1	2010-12-02	Kim	
	141	20100332635	A1	2010-12-30	ROGEL et al.	
	142	2010035656	A1	2010-02-11	Pan	
	143	2010045612	A1	2010-02-25	Moelne	
	144	2010045621	A1	2010-02-25	Kang et al.	
	145	2010053103	A1	2010-03-04	No et al.	
	146	2010053532	A1	2010-03-04	Lai	
	147	2010058211	A1	2010-03-04	Lee et al.	
	148	2010077829	A1	2010-04-01	Batista et al.	

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	149	2010079398	A1	2010-04-01	Shen et al.	
	150	2010085500	A1	2010-04-08	Kim	
	151	2010088654	A1	2010-04-08	Henhoeffer	
	152	2010090982	A1	2010-04-15	Oba et al.	
	153	2010097347	A1	2010-04-22	Lin	
	154	2010127983	A1	2010-05-27	Irani et al.	
	155	2010134429	A1	2010-06-03	You et al.	
	156	2010134448	A1	2010-06-03	Park et al.	
	157	2010149101	A1	2010-06-17	Guo et al.	
	158	2010149124	A1	2010-06-17	Kim et al.	
	159	2010164884	A1	2010-07-01	Chiu et al.	

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	160	2010188327	A1	2010-07-29	Frid et al.	
	161	2010188365	A1	2010-07-29	Tamaki et al.	
	162	2010194709	A1	2010-08-05	Tamaki et al.	
	163	2010201651	A1	2010-08-12	Baucom et al.	
	164	2010206560	A1	2010-08-19	Atencio	
	165	2010207900	A1	2010-08-19	Kung et al.	
	166	2010214499	A1	2010-08-26	Sanelle et al.	
	167	2010222735	A1	2010-09-02	Plahey et al.	
	168	2010225608	A1	2010-09-09	Zhou et al.	
	169	2010241989	A1	2010-09-23	Wen et al.	
	170	2010251119	A1	2010-09-30	Geppert et al.	

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	171	2010259490	A1	2010-10-14	Lee	
	172	2010277432	A1	2010-11-04	Tsai	
	173	2010328230	A1	2010-12-30	Faubert et al.	
	174	20110001706	A1	2011-01-06	Sanford et al.	
	175	20110007023	A1	2011-01-13	Abrahamsson et al.	
	176	20110012921	A1	2011-01-20	Cholewin et al.	
	177	20110016250	A1	2011-01-20	Lee et al.	
	178	2011001706	A1	2011-01-06	Sanford et al.	
	179	20110018695	A1	2011-01-27	Bells et al.	
	180	20110025969	A1	2011-02-03	Chen et al.	
	181	20110029868	A1	2011-02-03	Moran et al.	

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	182	20110035540	A1	2011-02-10	Fitzgerald et al.	
	183	20110037609	A1	2011-02-17	KIM et al.	
	184	20110037726	A1	2011-02-17	Lee	
	185	20110044064	A1	2011-02-24	Hu et al.	
	186	20110050576	A1	2011-03-03	Forutanpour et al.	Entire Document
	187	20110050588	A1	2011-03-03	Li et al.	Entire Document
	188	20110050591	A1	2011-03-03	Kim et al.	
	189	20110050592	A1	2011-03-03	Kim et al.	
	190	20110050593	A1	2011-03-03	Kim et al.	
	191	20110050594	A1	2011-03-03	Kim et al.	Entire Document
	192	20110050608	A1	2011-03-03	Homma et al.	

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	193	20110050653	A1	2011-03-03	MIYAZAWA et al.	
	194	20110051334	A1	2011-03-03	Griffith et al.	
	195	20110057613	A1	2011-03-10	Taguchi et al.	
	196	20110063248	A1	2011-03-17	YOON	
	197	20110066790	A1	2011-03-17	Mogul et al.	
	198	2011007023	A1	2011-01-13	Abrahamsson et al.	
	199	20110080417	A1	2011-04-07	Lin et al.	
	200	20110088416	A1	2011-04-21	Koethler	
	201	20110095783	A1	2011-04-28	Ferolito et al.	
	202	20110102336	A1	2011-05-05	SEOK et al.	
	203	20110102347	A1	2011-05-05	LIM et al.	

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	204	20110107212	A1	2011-05-05	JEONG	
	205	20110109573	A1	2011-05-12	Deslippe et al.	
	206	20110109829	A1	2011-05-12	Mathew et al.	
	207	20110110047	A1	2011-05-12	Pauley et al.	
	208	20110113208	A1	2011-05-12	Jouppi et al.	
	209	20110115738	A1	2011-05-19	Suzuki et al.	
	210	20110117968	A1	2011-05-19	Eromaki	
	211	20110118029	A1	2011-05-19	Lukas et al.	
	212	20110122084	A1	2011-05-26	Jeon et al.	
	213	2011012921	A1	2011-01-20	Cholewin et al.	
	214	20110141052	A1	2011-06-16	Bernstein et al.	

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	215	20110152739	A1	2011-06-23	Roncadi et al.	
	216	20110164047	A1	2011-07-07	Pance	
	217	20110169745	A1	2011-07-14	Fang et al.	
	218	20110169775	A1	2011-07-14	Liaw et al.	
	219	20110175805	A1	2011-07-21	ROTTLER et al.	
	220	20110175844	A1	2011-07-21	Berggren	
	221	20110175845	A1	2011-07-21	Honda et al.	
	222	20110175902	A1	2011-07-21	Mahowald	
	223	20110181552	A1	2011-07-28	Goertz et al.	
	224	20110205446	A1	2011-08-25	Hardacker et al.	
	225	20110210942	A1	2011-09-01	Kitamori et al.	

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	226	20110210943	A1	2011-09-01	Zaliva	
	227	20110227830	A1	2011-09-22	Chun	
	228	20110227836	A1	2011-09-22	Li et al.	
	229	20110227877	A1	2011-09-22	Chen	
	230	20110239110	A1	2011-09-29	Garrett et al.	
	231	20110248941	A1	2011-10-13	Abdo et al.	
	232	20110254793	A1	2011-10-20	Ban et al.	
	233	2011025969	A1	2011-02-03	Chen et al.	
	234	20110260994	A1	2011-10-27	Saynac et al.	
	235	20110273394	A1	2011-11-10	Young et al.	
	236	20110273396	A1	2011-11-10	CHUNG	

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	237	20110291945	A1	2011-12-01	Richard Alan Ewing et al.	
	238	20110291953	A1	2011-12-01	Cheok et al.	
	239	20110310537	A1	2011-12-22	Imamura et al.	
	240	20110314423	A1	2011-12-22	Ohmiya et al.	
	241	2011037726	A1	2011-02-17	Lee	
	242	2011044064	A1	2011-02-24	Hu et al.	
	243	2011045813	A1	2011-02-24	Choi	
	244	2011050591	A1	2011-03-03	Kim et al.	
	245	2011050592	A1	2011-03-03	Kim et al.	
	246	2011050593	A1	2011-03-03	Kim et al.	
	247	2011050594	A1	2011-03-03	Kim et al.	

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	248	2011050608	A1	2011-03-03	Homma et al.	
	249	2011051334	A1	2011-03-03	Griffith et al.	
	250	2011057889	A1	2011-03-10	Sakatsume	
	251	2011059777	A1	2011-03-10	Rao	
	252	2011061021	A1	2011-03-10	Kang et al.	
	253	2011063248	A1	2011-03-17	Yoon	
	254	2011084921	A1	2011-04-14	Kang et al.	
	255	2011088416	A1	2011-04-21	Koethler	
	256	2011102336	A1	2011-05-05	Seok et al.	
	257	2011102347	A1	2011-05-05	Lim et al.	
	258	2011109573	A1	2011-05-12	Deslippe et al.	

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	259	2011115738	A1	2011-05-19	Suzuki et al.	
	260	2011118029	A1	2011-05-19	Lukas et al.	
	261	2011122084	A1	2011-05-26	Jeon et al.	
	262	2011152739	A1	2011-06-23	Roncadi et al.	
	263	2011169775	A1	2011-07-14	Liaw et al.	
	264	2011175845	A1	2011-07-21	Honda et al.	
	265	2011181552	A1	2011-07-28	Goertz et al.	
	266	2011205446	A1	2011-08-25	Hardacker et al.	
	267	2011210942	A1	2011-09-01	Kitamori et al.	
	268	2011210943	A1	2011-09-01	Zaliva	
	269	2011227836	A1	2011-09-22	Li et al.	

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	270	2011227877	A1	2011-09-22	Chen	
	271	2011239110	A1	2011-09-29	Garrett et al.	
	272	2011248941	A1	2011-10-13	Abdo et al.	
	273	2011254793	A1	2011-10-20	Ban et al.	
	274	2011260984	A1	2011-10-27	Paleczny	
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