8457761

THE UNITED STATES OF AMERICA

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United States Patent and Trademark Office

February 09, 2024

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APPLICATION NUMBER: ***13/889,750***
FILING DATE: ***May 08, 2013***
PATENT NUMBER: ***8918741***
ISSUE DATE: ***December 23, 2014***

UNITED STATES PATENT AND TRADEMARK OFFICE
DEPARTMENT OF COMMERCE

Certified by

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Under Secretary of Commerce
for Intellectual Property
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Doc Code: PA..

Document Description: Power of Attorney

PTO/AIA/82A (07-12)

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TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B or equivalent) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5. If the Power of Attorney by Applicant form is not accompanied by this transmittal form or an equivalent, the Power of Attorney will not be recognized in the application.

Application Number	Not Yet Assigned
Filing Date	Concurrently Herewith
First Named Inventor	Phillip Lindberg
Title	UNLOCKING A TOUCH SCREEN DEVICE
Art Unit	
Examiner Name	
Attorney Docket Number	042933/427718

SIGNATURE of Applicant or Patent Practitioner

Signature	/Guy R. Gosnell/	Date	2013-05-08
Name	Guy R. Gosnell	Telephone	704-444-1000
Registration Number	34,610		

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

☐ *Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.31, 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: PA..

Document Description: Power of Attorney

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POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in the attached transmittal letter.

■ I hereby appoint 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 equivalent):

10949

OR

☐ I hereby appoint Practitioner(s) named below 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 equivalent):

Name	Registration Number	Name	Registration Number

Please recognize or change the correspondence address for the application identified in the attached transmittal letter 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:

☐ Inventor or Joint Inventor

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor

■ Assignee or Person to Whom the Inventor is Under an Obligation to Assign

☐ 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)

SIGNATURE of Applicant for Patent

Signature	Virpi Tognetty	Date	20 December 2012
Name	Virpi Tognetty Director, Patenting Operations Legal and Intellectual Property	Telephone	
Title and Company	NOKIA CORPORATION		

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. Submit multiple forms for more than one signature, see below *.

☐ *Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.31, 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.**

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20 December 2012

Jukka Nihtilä
Head, Business Development
Legal & IP

Doc code: Oath
Document Description: Oath or declaration filed

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SUBSTITUTE STATEMENT IN LIEU OF AN OATH OR DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (35 U.S.C. 115(d) AND 37 CFR 1.64)

Title of Invention	UNLOCKING A TOUCH SCREEN DEVICE

This statement is directed to:

☒ The attached application,

OR

☐ United States application or PCT international application number _____ filed on _____.

LEGAL NAME of inventor to whom this substitute statement applies:

(*E.g.*, Given Name (first and middle (if any)) and Family Name or Surname)

Sami Niemela

Residence (except for a deceased or legally incapacitated inventor):

City	State	Country
Helsinki		FI

Mailing Address (except for a deceased or legally incapacitated inventor):

Torivoudintie 11 D

City	State	Zip	Country
Helsinki		00640	FI

I believe the above-named inventor or joint inventor to be the original inventor or an original joint inventor of a claimed invention in the application.

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

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

Relationship to the inventor to whom this substitute statement applies:

- ☐ Legal Representative (for deceased or legally incapacitated inventor only),
- ☒ Assignee,
- ☐ Person to whom the inventor is under an obligation to assign,
- ☐ Person who otherwise shows a sufficient proprietary interest in the matter (petition under 37 CFR 1.46 is required), or
- ☐ Joint 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.

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SUBSTITUTE STATEMENT

Circumstances permitting execution of this substitute statement:

- ☐ Inventor is deceased,
- ☐ Inventor is under legal incapacity,
- ☐ Inventor cannot be found or reached after diligent effort, or
- ■ Inventor has refused to execute the oath or declaration under 37 CFR 1.63.

If there are joint inventors, please check the appropriate box below:

- ■ An application data sheet under 37 CFR 1.76 (PTO/AIA/14 or equivalent) naming the entire inventive entity has been or is currently submitted.

OR

- ☐ An application data sheet under 37 CFR 1.76 (PTO/AIA/14 or equivalent) has not been submitted. Thus, a Substitute Statement Supplemental Sheet (PTO/AIA/11 or equivalent) naming the entire inventive entity and providing inventor information is attached. See 37 CFR 1.64(b).

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.

PERSON EXECUTING THIS SUBSTITUTE STATEMENT:

Name: Kari Puranen	Date (Optional): 2 May 2013
Signature:	

Residence (unless provided in an application data sheet, PTO/AIA/14 or equivalent):

City Tampere	State	Country Finland

Mailing Address (unless provided in an application data sheet, PTO/AIA/14 or equivalent)

Keilalahdentie 4, FIN-00045 (Nokia Group), Espoo Finland

City Espoo	State	Zip 00045	Country Finland

Note: Use an additional PTO/AIA/02 form for each inventor who is deceased, legally incapacitated, cannot be found or reached after diligent effort, or has refused to execute the oath or declaration under 37 CFR 1.63.

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Doc code: Oath
Document Description: Oath or declaration filed

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SUBSTITUTE STATEMENT IN LIEU OF AN OATH OR DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (35 U.S.C. 115(d) AND 37 CFR 1.64)

Title of Invention	UNLOCKING A TOUCH SCREEN DEVICE

This statement is directed to:

☒ The attached application,

OR

☐ United States application or PCT international application number _____ filed on _____.

LEGAL NAME of inventor to whom this substitute statement applies:

(*E.g.*, Given Name (first and middle (if any)) and Family Name or Surname)

Phillip Lindberg

Residence (except for a deceased or legally incapacitated inventor):

City	State	Country
Helsinki		FI

Mailing Address (except for a deceased or legally incapacitated inventor):

Kadetintie 20 A 3

City	State	Zip	Country
Helsinki		00330	FI

I believe the above-named inventor or joint inventor to be the original inventor or an original joint inventor of a claimed invention in the application.

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

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

Relationship to the inventor to whom this substitute statement applies:

- ☐ Legal Representative (for deceased or legally incapacitated inventor only),
- ☒ Assignee,
- ☐ Person to whom the inventor is under an obligation to assign,
- ☐ Person who otherwise shows a sufficient proprietary interest in the matter (petition under 37 CFR 1.46 is required), or
- ☐ Joint 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.**

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SUBSTITUTE STATEMENT

Circumstances permitting execution of this substitute statement:

- ☐ Inventor is deceased,
- ☐ Inventor is under legal incapacity,
- ☐ Inventor cannot be found or reached after diligent effort, or
- ■ Inventor has refused to execute the oath or declaration under 37 CFR 1.63.

If there are joint inventors, please check the appropriate box below:

- ■ An application data sheet under 37 CFR 1.76 (PTO/AIA/14 or equivalent) naming the entire inventive entity has been or is currently submitted.

OR

- ☐ An application data sheet under 37 CFR 1.76 (PTO/AIA/14 or equivalent) has not been submitted. Thus, a Substitute Statement Supplemental Sheet (PTO/AIA/11 or equivalent) naming the entire inventive entity and providing inventor information is attached. See 37 CFR 1.64(b).

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.

PERSON EXECUTING THIS SUBSTITUTE STATEMENT:

Name: Kari Puranen	Date (Optional): 2 May 2013
Signature: Kari P	

Residence (unless provided in an application data sheet, PTO/AIA/14 or equivalent):

City Tampere	State	Country Finland

Mailing Address (unless provided in an application data sheet, PTO/AIA/14 or equivalent)

Keilalahdentie 4, FIN-00045 ESPOO, Finland

City Espoo	State	Zip 00045	Country Finland

Note: Use an additional PTO/AIA/02 form for each inventor who is deceased, legally incapacitated, cannot be found or reached after diligent effort, or has refused to execute the oath or declaration under 37 CFR 1.63.

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Doc Code: TRACK1.REQ
Document Description: TrackOne Request

PTO/AIA/424 (03-13)

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

First Named Inventor:	Lindberg	Nonprovisional Application Number (if known):	
Title of Invention:	UNLOCKING A TOUCH SCREEN DEVICE		

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), the prioritized examination fee set forth in 37 CFR 1.17(c), and if not already paid, the publication fee set forth in 37 CFR 1.18(d) have been filed with the request. The basic filing fee, search fee, examination fee, and any required excess claims and application size fees are filed with the request or have been already been paid.

2. The application contains or is amended to contain no more than four independent claims and no more than thirty total claims, and no multiple dependent claims.

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. The executed inventor's oath or declaration is filed with the application. (37 CFR 1.63 and 1.64)

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 /Guy R. Gosnell/	Date 2013-05-08
Name (Print/Typed) Guy R. Gosnell	Practitioner Registration Number 34610

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 _____ forms are submitted.

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	UNLOCKING A TOUCH SCREEN DEVICE
First Named Inventor/Applicant Name:	Phillip Lindberg
Filer:	Guy Randall Gosnell/Lauren Martin
Attorney Docket Number:	042933/427718

Filed as Large Entity

Track I Prioritized Examination - Nonprovisional Application under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility application filing	1011	1	280	280
Utility Search Fee	1111	1	600	600
Utility Examination Fee	1311	1	720	720
Request for Prioritized Examination	1817	1	4000	4000
Pages:				
Claims:				
Miscellaneous-Filing:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Publ. Fee- Early, Voluntary, or Normal	1504	1	300	300
OTHER PUBLICATION PROCESSING FEE	1808	1	130	130

Petition:	
Patent-Appeals-and-Interference:	
Post-Allowance-and-Post-Issuance:	
Extension-of-Time:	
Miscellaneous:	
Total in USD ($)	**6030**

Electronic Acknowledgement Receipt

EFS ID:	15725165
Application Number:	13889750
International Application Number:	
Confirmation Number:	1050
Title of Invention:	UNLOCKING A TOUCH SCREEN DEVICE
First Named Inventor/Applicant Name:	Phillip Lindberg
Customer Number:	10949
Filer:	Guy Randall Gosnell/Lauren Martin
Filer Authorized By:	Guy Randall Gosnell
Attorney Docket Number:	042933/427718
Receipt Date:	08-MAY-2013
Filing Date:	
Time Stamp:	15:41:52
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$6030
RAM confirmation Number	2100
Deposit Account	160605
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	427718-ADS.PDF	1508020 af7bcfab9297ae4a7b89516d9f60484f120237ae	no	7
Warnings:					
Information:					
2		427718-ApplAsFiled.PDF	1359280 45fe4a5ecb8a797208d503fa2dcabe6d5fea58ca	yes	37

Multipart Description/PDF files in .zip description

Document Description	Start	End
Specification	1	16
Claims	17	19
Abstract	20	20
Drawings-only black and white line drawings	21	30
Power of Attorney	31	32
Oath or Declaration filed	33	34
Oath or Declaration filed	35	36
TrackOne Request	37	37

Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	40133 a9b5b7e86ae816fcfe088eebd9d1f8b57d570dcc	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	2907433		

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.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	042933/427718
	Application Number	
Title of Invention	UNLOCKING A TOUCH SCREEN DEVICE	

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
	Phillip		Lindberg	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Helsinki	Country of Residence i	FI

Mailing Address of Inventor:

Address 1	Kadetintie 20 A 3		
Address 2			
City	Helsinki	State/Province	
Postal Code	00330	Country i	FI

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Sami		Niemela	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Helsinki	Country of Residence i	FI

Mailing Address of Inventor:

Address 1	Troivoudintie 11 D		
Address 2			
City	Helsinki	State/Province	
Postal Code	00640	Country i	FI

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	042933/427718
	Application Number	
Title of Invention	UNLOCKING A TOUCH SCREEN DEVICE	

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	10949		
Email Address		Add Email	Remove Email

Application Information:

Title of the Invention	UNLOCKING A TOUCH SCREEN DEVICE		
Attorney Docket Number	042933/427718	**Small Entity Status Claimed**	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	10	**Suggested Figure for Publication (if any)**	

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	10949		

Domestic Benefit/National Stage Information:

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Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Continuation of	13/357143	2012-01-24
Prior Application Status	Patented		Remove

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	042933/427718
	Application Number	
Title of Invention	UNLOCKING A TOUCH SCREEN DEVICE	

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13/357143	Division of	11/770929	2007-06-29	8127254	2012-02-28

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Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	042933/427718
	Application Number	
Title of Invention	UNLOCKING A TOUCH SCREEN DEVICE	

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Signature	/Guy R. Gosnell/			Date (YYYY-MM-DD)	2013-05-08
First Name	Guy	Last Name	Gosnell	Registration Number	34610

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	042933/427718
	Application Number	
Title of Invention	UNLOCKING A TOUCH SCREEN DEVICE	

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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.

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UNLOCKING A TOUCH SCREEN DEVICE

CROSS REFERENCE TO RELATED APPLICATIONS

[0001.1] This application is a continuation of and claims priority to U.S. Application No. 13/357,143, filed on January 24, 2012, which is a divisional of and claims priority to U. S. Application No. 11/770,929, filed on June 29, 2007, the entire contents of which are hereby incorporated by reference.

BACKGROUND

Field

[0001.2] The disclosed embodiments generally relate to user interfaces and in particular to transitioning from an idle/locked state of a device to an active/unlocked state of a device.

Brief Description of Related Developments

[0002] Mobile devices, such as mobile communication devices, generally include a variety of applications, including for example Internet communications, instant messaging capabilities, email facilities, web browsing and searching. In order to avoid the inadvertent activation of the applications of a device, devices generally includes a locked mode, wherein certain information is displayed, however any user inputs to the device will be ignored in the idle state, except to unlock the device. Typically, unlocking a device can require the manipulation of one or more keys of the device, fingerprint sensors, key combinations and number codes, for example. In most cases, when a device is unlocked, the user interface that is presented is pre-determined by the device. Given the variety of applications and application layers that are available is such devices, it would be advantageous to be able to easily unlock a device and move directly into a desired user interface or application.

SUMMARY

[0003] In one aspect, the disclosed embodiments are directed to a method. In one embodiment the method includes providing a touch or proximity screen device in an idle mode. A sector or region displayed on a screen of the device in the idle mode is contacted or activated and moved or expanded to reveal at least one application icon associated with an active/unlocked state of the device. The term idle mode generally be referred to as a reduced active region that can be

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000021

manipulated in limited ways, such as by the unlocking gesture or interaction described herein. As the icon is moved or dragged to an edge of the device, the device changes state to an active/unlocked mode and opens in the application or set of user elements associated with the revealed application icon.

[0004] In another aspect, the disclosed embodiments are directed to a user interface. In one embodiment the user interface has at least one region that is non-active in a locked mode of a device and an active region on top or in contrast with the at least one non-active region. The active region is configured to be moved and expanded to reveal the at least one region that is non-active in a locked mode. As the active region is moved towards the edge of a display of the user interface, the state of the device can transition from an idle/locked state to an active/unlocked state. The user interface opens to a set of user elements corresponding to an application revealed by the expanded active region.

[0005] In a further aspect the disclosed embodiments are directed to a computer program product and an apparatus.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] The foregoing aspects and other features of the embodiments are explained in the following description, taken in connection with the accompanying drawings, wherein:

[0007] FIG. 1 shows a block diagram of a system in which aspects of the disclosed embodiments may be applied;

[0008] FIGS. 2A-2D are illustrations of exemplary screen shots of the user interface of the disclosed embodiments.

[0009] FIG. 3 is an illustration of an exemplary screen shot of one aspect of the user interface of the disclosed embodiments.

[0010] FIGS. 4A-4B are illustrations of examples of devices that can be used to practice aspects of the disclosed embodiments.

[0011] FIG. 5 illustrates a block diagram of an exemplary apparatus incorporating features that may be used to practice aspects of the disclosed embodiments.

[0012] FIG. 6 is a block diagram illustrating one embodiment of a general architecture of the exemplary local system of FIGS. 4A-4B

DETAILED DESCRIPTION OF THE EMBODIMENT(s)

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000022

[0013] Referring to FIG. 1, one embodiment of a system 100 is illustrated that can be used to practice aspects of the claimed invention. Although aspects of the claimed invention will be described with reference to the embodiments shown in the drawings and described below, it should be understood that these aspects could be embodied in many alternate forms of embodiments. In addition, any suitable size, shape or type of elements or materials could be used.

[0014] The disclosed embodiments generally allow a user of a device or system, such as the system 100 shown in FIG. 1, to intuitively unlock, or partially unlock or enable, a touch screen device. The system or device 100 can be transitioned from an idle and locked state into an open state by moving or dragging an icon on the screen of the device. When the icon is dragged, the icon can reveal one or more active areas below the icon. The user moves or drags the icon to or near a desired active area and towards or near an unlock region of the display, such as for example, an edge region of the display. In alternate embodiments, any suitable region within the display area can be used as the unlock region. For 4 exemplary purposes, the edge region of the display area will be used herein to describe the unlock region. As the icon reaches the edge, the device unlocks from the idle and locked state into the user interface or application of the revealed active area.

[0015] In one embodiment, referring to FIG. 1, the system 100 of FIG. 1 can include an input device 104, output device 106, navigation module 122, applications area 180 and storage/memory device 182. The components described herein are merely exemplary and are not intended to encompass all components that can be included in a system 100. For example, in one embodiment, the system 100 comprises a mobile communication device or other such internet and application enabled devices. Thus, in alternate embodiments, the system 100 can include other suitable devices and applications for monitoring application content and activity levels in such a device. While the input device 104 and output device 106 are shown as separate devices, in one embodiment, the input device 104 and output device 106 can be part of, and form, the user interface 102. The user interface 102 can be used to display application and element information to the user, and allow the user to obtain application content and application activity data. In one embodiment, the user interface of the disclosed embodiments can be implemented on or in a device that includes a touch screen display or a proximity screen device. In alternate embodiments, the aspects of the user interface disclosed herein can be embodied on any suitable

device that will display information and allow the selection and activation of applications. The terms "select", "move", "drag" "contact" and "touch" are generally described herein with respect to a touch-screen display. However, in alternate embodiments, the terms are intended to encompass the required user action with respect to other input devices. For example, with respect to a proximity screen device, it is not necessary for the user to make direct contact in order to select, move or drag and object or other information. Thus, the above-noted terms are intended to encompass that a user only needs to be within the proximity of the device to carry out the desired function. For example, the term "contact" when used in the context of a proximity screen device, does not imply direct contact, but rather near or close contact, that activates the proximity device.

[0016] Similarly, the scope of the intended devices is not limited to single touch or contact devices. Multi-touch devices, where contact by one or more fingers or other pointing devices can navigate on and about the screen.

[0017] FIG. 2A illustrates one embodiment of a screen shot of a user interface 201 incorporating features of the disclosed embodiments. The screen or user interface 200 of FIG. 2A illustrates a locked or idle mode of the device 100 of FIG. 1. In this example, there are two icons 202 and 204 that appear in a relatively dimmed or less highlighted mode. The icons 202 and 204 each represent an application that is present or available in the device 100. In alternate embodiments, any number of icons can be displayed in a dimmed state, when the device 100 is in the locked or idle mode. In one embodiment, different application areas might have different degrees of "dimness" or shading. For example, the most or more used applications might appear brighter, or less dimmed or shaded, than less used applications. In alternate embodiments, any suitable mechanism can be used to provide variation and different degrees of highlighting to different application areas, based on different rules.

[0018] For example, different types of applications might be represented by different colors or shapes. In one embodiment, if the user holds a finger over or touches an application area 202, 204, a frame 203 around the application area could appear in a color, pattern or shape that is representative of a type of application. For example, a message application could be one color, while a settings application is a different color. This can provide the advantage that the user can visualize the area that is being selected. Thus, if for example, the areas are close to one another, the user can conveniently see which area is selected.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000024

[0019] Although the application areas 202 and 204 are described as being in a "dimmed" mode, in alternate embodiments, the applications that are not activatable in a locked or idle mode can be represented, highlighted or deemphasized in any suitable fashion. For example, a line or other image might be shown crossing the icons 202 and 204. The user should be aware when looking at the display that the applications are available in the device, but in a locked state and would be accessible if the device was in an unlocked or active state.

[0020] In one embodiment, the illumination or highlighting of application areas 202, 204 could have several different degrees, dependent upon how "active" the particular application area is. For example, when the screen 201 is in a locked or inactive state, the illumination or highlighting can be reduced or dimmed by 70% (a 30% illumination level), from a standard mode setting. An application that does not become active, or fully active, when selected, such as a clock that can be temporarily illuminated, may be displayed with a 60% illumination level. For an application that can become fully active, the illumination level might be 90% (dimmed 10%) from the normal levels. In alternate embodiments, any suitable illumination or dimming setting can be used.

[0021] Referring to FIG. 2A, in one embodiment, an unlocking icon or object 206 is provided. The icon 206 generally comprises a movable object that can be used to select and highlight different regions or areas on the screens. Although the icon 206 is shown in the shape of a square, in alternate embodiments, any suitable shape or image can be used. In one embodiment, the icon 206 can be highlighted in a contrasting fashion relative to the remainder of the display 200 and icons 202, 204. The icon 206 should be easily identifiable for its function when the device 100 is in the idle and locked mode. In one embodiment, the icon 206 can at least initially be located in a central location on the display 200, such as shown in FIG. 2A. In alternate embodiments, the icon 206 might move about the screen, in the idle and locked mode, such as would a screen saver.

[0022] The icon 206 shown in FIG. 2A is selectable and active in the idle/locked mode of the device. In one embodiment, in order to transition the state of the device 100 from the idle/locked mode to the active/unlocked mode, the icon 206 is contacted and dragged towards an edge of the display 200. The dragging of the icon 206 can be carried out in any suitable fashion, such as for example by touching the icon with a finger and moving the finger toward an edge. In alternate

embodiments, any suitable pointing device might be used. Similarly, in a proximity screen device, the about actions can be carried out without direct contact.

[0023] The unlocking of the device from the nonactive to active mode may also require an additional confirmation step. In one embodiment, after the user has moved the icon 206 to the unlocking region, and additional act(s) may be required by the user to change the state of the device. For example, the icon 206 is moved to the unlock region. The user releases the icon 206 and carries out another action to confirm the unlock. In one embodiment, this other action might be a tap on the icon 206, or a long press of the icon 206. In an alternate embodiment, a secondary key on the device might be enabled as an "unlock" key, and be required to be selected to confirm the unlock request.

[0024] While the unlocking of the device is described herein with respect to the use of the icon 206, in alternate embodiments, any suitable mechanism can be used to unlock the device or transition the device, or the applications of the device, from the non-active to active mode. In one embodiment, thus user can paint, draw or trace, for example, a specific pattern on the screen of the device, which is recognized as an unlock command. The pattern might include any suitable image, movement or text, for example. In this embodiment, all of the applications can be made active and available when the pattern is recognized.

[0025] In one embodiment, the icon 206 might also be configured for and used to generate a new set of available applications for the device. For example, when the icon 206 is in a certain position, such as the center of the screen, a press for a pre-determined duration could cause a new set of available applications to be displayed. This can be advantageous in devices that have limited screen area and cannot display all available applications simultaneously. By selecting the icon 206 in a certain fashion, for a pre-determined period of time, different application layers can be displayed at different times. In alternate embodiments, different layers of applications can be accessed in any suitable manner. For example, the user could access layer A by moving a finger, or the icon 206, to a top left corner of the screen 200. Layer B could be accessed my moving a finger or icon 206 to a top right corner. Each corner of the screen area, or other suitable region, could represent a different layer.

[0026] In one embodiment, referring to FIG. 2B, when the icon 206 is contacted or touched, the icon 206 can be highlighted in some fashion to indicate that it has been selected. For example, when the background area 201 of the display 200 is a dark color or tone in the idle/locked mode,

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the icon 206 can be highlighted in a contrasting color or tone, such as white. This allows the icons 202 and 204 to be easily visible underneath the icon 206, as shown for example in FIG. 2B. In alternate embodiments, the contacting of the icon 206 could be recognized by any suitable visual feedback, and may also include audible or tactile feedback.

[0027] As shown in FIG. 2B, in one embodiment, when the icon 206 of FIG. 2A is selected, the icon can expand in size, as shown by icon 210. The icon 210 can expand, dilate or open up to reveal the user interface and icons 202, 204 of an active idle state. Although items 202 and 204 are described as icons, in alternate embodiments these could also be text or an object other than an icon. The icon 210 can generally be configured to track the movement of the user's finger in proximity to or contacting the icon and open accordingly to reveal a larger active area below, and perhaps a different set of user interface elements. In one embodiment, is the user presses or holds the finger in a pre-determined position for a certain period of time, the icon can open to reveal the active area below. The longer the user holds the finger in the same position, the larger the active area size becomes. This allows for easier access to the applications as well as making it easier to visualize the different application symbols in the active area. As shown in FIG. 2B, if the user moves or expands the icon 210 towards the top of the display, the icon 202 can be more visible. If the icon is moved or expanded towards the bottom of the display, the icon 204 becomes more visible. In alternate embodiments where there are more icons related to an active idle state, those icons would become visible as the icon 210 is moved or expanded in that direction. For example, the icons 202, 204 could be suitably sized in order to allow for more such icons to appear on the display. Such icons might appear to the left/right, up/down, in diagonal directions extending from the center region of the display or in a circle at a distance from the center of the display. As the icon 210 is moved or expanded in any of these directions or orientations, the icons would become visible to the user, relative to their dimmed state in the idle/locked mode of the device. The icon can expanded to any suitable size and direction, and can be dragged into or across one or more areas or regions. The middle square region 206 (reduced active area) expands in all directions towards the extent of the display area (edge) relative to a common centre point (middle of the display area). This is synonymous with the action of "dilation".

[0028] Each area or region on the display of the device 200 in the idle/locked mode can have a different purpose and display a different set of user interface elements, which remain inactive

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and in the locked mode as the icon 210 is moved over them. The expansion and/or dilation of the icon 206 can be suitable configured to encompass one region at a time, if so desired. Alternatively, the icon 206 can be configured to encompass any suitable number or regions on the display 200.

[0029] The icon 206 does not have to encompass the entirety of an application area 202, 204 in order for the application area to be selected. In one embodiment, once a pre-determined percentage of the displayed object 202, 204 area is encompassed by the icon 206, the displayed object is selected. This percentage can be any desired percentage. This can be recognized by some highlighting of the object, such as for example, a frame around the object. The recognition could also be in the form of some visual, audio or tactile mechanism.

[0030] In one embodiment, the user drags or moves the icon 206 to the unlock region of the display to unlock the device from the inactive state and illuminate all applications in the active area. Once all the applications are illuminated, the user can move or drag the icon 206, or the user's finger to or near the desired application(s). In one embodiment, the user may have to confirm the selection in order to open the application.

[0031] In one embodiment, the shape of the icon 206 can be suitably configured relative to the number of icons, such as 202 and 204, present on the display 200. As shown in FIG. 2B, the shape of the icon 210 is substantially a square. In alternate embodiments, any suitable geometric shape can be used, including for example, a rectangle, circle, triangle or cone. In one embodiment, the shapes of the icon 210 as it expands may be as a point in the center region of the display 200, and extend and expand outwards towards the desired edge of the display 200. The width of the icon 210 can expand to encompass and reveal applications and elements in the path of the movement of the icon 210. An example of this is shown with respect to FIG. 2D. Here the shape or area of the icon 230 expands outwards in the shape of a cone from an origin, similar to the beam of a light from a flashlight, 232 as it is moved and dragged. The area of the cone 232 reveals application 234 and as it reaches the edge 236 of the display area 238, the device unlocks and opens the application 234. Here again, in one embodiment, the user may be required to confirm the unlocking operation with another act.

[0032] When the user has moved or expanded a size of the icon 210 to encompass a desired area and set of user interface elements or applications, the user can select to unlock the device. This could include reaching an unlocking area, such as an edge of the display area, a long press on the

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000028

screen, a double click or tap, or a hold and release for a pre-determined time period. In alternate embodiments, any suitable mechanism can be used to unlock the device from the inactive state after a region is highlighted or selected. When the device unlocks and transitions state to an active mode, the user interface elements 222, 224 associated with the selected icon, in this example icon 204, are displayed, as shown in FIG. 2C. The display 220 in FIG. 2C can be referred to an active idle mode or state. In one embodiment, the active idle mode refers to an idle screen on the device. The idle screen can present images, icons, text and objects, for example, that when selected and/or activated, provide direct access or short cuts to certain programs and applications associated with the idle state of the device. In this example, the icon 204 of FIG. 2A, representing a communication application, opens to user interface elements for contacts 222 and applications 224. This provides the user with the advantage of determining, prior to unlocking a device from an inactive state, an application or set of user interface elements for the device to open up to. The user selects which screen to go to directly after unlocking the device.

[0033] Referring to FIGS. 2A and 3, in one embodiment, the user can select or contact the dimmed icons 202 and 204 to determine a state, utility or function of the underlying application, without the need to unlock the device or open the application. For example, in FIG. 2A, dimmed icon 202 represents a time or clock application. In the dimmed mode, when the device is locked, it may not be possible to view any functions of the application, such as for example, the current time. However, the features of the disclosed embodiments allow the icon 202 to be contacted to temporarily illuminate or somehow highlight the icon, as illustrated by icon 302 in FIG. 3. This state, which might be described as a passive active state, allow for temporary activation of an application, such as a clock. This is also referred to herein as the "semi-active" state. As shown in FIG. 3, the clock application icon 302 is illuminated when that area is selected, and the current time is available and can be viewed, particularly against the dimmed and/or darkened background 304. In alternate embodiments, any suitable way to temporarily highlight the selected icon can be implemented. The clock function is illuminated temporarily, but does not become fully active. The icon 302 can remain illuminated for a pre-determined period of time, such as for example, 5 seconds. This allows the quick activation of high level user interface elements for passive information gathering, while the device remains in the idle and locked mode.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000029

[0034] In one embodiment, it is possible to lock the device, or change a state of the device from active to inactive, in a manner similar to the process used to change state from inactive to active. For example, while in the active state, the user can select and move the icon 210 to a locking region of the display. For exemplary purposes, this region will be described as an edge region of the display. Once the device is in the active mode, the areas that were described as "unlocking" regions might now become the "locking" regions. Once the icon is moved to the locking region, the device can change state.

[0035] In one embodiment, when the icon 210 is moved to a locking region, confirmation from the user can be required before the device changes state. In one embodiment, this might be a tapping on the icon 210, a long press or contact or other action. For example, the user drags the icon 206 to the lock region. The user could tap the icon 206 and then release. A tap on another application area, such as area 202 could confirm the lock mode. In one embodiment, the user drags the icon 206 to the lock region, and once the icon 206 is in that region, a lock function becomes enabled on a key of the device. Pressing that key will cause the device to lock and enter the inactive mode. Alternatively, forming a pattern or image on the screen, as described previously, can cause the device to change states.

[0036] The aspects of the disclosed embodiments can be implemented on any device that includes a user interface for the display and accessing of information, such as the system 100 shown in FIG. 1. In one embodiment, the input device 104 includes a touch screen display 112 on which the icons 202, 204, 206 and others can be displayed. The inputs and commands from a user, such as the touching of the screen, are received in the input module 104 and passed to the navigation module 122 for processing. The navigation module 122 can determine and set the state of the device. The output device 106, which in one embodiment is implemented in the touch screen display 112, can receive data from the user interface 102, application 180 and storage device 182 for output to the user. Examples of such devices include wireless and wired devices, mobile communication devices, Internet tablets, and touch pads.

[0037] Each of the input device 104 and output device 106 are configured to receive data or signals in any format, configure the data or signals to a format compatible with the application or device 100, and then output the configured data or signals. While a display 114 is shown as part of the output device 106, in other embodiments, the output device 106 could also include other

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000030

components and device that transmit or present information to a user, including for example audio devices and tactile devices.

[0038] The user input device 104 can include controls that allow the user to interact with and input information and commands to the device 100. For example, with respect to the embodiments described herein, the user interface 102 can comprise a touch screen display. The output device 106 can be configured to provide the content of the exemplary screen shots shown herein, which are presented to the user via the functionality of the display 114. Where a touch screen device is used, the displays 112 and 114 can comprise the same or parts of the same display. User inputs to the touch screen display are processed by, for example, the touch screen input control 112 of the input device 104. The input device 104 can also be configured to process new content and communications to the system 100. The navigation module 122 can provide controls and menu selections, and process commands and requests. Application and content objects can be provided by the menu control system 124. The process control system 132 can receive and interpret commands and other inputs, interface with the application module 180, storage device 180 and serve content as required. Thus, the user interface 102 of the embodiments described herein, can include aspects of the input device 104 and output device 106.

[0039] Examples of devices on which aspects of the disclosed embodiments can be practiced are illustrated with respect to FIGS. 4A and 4B. The terminal or mobile communications device 400 may have a keypad 410 and a display 420. The keypad 410 may include any suitable user input devices such as, for example, a multi-function/scroll key 430, soft keys 431, 432, a call key 433, an end call key 434 and alphanumeric keys 435. The display 420 may be any suitable display, such as for example, a touch screen display or graphical user interface. The display may be integral to the device 400 or the display may be a peripheral display connected to the device 400. A pointing device, such as for example, a stylus, pen or simply the user's finger may be used with the display 420. In alternate embodiments any suitable pointing device may be used. In other alternate embodiments, the display may be a conventional display. The device 400 may also include other suitable features such as, for example, a camera, loud speaker, connectivity port or tactile feedback features. The mobile communications device may have a processor 401 connected to the display for processing user inputs and displaying information on the display 420. A memory 402 may be connected to the processor 401 for storing any suitable information

and/or applications associated with the mobile communications device 400 such as phone book entries, calendar entries, etc.

[0040] In the embodiment where the device 400 comprises a mobile communications device, the device can be adapted to communication in a telecommunication system, such as that shown in FIG. 6. In such a system, various telecommunications services such as cellular voice calls, www/wap browsing, cellular video calls, data calls, facsimile transmissions, music transmissions, still image transmission, video transmissions, electronic message transmissions and electronic commerce may be performed between the mobile terminal 600 and other devices, such as another mobile terminal 606, a line telephone 632, a personal computer 651 or an Internet server 622. It is to be noted that for different embodiments of the mobile terminal 600 and in different situations, some of the telecommunications services indicated above may or may not be available. The aspects of the disclosed embodiments are not limited to any particular set of services in this respect.

[0041] The mobile terminals 600, 606 may be connected to a mobile telecommunications network 610 through radio frequency (RF) links 602, 608 via base stations 604, 609. The mobile telecommunications network 610 may be in compliance with any commercially available mobile telecommunications standard such as for example GSM, UMTS, D-AMPS, CDMA2000, (W)CDMA, WLAN, FOMA and TD-SCDMA.

[0042] The mobile telecommunications network 610 may be operatively connected to a wide area network 620, which may be the internet or a part thereof. An internet server 622 has data storage 624 and is connected to the wide area network 620, as is an Internet client computer 626. The server 622 may host a www/wap server capable of serving www/wap content to the mobile terminal 600.

[0043] A public switched telephone network (PSTN) 630 may be connected to the mobile telecommunications network 610 in a familiar manner. Various telephone terminals, including the stationary telephone 632, may be connected to the PSTN 630.

[0044] The mobile terminal 600 is also capable of communicating locally via a local link 601 or 651 to one or more local devices 603 or 650. The local links 601 or 651 may be any suitable type of link with a limited range, such as for example Bluetooth, a Universal Serial Bus (USB) link, a wireless Universal Serial Bus (WUSB) link, an IEEE 802.11 wireless local area network (WLAN) link, an RS-232 serial link, etc. The local devices 603 can, for example, be various

sensors that can communicate measurement values to the mobile terminal 600 over the local link 601. The above examples are not intended to be limiting, and any suitable type of link may be utilized. The local devices 603 may be antennas and supporting equipment forming a WLAN implementing Worldwide Interoperability for Microwave Access (WiMAX, IEEE 802.16), WiFi (IEEE 802.11x) or other communication protocols. The WLAN may be connected to the internet. The mobile terminal 600 may thus have multi-radio capability for connecting wirelessly using mobile communications network 610, WLAN or both. Communication with the mobile telecommunications network 610 may also be implemented using WiFi, WiMax, or any other suitable protocols, and such communication may utilize unlicensed portions of the radio spectrum (e.g. unlicensed mobile access (UMA)). In one embodiment, the navigation module 122 of FIG. 1 includes a communication module that is configured to interact with the system described with respect to FIG. 6.

[0045] In one embodiment, the system 100 of FIG. 1 may be for example, a PDA style device 440 illustrated in Figure 4B. The PDA 440 may have a keypad 441, a touch screen display 442 and a pointing device 443 for use on the touch screen display 442. In still other alternate embodiments, the device may be a personal communicator, a tablet computer, a laptop or desktop computer, a television or television set top box, or any other suitable device capable of containing the display 442 and supported electronics such as a processor and memory. The exemplary embodiments herein will be described with reference to the mobile communications device 400 for exemplary purposes only and it should be understood that the embodiments could be applied equally to any suitable device incorporating a display, processor, memory and supporting software or hardware.

[0046] The user interface 102 of FIG. 1 can also include a menu system 124 in the navigation module 122. The navigation module 122 provides for the control of certain states, processes and utilities of the device 100. The menu system 124 can provide for the selection of different tools and application options related to the applications or programs running on the device 100. In the embodiments disclosed herein, the navigation module 122 receives certain inputs, such as for example, signals, transmissions, instructions or commands related to the functions of the device 100. Depending on the inputs, the navigation module interprets the commands and directs the process control 132 to execute the commands accordingly.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000033

[0047] Activating a control generally includes any suitable manner of selecting or activating a function associated with the device, including touching, pressing or moving the input device. In one embodiment, where the input device 104 comprises control 110, which in one embodiment can comprise a device having a keypad, pressing a key can activate a function. Alternatively, where the control 110 of input device 104 also includes a multifunction rocker style switch, the switch can be used to select a menu item and/or select or activate a function. When the input device 104 includes control 112, which in one embodiment can comprise a touch screen pad, user contact with the touch screen will provide the necessary input. Voice commands and other touch sensitive input devices can also be used.

[0048] Although the above embodiments are described as being implemented on and with a mobile communication device, it will be understood that the disclosed embodiments can be practiced on any suitable device. For example, the device 100 of FIG. 1 can generally comprise any suitable electronic device, such as for example a personal computer, a personal digital assistant (PDA), a mobile terminal, a mobile communication terminal in the form of a cellular/mobile phone, or a multimedia device or computer. In alternate embodiments, the device 100 of FIG. 1 may be a personal communicator, a mobile phone, a tablet computer, a laptop or desktop computer, a television or television set top box a DVD or High Definition player or any other suitable device capable of containing for example a display 114 shown in FIG. 1, and supported electronics such as the processor 401 and memory 402 of FIG. 4. For description purposes, the embodiments described herein will be with reference to a mobile communications device for exemplary purposes only and it should be understood that the embodiments could be applied equally to any suitable device incorporating a display, processor, memory and supporting software or hardware.

[0049] Referring to FIG. 1, the display 114 of the device 100 can comprise any suitable display, such as noted earlier, a touch screen display or graphical user interface. In one embodiment, the display 114 can be integral to the device 100. In alternate embodiments the display may be a peripheral display connected or coupled to the device 100. A pointing device, such as for example, a stylus, pen or simply the user's finger may be used with the display 114. In alternate embodiments any suitable pointing device may be used. In other alternate embodiments, the display may be any suitable display, such as for example a flat display 114 that is typically made

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000034

of an LCD with optional back lighting, such as a TFT matrix capable of displaying color images. A touch screen may be used instead of a conventional LCD display.

[0050] The device 100 may also include other suitable features such as, for example, a camera, loudspeaker, connectivity port or tactile feedback features.

[0051] The disclosed embodiments may also include software and computer programs incorporating the process steps and instructions described above that are executed in different computers. Figure 5 is a block diagram of one embodiment of a typical apparatus 500 incorporating features that may be used to practice aspects of the invention. The apparatus 500 can include computer readable program code means for carrying out and executing the process steps described herein. As shown, a computer system 502 may be linked to another computer system 504, such that the computers 502 and 504 are capable of sending information to each other and receiving information from each other. In one embodiment, computer system 502 could include a server computer adapted to communicate with a network 506. Computer systems 502 and 504 can be linked together in any conventional manner including, for example, a modem, wireless, hard wire connection, or fiber optic link. Generally, information can be made available to both computer systems 502 and 504 using a communication protocol typically sent over a communication channel or through a dial-up connection on ISDN line. Computers 502 and 504 are generally adapted to utilize program storage devices, such as memory, embodying machine-readable program source code, which is adapted to cause the computers 502 and 504 to perform the method steps, disclosed herein. The program storage devices incorporating aspects of the invention may be devised, made and used as a component of a machine utilizing optics, magnetic properties and/or electronics to perform the procedures and methods disclosed herein. In alternate embodiments, the program storage devices may include magnetic media such as a diskette or computer hard drive, which is readable and executable by a computer. In other alternate embodiments, the program storage devices could include optical disks, read-only-memory ("ROM") floppy disks and semiconductor materials and chips.

[0052] Computer systems 502 and 504 may also include a microprocessor for executing stored programs. Computer 502 may include a data storage device 508 on its program storage device for the storage of information and data. The computer program or software incorporating the processes and method steps incorporating aspects of the invention may be stored in one or more computers 502 and 504 on an otherwise conventional program storage device. In one

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000035

embodiment, computers 502 and 804 may include a user interface 510, and a display interface 512 from which aspects of the invention can be accessed. The user interface 510 and the display interface 512 can be adapted to allow the input of queries and commands to the system, as well as present the results of the commands and queries.

[0053] The disclosed embodiments generally provide for a user to select an application or set of user interface elements that a device will open to from an idle and locked mode. A small icon can be dragged toward an edge of a display of the device to initiate the unlocking process. As the icon is moved or dragged, the icon can expand to reveal one or more active areas below the icon, or below the path that the icon travels. The user can move the icon about the screen to find a desired application or active areas for the device to open up to or into. When the user moves the icon to substantially at or near an edge of the display of the device, device can transition from the idle/locked mode to the active/unlocked mode. The disclosed embodiments thus provide an intuitive way and physical method to unlock a touch screen device.

[0054] It should be understood that the foregoing description is only illustrative of the embodiments. Various alternatives and modifications can be devised by those skilled in the art without departing from the embodiments. Accordingly, the disclosed embodiments are intended to embrace all such alternatives, modifications and variances that fall within the scope of the appended claims.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000036

CLAIMS

1. An apparatus, comprising:

at least one processor; and

at least one memory storing computer program code configured, working with the at least one processor, to cause at least the following to be performed:

causing a display of a device to display an icon, relating to an application, when the device is in a locked mode; and

enabling a user to select the icon while the device is in the locked mode, in order to determine a state, function or utility of the application while the device remains in the locked mode.

2. The apparatus as claimed in claim 1, wherein the icon is a dimmed icon.

3. The apparatus as claimed in claim 1, wherein the computer program code is configured, working with the at least one processor, to cause at least the following to be performed: responding to user selection of the icon by illuminating or highlighting the icon.

4. The apparatus as claimed in claim 3, wherein a movable object is provided to enable the user to select the icon.

5. The apparatus as claimed in claim 4, wherein the movable object is a further icon.

6. The apparatus as claimed in claim 3, wherein the icon is highlighted or illuminated to a lesser extent than that associated with a standard mode setting.

7. The apparatus as claimed in claim 1, wherein the icon represents an application that is present or available in the device.

8. The apparatus as claimed in claim 1, wherein the computer program code is configured, working with the at least one processor, to cause at least the following to be performed: causing the display to display another icon, relating to another application, when the device is in a locked mode.

9. The apparatus as claimed in claim 8, wherein the another icon represents an application that is present or available in the device.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000037

10. The apparatus as claimed in claim 8, wherein the another icon indicates that the another application is not activatable when the device is in the locked mode.

11. The apparatus as claimed in claim 1, wherein the display is a touch screen display, and enabling a user to select the icon comprises enabling the user to select the icon using the touch screen display.

12. The apparatus as claimed in claim 1, wherein the apparatus is the device.

13. A method, comprising:
causing a display of a device to display an icon, relating to an application, when the device is in a locked mode; and
enabling a user to select the icon while the device is in the locked mode, in order to determine a state, function or utility of the application while the device remains in the locked mode.

14. The method as claimed in claim 13, wherein the icon is a dimmed icon.

15. The method as claimed in claim 13, further comprising: responding to user selection of the icon by illuminating or highlighting the icon.

16. The method as claimed in claim 13, wherein a movable object is provided to enable the user to select the icon.

17. The method as claimed in claim 13, wherein the icon represents an application that is present or available in the device.

18. The method as claimed in claim 13, wherein the display is a touch screen display, and enabling a user to select the icon comprises enabling the user to select the icon using the touch screen display.

19. A non-transitory computer readable medium storing computer program code that, when performed by at least one processor, causes at least the following to be performed:
causing a display of a device to display an icon, relating to an application, when the device is in a locked mode; and

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000038

enabling a user to select the icon while the device is in the locked mode, in order to determine a state, function or utility of the application while the device remains in the locked mode.

20. The non-transitory computer readable medium as claimed in claim 19, wherein the icon is a dimmed icon.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000039

ABSTRACT

A method for unlocking a touch screen device includes providing a touch screen device in an idle mode. An area or region displayed on a screen of the device in the idle mode is contacted or activated to reveal at least one application icon associated with an active/unlocked state of the device. The region is moved, expanded or dragged to an edge of the device to change a state of the device to an active/unlocked mode and activate the revealed application.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000040

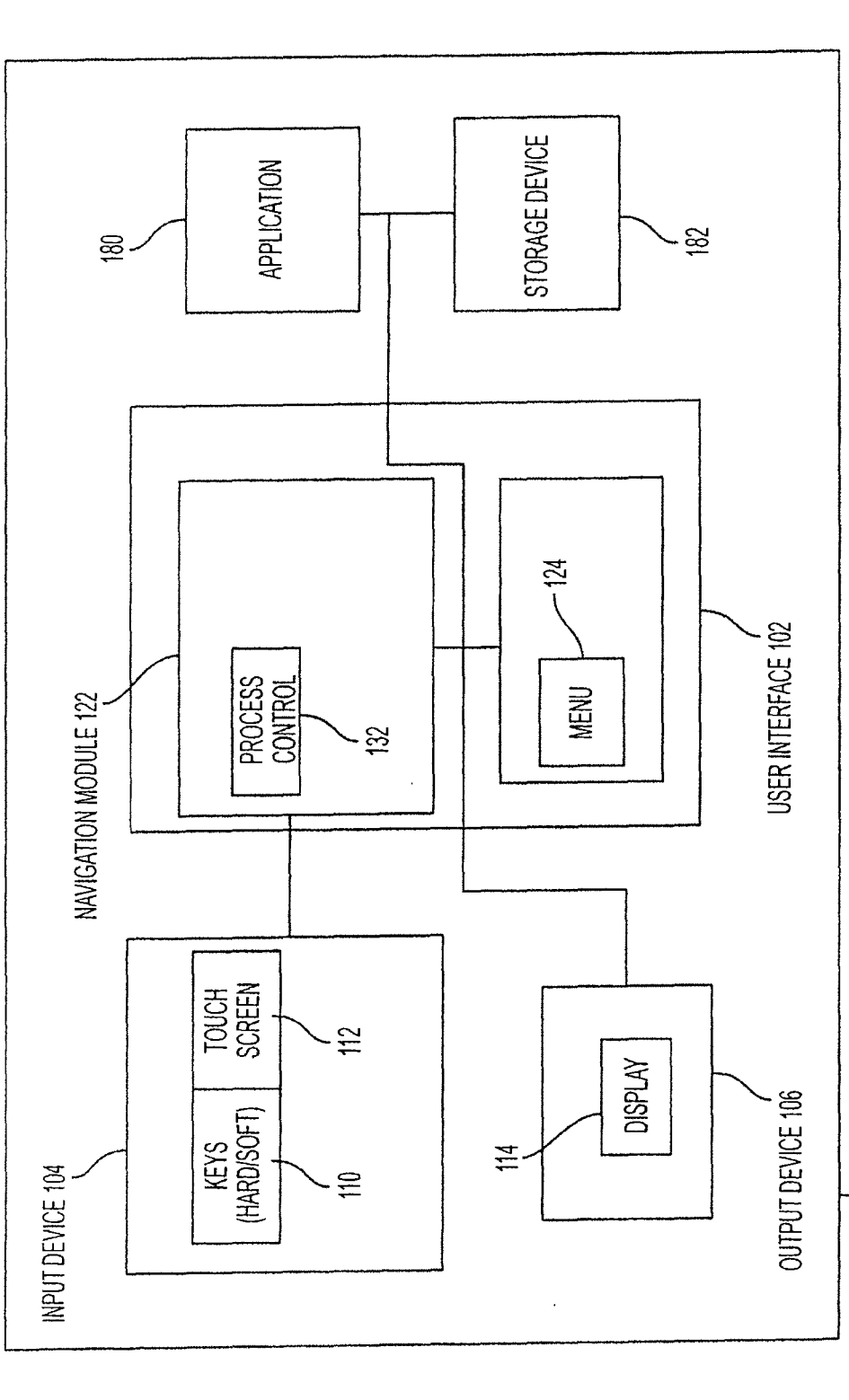


FIG. 1

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000041

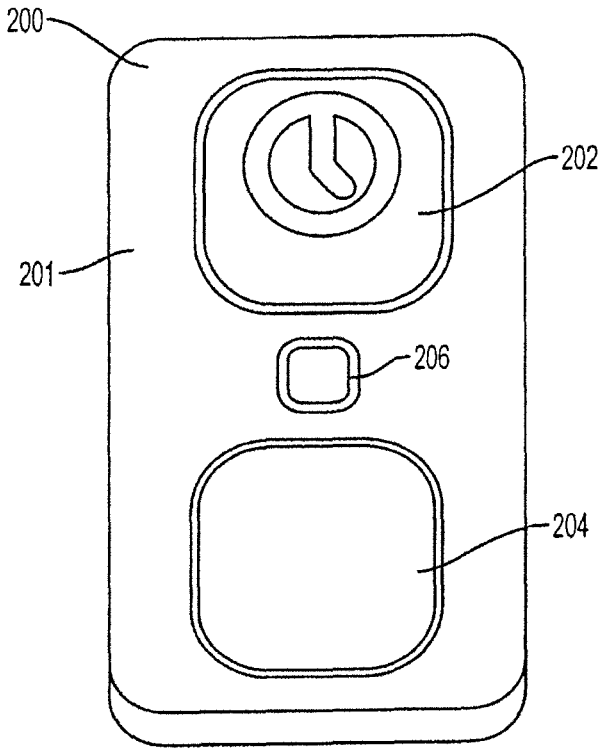


FIG. 2A

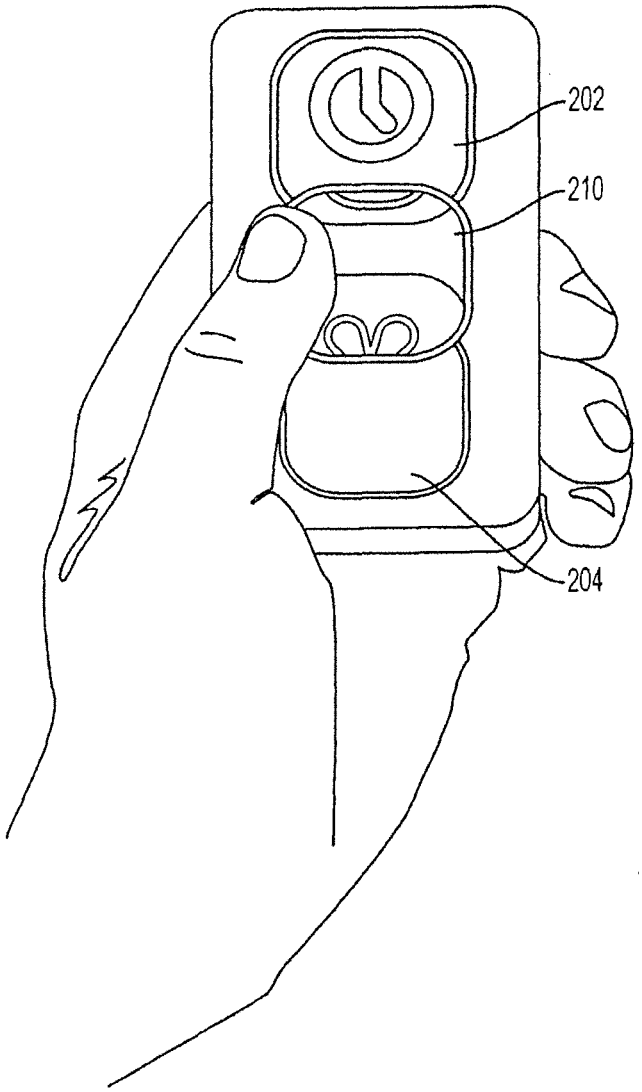


FIG. 2B

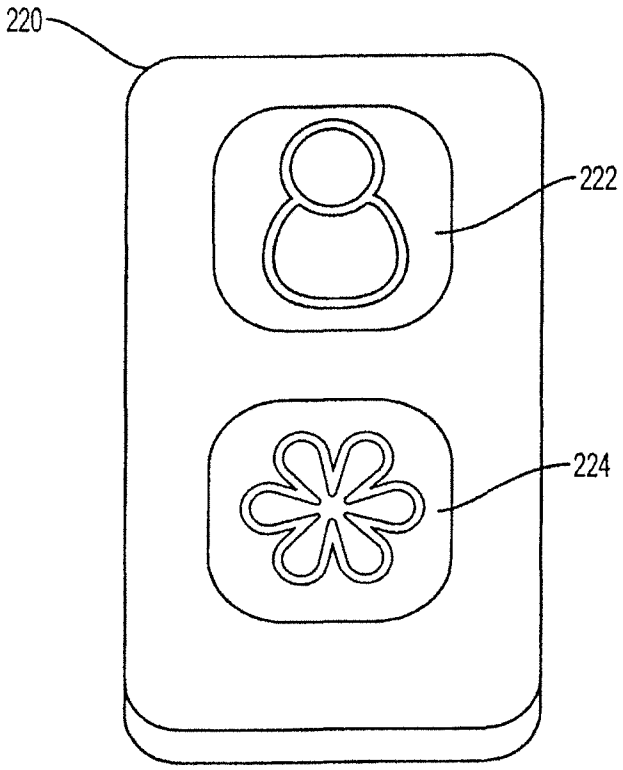


FIG. 2C

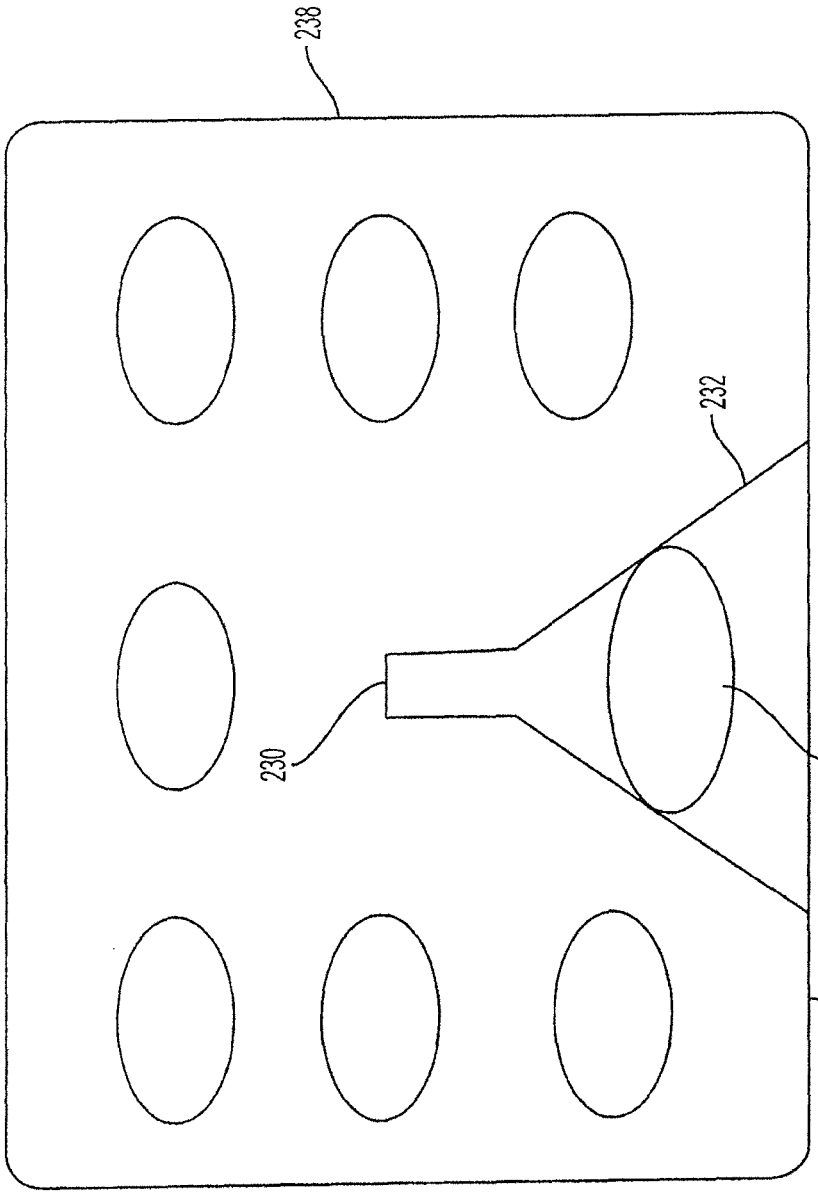


FIG. 2D

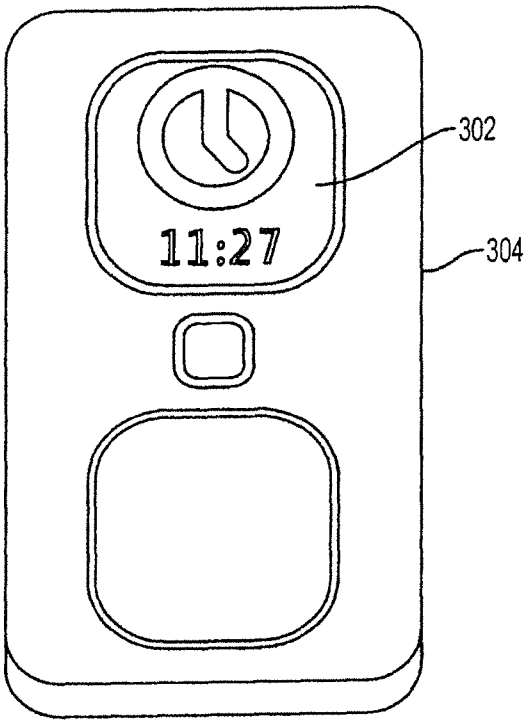


FIG. 3

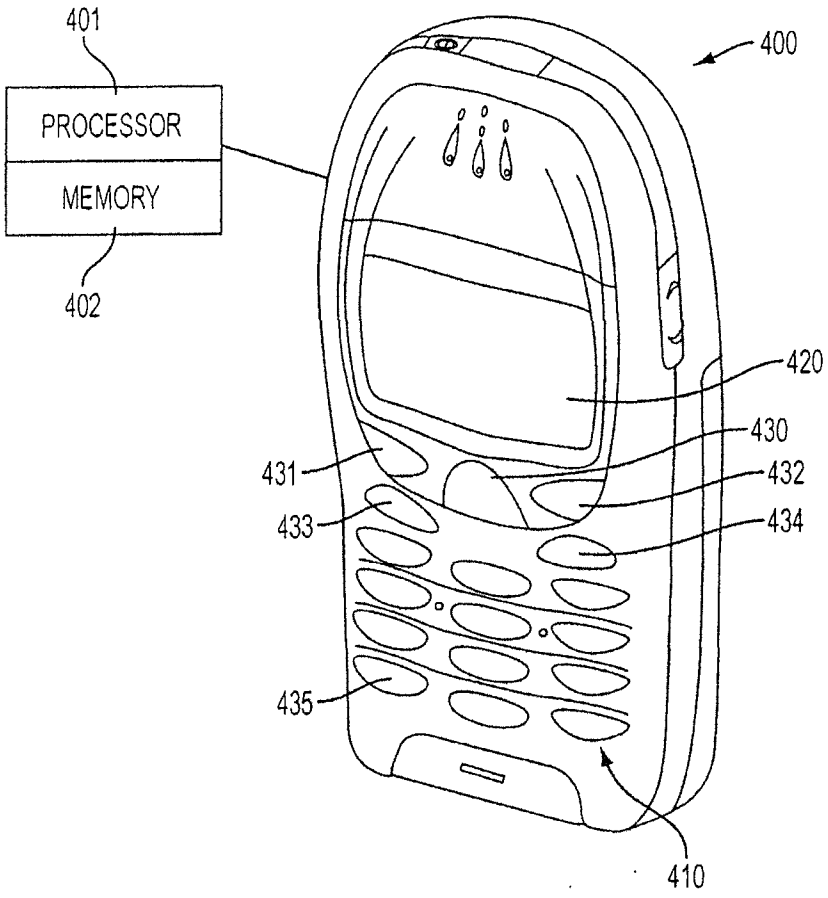


FIG. 4A

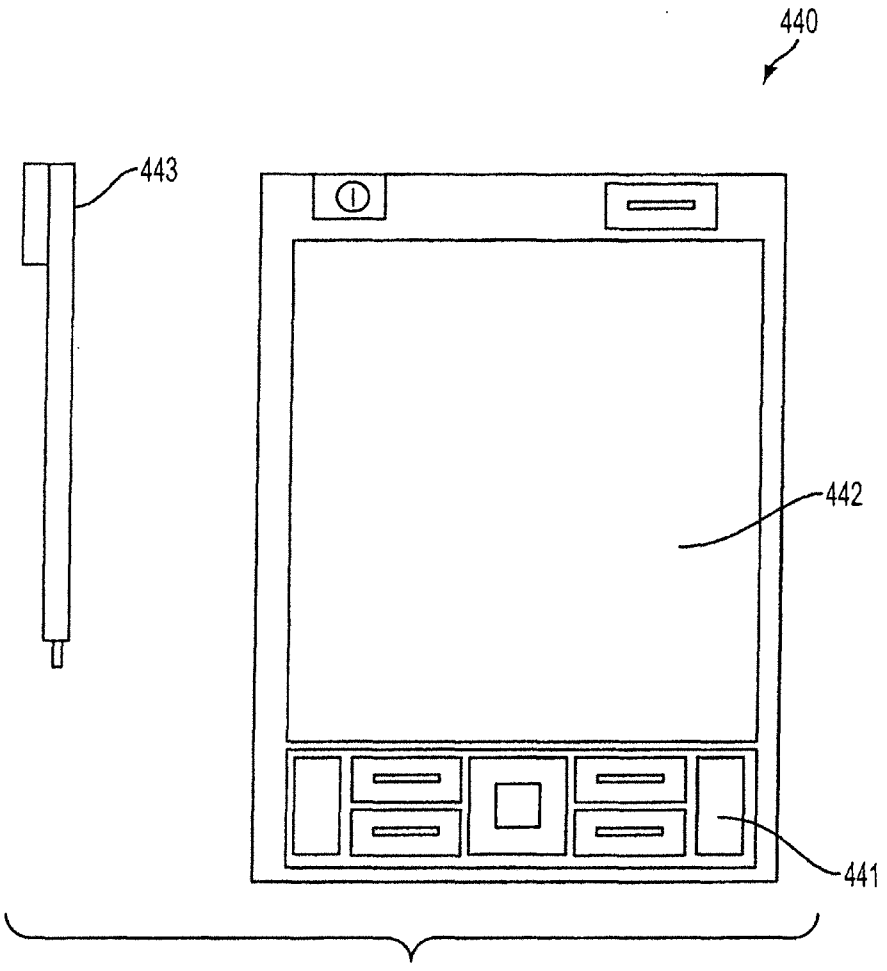


FIG. 4B

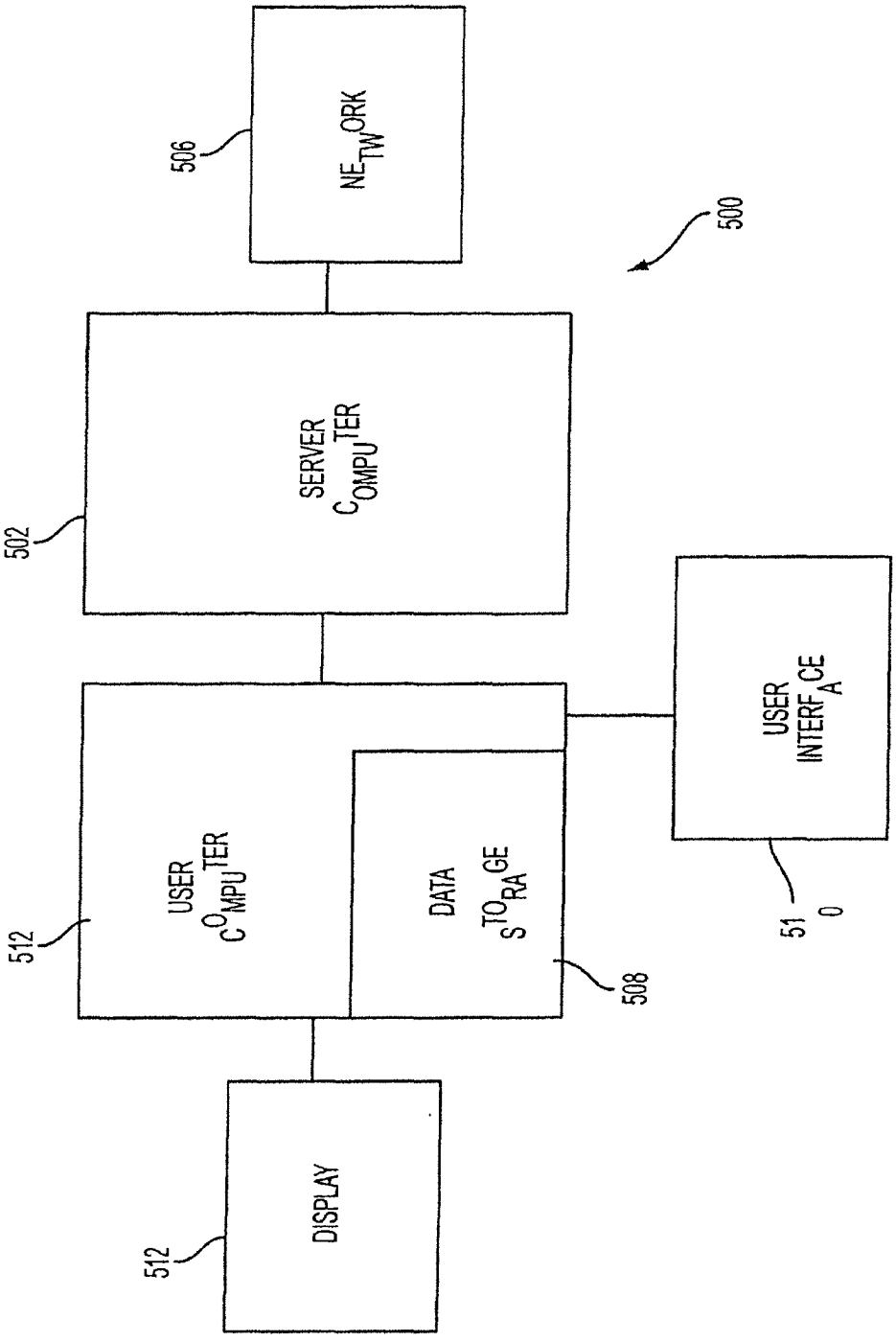


FIG. 5

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000049

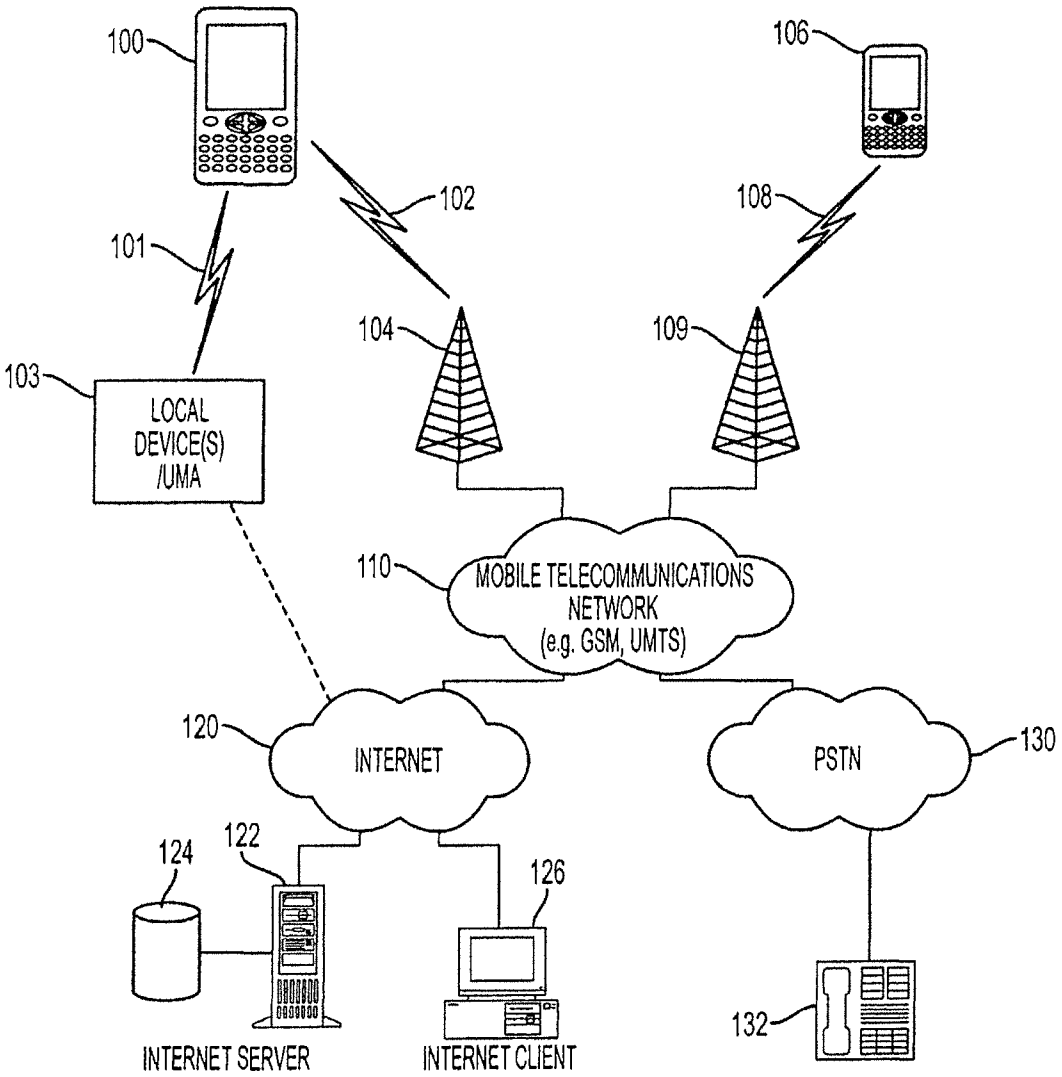

100
106
102
101
108
104
109
103
LOCAL
DEVICE(S)
/UMA
110
MOBILE TELECOMMUNICATIONS
NETWORK
(e.g. GSM, UMTS)
120
INTERNET
PSTN
130
124
122
126
132
INTERNET SERVER
INTERNET CLIENT

FIG. 6

Document code: WFEE

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Substitute for form 1449/PTO (Revised 07/2007)	Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT *(Use as many sheets as necessary)*	Application Number	13/889,750
	Filing Date	May 8, 2013
	First Named Inventor	Lindberg et al.
	Art Unit	2172
	Examiner Name	
Sheet 1 of 1	Attorney Docket Number	042933/427718

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.	Document Number Number - Kind Code (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages of Relevant Figures Appear
	1	US-6,920,619	07-19-2005	Milekic	
	2	US-7,509,140	03-24-2009	Elomaa	
	3	US-7,610,599	10-27-2009	Nashida et al.	
	4	US-2004/0061788 A1	04-01-2004	Bateman	
	5	US-2005/0060653 A1	03-17-2005	Fukase et al.	
	6	US-2007/0067734 A1	03-22-2007	Cunningham et al.	
	7	US-2007/0150834 A1	06-28-2007	Muller et al.	
	8	US-2007/0150842 A1	06-28-2007	Chaudhri et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials	Cite No.	Foreign Patent Document Country Code – Number Kind Code (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	English Language Translation Attached
	9	EP 1 450 248	08-25-2004	Giat Industries		
		*Abstract only				

OTHER DOCUMENTS

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, page(s) , volume-issue number(s), publisher, city and/or country where published.	English Language Translation Attached
	10	International Search Report and Written Opinion from International Application No. PCT/IB2008/001662 dated December 15, 2009	
	11	Office Action for Chinese Application No. 2008-800222885 dated November 23, 2011	
	12	Office Action for Korean Application No. 10-2010-7002006 dated August 23, 2011	

Examiner Signature		Date Considered	

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Submitted June 7, 2013

Electronic Acknowledgement Receipt

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Application Number:	13889750
International Application Number:	
Confirmation Number:	1050
Title of Invention:	UNLOCKING A TOUCH SCREEN DEVICE
First Named Inventor/Applicant Name:	Phillip Lindberg
Customer Number:	10949
Filer:	Donald Merton Hill/Joyce Smith
Filer Authorized By:	Donald Merton Hill
Attorney Docket Number:	042933/427718
Receipt Date:	07-JUN-2013
Filing Date:	08-MAY-2013
Time Stamp:	15:03:18
Application Type:	Utility under 35 USC 111(a)

Payment information:

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		IDS427718.PDF	115807 3933f578b6ef5560c41b2614b7d0435c0179adef	yes	2

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Transmittal Letter	1	1
	Information Disclosure Statement (IDS) Form (SB08)	2	2
Warnings:			
Information:			
	Total Files Size (in bytes):	115807	

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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.

Attorney's Docket No. 042933/427718 PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re:	Lindberg et al.	Confirmation No.:	1050
Appl No.:	13/889,750	Group Art Unit:	2172
Filed:	May 8, 2013		
For:	UNLOCKING A TOUCH SCREEN DEVICE		

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

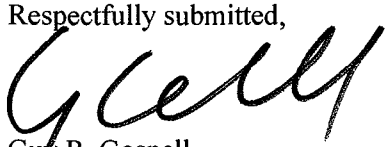
INFORMATION DISCLOSURE STATEMENT
CITATION UNDER 37 C.F.R. § 1.97

Attached is a list of documents on form PTO-1449.

It is requested that the Examiner consider these documents and officially make them of record in accordance with the provisions of 37 C.F.R. § 1.97 and Section 609 of the MPEP. By identifying the listed documents, Applicant in no way makes any admission as to the prior art status of the listed documents, but is instead identifying the listed documents for the sake of full disclosure.

Any foreign patents or non-patent literature documents items are attached, except those that were supplied in, or cited by the Office during prosecution of, parent Application No. 13/357,143 filed January 24, 2012 which is a divisional of 11/770,929 filed June 29, 2007. Since the benefit of this application was claimed under 35 U.S.C. 120, no copies need to be furnished in accordance with 37 C.F.R. 1.98(d); however, copies will be furnished on request.

Respectfully submitted,



Guy R. Gosnell
Registration No. 34,610

Customer No. 10949
ALSTON & BIRD LLP
Bank of America Plaza
101 South Tryon Street, Suite 4000
Charlotte, NC 28280-4000
Tel Charlotte Office (704) 444-1000
Fax Charlotte Office (704) 444-1111

ELECTRONICALLY FILED USING THE EFS-WEB ELECTRONIC FILING SYSTEM OF THE UNITED STATES PATENT & TRADEMARK OFFICE ON June 7, 2013.
#34178461v1

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 13/889,750

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			N/A	280
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	600
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	720
TOTAL CLAIMS (37 CFR 1.16(i))	20 minus 20 =	*			OR	x 80 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*				x 420 =	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).						0.00
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			TOTAL	1600

APPLICATION AS AMENDED - PART II

		(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($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	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	

		(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($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT B	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.

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UNITED STATES DEPARTMENT OF COMMERCE
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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
13/889,750	05/08/2013	2172	2040	042933/427718	20	3

CONFIRMATION NO. 1050

10949
Nokia Corporation and Alston & Bird LLP
c/o Alston & Bird LLP
Bank of America Plaza, 101 South Tryon Street
Suite 4000
Charlotte, NC 28280-4000

FILING RECEIPT



Date Mailed: 06/12/2013

Receipt is acknowledged of this non-provisional 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 APPLICANT, 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 Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections 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**

Inventor(s)

Phillip Lindberg, Helsinki, FINLAND;
Sami Niemela, Helsinki, FINLAND;

Applicant(s)

Nokia Corporation, Espoo, FINLAND

Assignment For Published Patent Application

Nakia Corporation, Espoo, FINLAND

Power of Attorney: The patent practitioners associated with Customer Number 10949

Domestic Priority data as claimed by applicant

This application is a CON of 13/357,143 01/24/2012
which is a DIV of 11/770,929 06/29/2007 PAT 8127254

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 - A proper **Authorization to Permit Access to Application by Participating Offices** (PTO/SB/39 or its equivalent) has been received by the USPTO.

If Required, Foreign Filing License Granted: 06/06/2013
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/889,750**
Projected Publication Date: 09/19/2013

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000057

Non-Publication Request: No

Early Publication Request: No

Title

UNLOCKING A TOUCH SCREEN DEVICE

Preliminary Class

715

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

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

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.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

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LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

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The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/889,750	05/08/2013	Phillip Lindberg	042933/427718

CONFIRMATION NO. 1050

10949
Nokia Corporation and Alston & Bird LLP
c/o Alston & Bird LLP
Bank of America Plaza, 101 South Tryon Street
Suite 4000
Charlotte, NC 28280-4000

NOTICE

OC000000061757876

Date Mailed: 06/12/2013

INFORMATIONAL NOTICE TO APPLICANT

Applicant is notified that the above-identified application contains the deficiencies noted below. No period for reply is set forth in this notice for correction of these deficiencies. However, if a deficiency relates to the inventor's oath or declaration, the applicant must file an oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each actual inventor no later than the expiration of the time period set in the "Notice of Allowability" to avoid abandonment. See 37 CFR 1.53(f).

The item(s) indicated below are also required and should be submitted with any reply to this notice to avoid further processing delays.

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):
  ALL
  Applicant may submit the inventor's oath or declaration at any time before the Notice of Allowance and Fee(s) Due, PTOL-85, is mailed.
- The substitute statement is signed by a person who is not identified as the applicant under 37 CFR 1.46 in an application data sheet (ADS). Only an applicant under 37 CFR 1.43, 1.45 or 1.46 may execute a substitute statement. See 37 CFR 1.64(a). An application data sheet in compliance with 37 CFR 1.76 identifying the person (i.e., assignee, obligated assignee, or person who otherwise shows sufficient proprietary interest) executing the substitute statement as the applicant, or an inventor's oath or declaration in compliance with 37 CFR 1.63 or 1.64 executed by or with respect to the inventor for whom the substitute statement was provided, is required.

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/889,750	05/08/2013	Phillip Lindberg	042933/427718

CONFIRMATION NO. 1050

POA ACCEPTANCE LETTER

10949
Nokia Corporation and Alston & Bird LLP
c/o Alston & Bird LLP
Bank of America Plaza, 101 South Tryon Street
Suite 4000
Charlotte, NC 28280-4000

OC000000061757942

Date Mailed: 06/12/2013

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 05/08/2013.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/lnguyen/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

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To: usptomail@alston.com,,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 10949

Jun 12, 2013 05:23:52 AM

Dear PAIR Customer:

Nokia Corporation and Alston & Bird LLP
c/o Alston & Bird LLP
Bank of America Plaza, 101 South Tryon Street
Suite 4000
Charlotte, NC 28280-4000
UNITED STATES

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Application	Document	Mailroom Date	Attorney Docket No.
13889750	APP.FILE.REC	06/12/2013	042933/427718
	M327	06/12/2013	042933/427718
	N570	06/12/2013	042933/427718

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MAILED
JUN 13 2013
OFFICE OF PETITIONS

Nokia Corporation and Alston & Bird LLP
c/o Alston & Bird LLP
Bank of America Plaza, 101 South Tryon Street
Suite 4000
Charlotte NC 28280-4000

Doc Code: TRACK1.GRANT

Decision Granting Request for Prioritized Examination (Track I or After RCE)	Application No.: 13/889,750

1. THE REQUEST FILED May 8, 2013 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 Brian W. Brown at 571-272-5338.

/Brian W. Brown/
[*Signature*]

Petitions Examiner, Office of Petitions
(Title)

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000063

To: usptomail@alston.com,,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 10949

Jun 18, 2013 05:23:06 AM

Dear PAIR Customer:

Nokia Corporation and Alston & Bird LLP
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UNITED STATES

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Application	Document	Mailroom Date	Attorney Docket No.
13889750	TRACK1.GRANT	06/13/2013	042933/427718

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/889,750	05/08/2013	Phillip Lindberg	042933/427718

CONFIRMATION NO. 1050

10949
Nokia Corporation and Alston & Bird LLP
c/o Alston & Bird LLP
Bank of America Plaza, 101 South Tryon Street
Suite 4000
Charlotte, NC 28280-4000

PUBLICATION NOTICE

OC000000063889961

Title:UNLOCKING A TOUCH SCREEN DEVICE

Publication No.US-2013-0246971-A1
Publication Date:09/19/2013

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently http://pair.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

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Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 10949

Sep 20, 2013 05:26:34 AM

Dear PAIR Customer:

Nokia Corporation and Alston & Bird LLP
c/o Alston & Bird LLP
Bank of America Plaza, 101 South Tryon Street
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Charlotte, NC 28280-4000
UNITED STATES

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Application	Document	Mailroom Date	Attorney Docket No.
13889750	NTC.PUB	09/19/2013	042933/427718

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/889,750	05/08/2013	Phillip Lindberg	042933/427718	1050

10949 7590 10/15/2013

Nokia Corporation and Alston & Bird LLP
c/o Alston & Bird LLP
Bank of America Plaza, 101 South Tryon Street
Suite 4000
Charlotte, NC 28280-4000

EXAMINER	
ABDUL-ALI, OMAR R	

ART UNIT	PAPER NUMBER
2142	

NOTIFICATION DATE	DELIVERY MODE
10/15/2013	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):

usptomail@alston.com

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Office Action Summary	Application No. 13/889,750	Applicant(s) LINDBERG ET AL.	
	Examiner OMAR ABDUL-ALI	Art Unit 2142	AIA (First Inventor to File) Status No

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

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *5/08/2013*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ 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.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) *1-20* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-20* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, 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.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ 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)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *6/13*.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

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DETAILED ACTION

1. The present application is being examined under the pre-AIA first to invent provisions. This action is in response to the original filing of May 8, 2013. Claims 1-20 are pending and have been considered below.

Claim Rejections - 35 USC § 112

2. The following is a quotation of 35 U.S.C. 112(b):

> (b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 5 is rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor, or for pre-AIA the applicant regards as the invention. Claim 5 states, “wherein the movable object is a further icon". It is unclear what the applicant means by 'further icon'. Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of pre-AIA 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before

> the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1, 7, 11-13, and 17-19 are rejected under pre-AIA 35 U.S.C. 102(e) as being anticipated by Michalske (US 2009/0205041).

Claims 1, 13, and 19: Michalske discloses an apparatus, method, and medium, comprising:

a. at least one processor (page 3, paragraph 38);

b. at least one memory storing computer program code configured, working with the at least one processor, to cause at least the following to be performed: causing a display of a device to display an icon, relating to an application, when the device is in a locked mode (Fig. 6A, '607');

and

c. enabling a user to select the icon while the device is in the locked mode, in order to determine a state, function or utility of the application while the device remains in the locked mode (page 3, paragraph 34). A user may select the emergency icon to access information even though the software lock remains engaged.

Claims 7 and 17: Michalske discloses an apparatus as in Claims 1 and 13 above, further comprising wherein the icon represents an application that is present or available in the device (page 4, paragraph 47).

Claims 11 and 18: Michalske discloses an apparatus as claimed in Claims 1 and 13 above, further comprising wherein the display is a touch screen display, and enabling a user to select the icon comprises enabling the user to select the icon using the touch screen display (Fig. 6A).

Claim 12: Michalske discloses an apparatus as claimed in Claim 1 above, further comprising wherein the apparatus is the device (Fig. 6A).

Claim Rejections - 35 USC § 103

6. The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 2, 8-10, 14, and 20 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Michalske (US 2009/0205041) in view of Chaudhri et al. (US 2007/0150842).

Claims 2, 14, and 20: Michalske discloses an apparatus as in Claims 1, 13, and 29 above, but does not explicitly disclose wherein the icon is a dimmed icon. Chaudhri discloses a similar method that further discloses the use of dimmed icons on a locked screen (page 8, paragraph 85). Therefore it would have been obvious to one having

ordinary skill in the art at the time the invention was made to include a dimmed icon in Michalske for the purpose of indicating application state.

Claim 8: Michalske discloses an apparatus as in Claim 1 above, but does not explicitly disclose wherein the computer program code is configured, working with the at least one processor, to cause at least the following to be performed: causing the display to display another icon, relating to another application, when the device is in a locked mode. Chaudhri discloses a similar method that further discloses causing a display to display additional icons on a locked screen corresponding to an application (page 8, paragraph 85). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to cause the display in Michalske to display another icon relating to another application for the purpose of design choice.

Claim 9: Michalske and Chaudhri disclose an apparatus as in Claim 8 above, and Chaudhri further discloses wherein the another icon represents an application that is present or available in the device (page 8, paragraph 85).

Claim 10: Michalske and Chaudhri disclose an apparatus as in Claim 8 above, and Chaudhri further discloses wherein the another icon indicates that the another application is not activatable when the device is in the locked mode (page 8, paragraph 85).

8. Claims 3, 6, and 15 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Michalske (US 2009/0205041) in view of Nichols (US 2010/0070931).

Claims 3 and 15: Michalske discloses an apparatus as in Claims 1 and 13 above, but does not explicitly disclose wherein the computer program code is configured, working with the at least one processor, to cause at least the following to be performed: responding to user selection of the icon by illuminating or highlighting the icon. Nichols discloses a similar method that further discloses highlighting an icon when a touch selection is performed (page 5, paragraph 74). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to illuminate an icon in response to user selection in Michalske, for the purpose of providing selection emphasis.

Claim 6: Michalske and Nichols disclose an apparatus as in Claim 3 above, and Nichols further discloses wherein the icon is highlighted or illuminated to a lesser extent than that associated with a standard mode setting (page 5, paragraph 74).

9. Claims 4 and 16 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Michalske (US 2009/0205041) in view of Paloniemi et al. (US 2001/0017934).

Claims 4 and 16: Michalske discloses an apparatus as in Claims 3 and 13 above, but does not explicitly disclose wherein a movable object is provided to enable the user to select the icon. Paloniemi discloses a similar method that further discloses enabling a user to select an icon with a movable icon (page 3, paragraph 32). Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a movable object to enable to user to select the icon in Michalske, for the purpose of providing selection emphasis.

Claim 5: Michalske and Paloniemi disclose an apparatus as in Claim 4 above, and Paloniemi further discloses wherein the movable object is a further icon (Page 3, paragraph 32).

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. Nilsson (US 2010/0306705);

b. Shim et al. (US 2009/0064047);

c. Pisula et al. (US 8,341,557).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to OMAR ABDUL-ALI whose telephone number is (571)270-1694. The examiner can normally be reached on Monday-Friday 10:30-7:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Stevens can be reached on 571-272-4102. 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 http://pair-direct.uspto.gov. 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.

/OMAR ABDUL-ALI/
Primary Examiner, Art Unit 2142

Notice of References Cited	Application/Control No. 13/889,750	Applicant(s)/Patent Under Reexamination LINDBERG ET AL.	
	Examiner OMAR ABDUL-ALI	Art Unit 2142	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2009/0205041	08-2009	Michalske, Steven Charles	726/17
*	B	US-2007/0150842	06-2007	Chaudhri et al.	715/863
*	C	US-2010/0070931	03-2010	NICHOLS, Paul	715/863
*	D	US-2001/0017934	08-2001	Paloniemi et al.	382/107
*	E	US-2010/0306705	12-2010	Nilsson, Fredrik	715/835
*	F	US-2009/0064047	03-2009	SHIM et al.	715/835
*	G	US-8,341,557	12-2012	Pisula et al.	715/863
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	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.

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	137	"715"/$.ccls. and locked with icon and @ad<"20090629"	US-PGPUB; USPAT	ADJ	OFF	2013/09/27 15:28
S2	1	("20070150842").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/09/27 16:14
S3	1	"715"/$.ccls. and lockscreen with icon and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/27 16:18
S4	3	"715"/$.ccls. and lock screen with icon and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/27 16:19
S5	0	"715"/$.ccls. and lock screen with dim$3 and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/29 01:20
S6	0	"715"/$.ccls. and lock screen same dim$3 and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/29 01:20
S7	2	"715"/$.ccls. and lock with icon same dim$3 and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/29 01:21
S8	3	"715"/$.ccls. and lock with icon same transpar$5 and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/29 01:47
S9	0	"715"/$.ccls. and lockscreen with icon same transpar$5 and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/29 01:48
S10	0	"715"/$.ccls. and lockscreen same transpar$5 and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/29 01:48
S11	36	"715"/$.ccls. and lock same transpar$5 and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/29 01:49
S12	2	"715"/$.ccls. and lockscreen and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/29 01:50
S13	106	"715"/$.ccls. and locked near2 (device or phone or handset) and (transpar$4 or translu$4 or opa$4) and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/29 01:57
S14	1	"715"/$.ccls. and locked near2 (device or phone or handset) same (transpar$4 or translu$4 or opa$4) and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/29 01:57
S15	106	"715"/$.ccls. and locked near2 (device or phone or handset) and (transpar$4 or translu$4 or opa$4) and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/29 01:58
S16	3	"715"/$.ccls. and locked near2 (device or	US-	ADJ	ON	2013/09/29

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		phone or handset) and (transpar$4 or translu$4 or opa$4) with icon and @ad<"20090629"	PGPUB; USPAT			01:58
S17	7	"715"/$.ccls. and locked near2 (device or phone or handset) and (dimmed) with icon and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/29 02:01
S18	2	"715"/$.ccls. and locked near2 (device or phone or handset) same highlight with icon and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/29 02:08
S19	2	"715"/$.ccls. and locked near2 (device or phone or handset) same illuminat$3 with icon and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/29 02:09
S20	2	"715"/$.ccls. and locked same illuminat$3 with icon and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/29 02:09
S21	0	"715"/$.ccls. and lock same illuminat$3 with icon and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/29 02:09
S22	7	"715"/$.ccls. and lock same highlight with icon and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/29 02:09
S23	29	"715"/$.ccls. and highlight near2 icon and touchscreen and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/29 02:11
S24	2	"715"/860 and touchscreen same icon and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/29 02:23
S25	0	"715"/860 and highlight$3 near2 icon with touch$3and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/29 02:23
S26	1	"715"/860 and highlight$3 near2 icon with touch$3 and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/29 02:23
S27	34	highlight$3 near2 icon with finger and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/29 02:29
S28	374	icon with finger with cursor and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/29 02:47
S29	67	"715"/$.ccls. and icon with finger with cursor and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/29 02:48
S30	0	"715"/$.ccls. and icon with finger with cursor same handset and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/29 02:49
S31	1	"715"/$.ccls. and icon with finger with cursor same phone and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/29 02:59
S32	1	"715"/$.ccls. and icon with finger with pointer same phone and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/29 02:59
S33	1	"715"/$.ccls. and icon with finger same pointer same phone and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/29 02:59
S34	9	"715"/$.ccls. and icon with finger and pointer same phone and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/29 03:05

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S35	3	"715"/$.ccls. and icon with finger same cursor same phone and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/29 03:08
S36	67	"715"/$.ccls. and icon with finger with cursor and @ad<"20090629"	US-PGPUB; USPAT	ADJ	ON	2013/09/29 03:12

EAST Search History (Interference)

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Substitute for form 1449/PTO (Revised 07/2007)	Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT *(Use as many sheets as necessary)*	Application Number	13/889,750
	Filing Date	May 8, 2013
	First Named Inventor	Lindberg et al.
	Art Unit	2172
	Examiner Name	
Sheet 1 of 1	Attorney Docket Number	042933/427718

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.	Document Number Number - Kind Code (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages of Relevant Figures Appear
	1	US-6,920,619	07-19-2005	Milekic	
	2	US-7,509,140	03-24-2009	Elomaa	
	3	US-7,610,599	10-27-2009	Nashida et al.	
	4	US-2004/0061788 A1	04-01-2004	Bateman	
	5	US-2005/0060653 A1	03-17-2005	Fukase et al.	
	6	US-2007/0067734 A1	03-22-2007	Cunningham et al.	
	7	US-2007/0150834 A1	06-28-2007	Muller et al.	
	8	US-2007/0150842 A1	06-28-2007	Chaudhri et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials	Cite No.	Foreign Patent Document Country Code – Number Kind Code (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	English Language Translation Attached
	9	EP 1 450 248	08-25-2004	Giat Industries		
		*Abstract only				

OTHER DOCUMENTS

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, page(s) , volume-issue number(s), publisher, city and/or country where published.	English Language Translation Attached
	10	International Search Report and Written Opinion from International Application No. PCT/IB2008/001662 dated December 15, 2009	
	11	Office Action for Chinese Application No. 2008-800222885 dated November 23, 2011	
	12	Office Action for Korean Application No. 10-2010-7002006 dated August 23, 2011	

Examiner Signature	/Omar Abdul-ali/	Date Considered	10/01/2013

*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. LEGAL02/34178466v1

Submitted June 7, 2013

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /O.A.A

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BIB DATA SHEET

CONFIRMATION NO. 1050

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
13/889,750	05/08/2013	715	2142	042933/427718

APPLICANTS

Phillip Lindberg, Helsinki, FINLAND;
Sami Niemela, Helsinki, FINLAND;
NOKIA CORPORATION, Espoo, FINLAND

**** CONTINUING DATA ***************************

This application is a CON of 13/357,143 01/24/2012
which is a DIV of 11/770,929 06/29/2007 PAT 8127254

**** FOREIGN APPLICATIONS ***************************

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****

06/06/2013

Foreign Priority claimed	35 USC 119(a-d) conditions met	Verified and Acknowledged	Met after Allowance	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
☐ Yes ☑ No	☐ Yes ☑ No	/OMAR R ABDUL-ALI/ Examiner's Signature	☐ Initials	FINLAND	10	20	3

ADDRESS

Nokia Corporation and Alston & Bird LLP
c/o Alston & Bird LLP
Bank of America Plaza, 101 South Tryon Street
Suite 4000
Charlotte, NC 28280-4000
UNITED STATES

TITLE

UNLOCKING A TOUCH SCREEN DEVICE

FILING FEE RECEIVED		
2040	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13889750	LINDBERG ET AL.
	Examiner	Art Unit
	OMAR ABDUL-ALI	2142

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
715	863	10/01/2013	OAA
715	702	10/01/2013	OAA

SEARCH NOTES		
Search Notes	Date	Examiner
Performed EAST search (USPAT, US-PGPUB)	10/01/2013	OAA

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13889750	LINDBERG ET AL.
	Examiner	**Art Unit**
	OMAR ABDUL-ALI	2142

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

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

CLAIM		DATE								
Final	Original	10/01/2013								
	1	=								
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	4	=								
	5	=								
	6	=								
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	17	=								
	18	=								
	19	=								
	20	=								

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To: usptomail@alston.com,,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 10949

Oct 15, 2013 05:24:01 AM

Dear PAIR Customer:

Nokia Corporation and Alston & Bird LLP
c/o Alston & Bird LLP
Bank of America Plaza, 101 South Tryon Street
Suite 4000
Charlotte, NC 28280-4000
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 10949 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

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Application	Document	Mailroom Date	Attorney Docket No.
13889750	CTNF	10/15/2013	042933/427718
	892	10/15/2013	042933/427718
	1449	10/15/2013	042933/427718

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UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.:	13/889,750	Confirmation No.: 1050
Applicant(s):	Lindberg et al.	
Filed:	May 8, 2013	
Art Unit:	2142	
Examiner:	Omar R. Abdul-Ali	
Title:	UNLOCKING A TOUCH SCREEN DEVICE	

Docket No.: 042933/427718
Customer No.: 10949

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

REPLY

In response to the Official Action dated October 15, 2013, please amend the above-identified application as follows:

Remarks begin on page 2 of this paper.

REMARKS

Claim 5 was rejected under 35 USC § 112(b) or 35 USC § 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor, or for pre-AIA the applicant regards as the invention. In particular, the Official Action indicated that reference to a "further icon" was unclear. By referring to a "further icon" in Claim 5, a distinction is drawn between the icon that relates to an application that is referenced in independent Claim 1 and the further icon that comprises the movable object in dependent Claim 5. As the further icon that comprises the movable object in dependent Claim 5 is in addition to and distinct from the icon that relates to an application that is referenced in independent Claim 1, the further icon of dependent Claim 5 is, indeed, a further icon such that the use of the "further icon" terminology in Claim 5 is submitted to be both clear and appropriate. As such, the rejection of Claim 5 as being indefinite is respectfully traversed.

Claims 1, 7, 11-13, and 17-19 were rejected under pre-AIA 35 USC § 102(e) as being anticipated by US Patent Application Publication No. US 2009/0205041 to Michalske (hereinafter "Michalske"). The remaining claims were rejected under pre-AIA 35 USC § 103(a) as being unpatentable over Michalske in view of various secondary references, such as US Patent Application Publication No. US 2007/0150842 to Chaudhri, et al. in regards to Claims 2, 8-10, 14 and 20, US Patent Application Publication No. US 2010/0070931 to Nichols (hereinafter "Nichols") in regards to Claims 3, 6 and 15 and US Patent Application Publication No. US 2001/0017934 to Paloniemi, et al. in regards to Claims 4 and 16. As described below, the rejections of the claims as being anticipated or unpatentable are traversed as at least two of the cited references do not properly quality as prior art and, as such, cannot properly be cited. Based on the following remarks, reconsideration of the present application and allowance of the claims are respectfully requested.

The present application was filed on May 8, 2013 and is a continuation of U.S. Patent Application Serial No. 13/357,143 filed on January 24, 2010 which, in turn, is a divisional of U.S. Patent Application Serial No. 11/770,929 filed on June 29, 2007. As such, the present

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application enjoys a priority date of June 29, 2007.

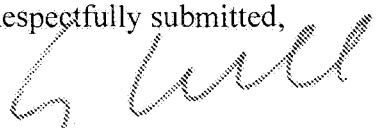
Turning now to the cited references, both Michalske and Nichols were filed after the priority date of the present application and, as such, do not quality as prior art under 35 USC § 102. In this regard, Michalske was filed on February 8, 2008 and Nichols was filed on September 15, 2008, both dates being well after the priority date of June 29, 2007 for the present application. Since Michalske and Nichols do not properly quality as prior art, all rejections that rely upon one or both of these references are similarly improper. In this regard, Michalske is the primary reference with all rejections under pre-AIA 35 USC § 102(e) and pre-AIA 35 USC § 103(a) being based, entirely or at least in part, upon Michalske. As such, each of the rejections under pre-AIA 35 USC § 102(e) and pre-AIA 35 USC § 103(a) is improper and is respectfully requested to be withdrawn.

In view of the remarks presented above, Applicants respectfully submit that the present application is in condition for allowance. As such, the issuance of a Notice of Allowance is therefore respectfully requested. In order to expedite the examination of the present application, the Examiner is encouraged to contact Applicants' undersigned attorney in order to resolve any remaining issues.

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It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefor (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,



Guy R. Gosnell
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Charlotte, NC 28280-4000
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Electronic Acknowledgement Receipt

EFS ID:	17922216
Application Number:	13889750
International Application Number:	
Confirmation Number:	1050
Title of Invention:	UNLOCKING A TOUCH SCREEN DEVICE
First Named Inventor/Applicant Name:	Phillip Lindberg
Customer Number:	10949
Filer:	Guy Randall Gosnell/Lauren Martin
Filer Authorized By:	Guy Randall Gosnell
Attorney Docket Number:	042933/427718
Receipt Date:	15-JAN-2014
Filing Date:	08-MAY-2013
Time Stamp:	16:00:17
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		427718-AmendAsFiled.PDF	383192 824968e779a1a81091b6b38c8960aa208d4af7b0	yes	4

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	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
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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
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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.

Substitute for form 1449/PTO (Revised 07/2007)	Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT *(Use as many sheets as necessary)*	Application Number	13/889,750
	Filing Date	May 8, 2013
	First Named Inventor	Lindberg et al.
	Art Unit	2142
	Examiner Name	O. R. Abdul-Ali
Sheet 1 of 2	Attorney Docket Number	042933/427718

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.	Document Number Number - Kind Code (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages of Relevant Figures Appear
	1	US-6,249,606	06-19-2001	Kiraly et al.	
	2	US-7,593,000	09-22-2009	Chin	
	3	US-7,683,888	03-23-2010	Kennedy	
	4	US-8,127,254	02-28-2012	Lindberg et al.	
	5	US-8,209,637	06-26-2012	Chaudhri et al.	
	6	US-8,427,445	04-23-2013	Kennedy	
	7	US-8,443,199	05-14-2013	Kim et al.	
	8	US-2009/0264159 A1	10-22-2009	Hsieh et al.	
	9	US-2010/0095206 A1	04-15-2010	Kim	
	10	US-2010/0162182 A1	06-24-2010	Oh et al.	
	11	US-2012/0098639 A1	04-26-2012	Ijas	

FOREIGN PATENT DOCUMENTS

Examiner Initials	Cite No.	Foreign Patent Document Country Code – Number Kind Code (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	English Language Translation Attached
	12	EP 2 230 623 A1	09-22-2010	LG Electronics Inc.		
	13	EP 2 256 610 A1	12-01-2010	HTC Corporation		
	14	WO 00/33570 A1	06-08-2000	Sony Corporation		*(corresponds to US 7,610,599 previously cited)
	15	WO 2008/116395 A1	10-02-2008	Computime, Ltd.		
		*Abstract only				

Examiner Signature		Date Considered	

*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. LEGAL02/34635415v1

Submitted January 23, 2014

Substitute for form 1449/PTO (Revised 07/2007)				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT *(Use as many sheets as necessary)*				Application Number	13/889,750
				Filing Date	May 8, 2013
				First Named Inventor	Lindberg et al.
				Art Unit	2142
				Examiner Name	O. R. Abdul-Ali
Sheet	2	of	2	Attorney Docket Number	042933/427718

OTHER DOCUMENTS

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, page(s), volume-issue number(s), publisher, city and/or country where published.	English Language Translation Attached
	16	International Search Report and Written Opinion for Application No. PCT/FI2011/050776 mailed December 27, 2011	
	17	Office Action for European Application No. EP 08 776 289.4 dated April 26, 2013	

Examiner Signature		Date Considered	

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Submitted January 23, 2014

Espacenet

Bibliographic data: WO0033570 (A1) — 2000-06-08

INFORMATION PROVIDING DEVICE AND METHOD

No documents available for this priority number.

Inventor(s): NASHIDA TATSUSHI [JP]; HASHIMOTO TAKESHI [JP]; KOBAYASHI MOTOKI [JP] ± (NASHIDA, TATSUSHI, ; HASHIMOTO, TAKESHI, ; KOBAYASHI, MOTOKI)

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Classification: - international: ***H04N5/445; H04N7/173;*** *H04N5/50;* (IPC1-7): G06F3/00; H04N5/445; H04N7/08; H04Q9/00
- cooperative: **H04N21/42204; H04N21/4316; H04N21/4438; H04N5/44543;** H04N21/47; H04N5/45; H04N5/50

Application number: WO1999JP06709 19991130

Priority number (s): JP19980338917 19981130

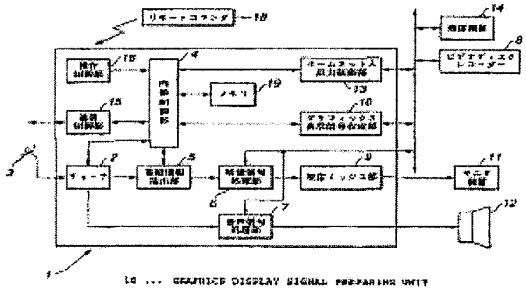
Also published as: US7610599 (B1) US2011214145 (A1) US2008276280 (A1) US7937726 (B2) JP4314743 (B2)

Abstract of WO0033570 (A1)

An information providing device and an information providing method, wherein indexing information is acquired via a network and an information screen is classified by the acquired information to form a menu screen, thereby it is possible to select a desired program simply and quickly even when many information screens such as programs are provided from a plurality of information sources by being applied to a set-top box of a digital satellite broadcasting.

Last updated: 11.12.2013 Worldwide Database 5.8.15; 93p

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10 ... GRAPHICS DISPLAY SIGNAL PREPARING UNIT
... VIDEO MIXING UNIT
14 ... COMMUNICATION EQUIPMENT
... VIDEO DISK RECORDER
12 ... MONITOR DEVICE
16 ... REMOTE COMMANDER
16 ... OPERATION CONTROL UNIT
15 ... COMMUNICATION CONTROL UNIT
2 ... TUNER
4 ... INTERNAL CONTROL UNIT
5 ... PROGRAM INFORMATION EXTRACTION UNIT
18 ... MEMORY
6,7 ... VIDEO SIGNAL PROCESSING UNIT
17 ... HOME NET I/O CONTROL UNIT

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(21) 国際出願番号 PCT/JP99/06709

(22) 国際出願日 1999年11月30日(30.11.99)

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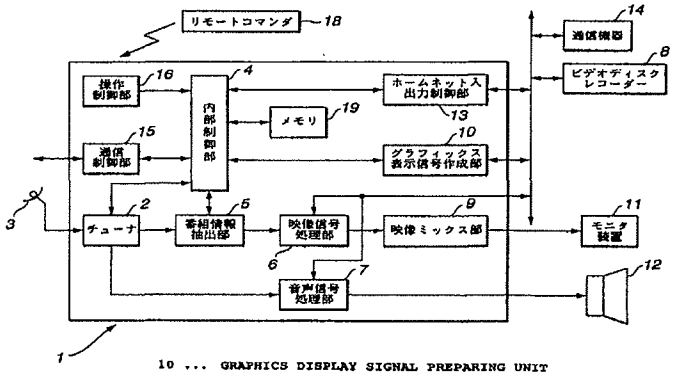
添付公開書類
国際調査報告書
補正書

(54)Title: **INFORMATION PROVIDING DEVICE AND METHOD**

(54)発明の名称 情報提供装置及び情報提供方法

(57) Abstract

An information providing device and an information providing method, wherein indexing information is acquired via a network and an information screen is classified by the acquired information to form a menu screen, thereby it is possible to select a desired program simply and quickly even when many information screens such as programs are provided from a plurality of information sources by being applied to a set-top box of a digital satellite broadcasting.



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4 ... INTERNAL CONTROL UNIT
5 ... PROGRAM INFORMATION EXTRACTION UNIT
19 ... MEMORY
6,7 ... VIDEO SIGNAL PROCESSING UNIT
13 ... HOME NET I/O CONTROL UNIT

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(57)要約

本発明は、情報提供装置及び情報提供方法に関し、ネットワークを介してインデックス用の情報を取得し、この情報により情報画面を分類してメニュー画面を形成する。これにより、本発明では、例えばディジタル衛星放送のセットトップボックスに適用して、複数の情報源より多数の番組等の情報画面が提供される場合でも、簡易かつ迅速に所望の番組等を選択することができることになる。

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LI リヒテンシュタイン
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LR リベリア
LS レソト
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MD モルドヴァ
MG マダガスカル
MK マケドニア旧ユーゴスラヴィア共和国
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MN モンゴル
MR モーリタニア
MW マラウイ
MX メキシコ
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NL オランダ
NO ノールウェー
NZ ニュー・ジーランド
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RU ロシア
SD スーダン
SE スウェーデン
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SI スロヴェニア
SK スロヴァキア
SL シエラ・レオネ
SN セネガル
SZ スワジランド
TD チャード
TG トーゴー
TJ タジキスタン
TZ タンザニア
TM トルクメニスタン
TR トルコ
TT トリニダッド・トバゴ
UA ウクライナ
UG ウガンダ
US 米国
UZ ウズベキスタン
VN ヴィェトナム
YU ユーゴースラビア
ZA 南アフリカ共和国
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明細書

情報提供装置及び情報提供方法

技術分野

本発明は、情報提供装置及び情報提供方法に関し、例えばディジタル衛星放送のセットトップボックスに適用することができるものであって、例えばインデックス画像等を順次拡大し、この拡大した画像が内周側より時系列の順序でらせん状に連続するように表示することにより、時系列により連続する多くの画像について、前後関係を容易に理解することができるように表示する、情報提供装置及び情報提供方法に関する。

背景技術

従来、ディジタル衛星放送のセットトップボックス等においては、多数のチャンネルより所望のチャンネルを簡易に選択できるように、例えばマルチ画面により各チャンネルの放送内容等を表示するようになされている。

ところでこの種の映像機器においては、例えば光ディスク装置、ハードディスク装置等の記録再生装置に接続して所望の番組を記録することが考えられ、この場合にいわゆるタイムシフトにより所望の番組を視聴することが考えられる。

ユーザーにおいては、このように記録した番組を視聴する場合に、

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特定のシーンだけ視聴したい場合が考えられる。この場合、各シーンの先頭画面を静止画像により表示し、ユーザーの選択により対応するシーンを再生することにより、ユーザーの所望するシーンを選択的に提供することができると考えられ、使い勝手を向上できると考えられる。

ところが単にこの種の静止画像を並べて表示したのでは、各静止画像の前後関係等を容易に把握することが困難になり、却って使い勝手が悪くなる。

発明の開示

本発明は以上の点を考慮してなされたもので、時系列により連続する多くの画像について、前後関係を理解容易に表示することができる映像信号処理装置及び映像信号処理方法を提供することを目的とする。

本発明の情報提供装置は、複数の情報源を介して提供される種々の情報データに基づいて画面に情報を表示させる情報提供装置であり、上記複数の情報源のうち第１の情報源から上記第１の情報源に関する第１の情報データを取得する第１の情報取得手段と、上記複数の情報源のうち第２の情報源から上記第２の情報源に関する第２の情報データを取得する第２の情報取得手段と、取得した上記第１の情報データ及び上記第２の情報データに基づいて、上記画面に分類したメニュー画面を表示させるメニュー画面表示手段と、上記メニュー画面における選択操作に応動して上記第１の情報源または上記第２の情報源から必要な情報データを取得し、上記必要な情報デ

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ータに基づいた情報を上記画面に表示させる表示手段と、を有することを特徴とする。

ここで、上記第１の情報データは上記第１の情報源から出力されるコンテンツに関するインデックス情報であって、上記必要な情報は上記コンテンツの内容を表示させるための情報データである。

また、上記第１の情報源と上記情報提供装置とは、ネットワークを介して接続されており、上記第１の情報取得手段は、上記ネットワークを介して上記第１の情報データを取得する。

次に、本発明の情報提供方法は、複数の情報源を介して提供される種々の情報データに基づいて画面に情報を表示させる情報提供方法であり、上記複数の情報源のうち第１の情報源から上記第１の情報源に関する第１の情報データを取得する第１の情報取得工程と、上記複数の情報源のうち第２の情報源から上記第２の情報源に関する第２の情報データを取得する第２の情報取得工程と、取得した上記第１の情報データ及び上記第２の情報データに基づいて、上記画面に分類したメニュー画面を表示させるメニュー画面表示工程と、上記メニュー画面における選択操作に応動して上記第１の情報源または上記第２の情報源から必要な情報データを取得し、上記必要な情報データに基づいた情報を上記画面に表示させる表示工程と、を有することを特徴とする。

ここで、上記第1の情報データは上記第１の情報源から出力されるコンテンツに関するインデックス情報であって、上記必要な情報は上記コンテンツの内容を表示させるための情報データである。

また、第１の情報取得工程は、上記第１の情報源から上記第１の情報源に関する第１の情報データをネットワークを介して取得する。

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図面の簡単な説明

図１は、本発明の実施の形態に係るセットトップボックスを示すブロック図である。

図２は、図１のセットトップボックスの内部制御部を示すブロック図である。

図３は、図１のセットトップボックスのリモートコマンダを示す斜視図である。

図４は、図３のリモートコマンダを示すブロック図である。

図５は、メインメニュー画面を示す平面図である。

図６は、推奨チャンネルについて、メインメニュー画面とその下位階層のメニューとの関係を示す略線図である。

図７は、図６の推奨チャンネルのメニュー画面を示す平面図である。

図８（Ａ）乃至図８（Ｃ）は、メインメニュー画面から推奨チャンネルのメニュー画面への遷移の説明に用いる平面図である。

図９（Ａ）乃至図９（Ｃ）は、推奨チャンネルのメニュー画面におけるフォーカスの切り換えの説明に用いる平面図である。

図１０（Ａ）乃至図１０（Ｄ）は、推奨チャンネルのメニュー画面から番組の表示への遷移の説明に用いる平面図である。

図１１は、推奨チャンネルにおける番組案内を示す平面図である。

図１２は、カテゴリーについて、メインメニュー画面とその下位階層のメニューとの関係を示す略線図である。

図１３は、図１２のカテゴリーのメニュー画面を示す平面図であ

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る。

図１４は、カテゴリーの番組選択のメニュー画面を示す平面図である。

図１５（Ａ）乃至図１５（Ｃ）は、カテゴリーのメニュー画面から番組選択のメニュー画面への遷移の説明に用いる平面図である。

図１６（Ａ）乃至図１６（Ｂ）は、図１５の続きの説明に用いる平面図である。

図１７は、カテゴリーにおける番組案内を示す平面図である。

図１８は、メディアについて、メインメニュー画面とその下位階層のメニューとの関係を示す略線図である。

図１９は、図１８のメディアのメニュー画面を示す平面図である。

図２０は、メディアの番組選択のメニュー画面を示す平面図である。

図２１は、メニュー画面の切り換えにおける内部制御部の処理手順を示すフローチャートである。

図２２は、図２１の続きを示すフローチャートである。

図２３は、第１のサーチ画面を示す平面図である。

図２４は、メディアがランダムアクセス困難な場合の第１のサーチ画面を示す平面図である。

図２５は、第２のサーチ画面を示す平面図である。

図２６（Ａ）乃至図２６（Ｃ）は、第２のサーチ画面における円周方向のフォーカスの切り換えの説明に用いる平面図である。

図２７（Ａ）乃至図２７（Ｃ）は、第２のサーチ画面における内外周方向のフォーカスの切り換の説明に用いる平面図である。

図２８は、第１のサーチ画面の表示における内部制御部の処理手

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順を示すフローチャートである。

図２９は、第１のサーチ画面の表示における内部制御部の処理手順を示すフローチャートである。

図３０は、図２９の続きを示すフローチャートである。

図３１は、第２のサーチ画面の表示における内部制御部の処理手順を示すフローチャートである。

図３２は、図３１の続きを示すフローチャートである。

図３３は、図３２の続きを示すフローチャートである。

図３４は、番組情報の取得の説明に供するフローチャートである。

発明を実施するための最良の形態

以下、適宜図面を参照しながら本発明の実施の形態を詳述する。

（１）実施の形態の構成

（１－１）全体構成

図１は、本発明の実施の形態に係るセットトップボックスを示すブロック図である。このセットトップボックス１において、チューナ２は、アンテナ３よりダウンコンバートされたディジタル衛星放送の放送波、ディジタル地上波の放送波を受け、内部制御部４の制御に従ってこれらの放送波より所望のトランスポートストリームを復調する。さらにチューナ２は、内部制御部４の制御に従ってこの復調したトランスポートストリームより画像データ及び音声データを復調して電子番組情報（ＥＰＧ：Electronic Program Guide）と共に出力する。

番組情報抽出部５は、このチューナ２の出力データより電子番組

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情報を抽出して内部制御部４に出力すると共に、画像データ及び音声データをそれぞれ映像信号処理部６及び音声信号処理部７に出力する。

映像信号処理部６は、内部制御部４の制御により、この番組情報抽出部５より出力される画像データ、外部機器であるビデオディスクレコーダー８より入力される画像データをデータ伸長して出力する。なおここでこの画像データにあっては、例えばＭＰＥＧ（Moving Picture Experts Group）のフォーマットによりデータ圧縮されて伝送されてきたものである。

また映像信号処理部６は、内部制御部４の制御により、所望の番組をビデオディスクレコーダー８で記録する場合、番組情報抽出部５より出力される画像データをビデオディスクレコーダー８に出力する。このとき映像信号処理部６は、連続するフレームの比較によりシーンチェンジの場面を検出し、このシーンチェンジした画像を静止画像（以下インデックス画像と呼ぶ）により記録中のビデオディスクレコーダー８に出力して記録する。これにより映像信号処理部６は、番組を構成する各シーンのインデックス画像をビデオディスクレコーダー８に記録する。また映像信号処理部６は、このようにして記録した静止画像と本来の画像データとの関連を示す時間情報を内部制御部４に通知する。これによりこのセットトップボックス１においては、このようにして記録したインデックス画像を使用してユーザーの所望するシーンを簡易に選択できるようになされている。

映像ミックス部９は、この映像信号処理部６より出力される画像データとグラフィックス表示信号作成部１０より出力される画像デ

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ータとを合成してモニタ装置１１に出力する。これによりセットトップボックス１においては、所望の番組をモニタ装置１１により視聴できるようになされ、またこの番組の選択に必要な種々のメニュー画面を目視できるようになされている。このとき映像ミックス部９は、内部制御部４の制御により、クロスフェード等の処理によりこれら２つの画像データを合成して出力し、また映像信号処理部６より出力される画像データによる画像を、グラフィックス表示信号作成部１０より出力される画像データによる画像の一部にはめ込んで表示するように、画像データをキーイングして合成する。

音声信号処理部７は、番組情報抽出部５より出力される音声データ、外部機器であるビデオディスクレコーダー８より入力される音声データをデータ伸長し、スピーカ１２に出力する。これによりセットトップボックス１においては、所望の番組についてスピーカ１２により音声を視聴できるようになされている。また音声信号処理部７は、内部制御部４の制御により、所望の番組を記録する場合には、映像信号処理部６と連動して、番組情報抽出部５より出力される音声データをビデオディスクレコーダー８に出力する。

ビデオディスクレコーダー８は、このセットトップボックス１に接続可能な各種メディアであり、この実施の形態においては、ビデオテープレコーダ、コンパクトディスクプレイヤー、ハードディスク装置、光ディスク装置が適用されるようになされている。

ホームネット入出力制御部１３は、ＩＥＥＥ１３９４インターフェースを介してビデオディスクレコーダー８等を接続してなるホームネットワークに対して、このセットトップボックス１におけるインターフェースの制御部であり、内部制御部４の制御によりビデオ

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ディスクレコーダー８の動作を制御する。これによりセットトップボックス１においては、ディジタル衛星放送、ディジタル地上波放送による番組をビデオディスクレコーダー８に記録できるようになされ、またこのビデオディスクレコーダー８に記録した番組、光ディスク等により提供される番組を視聴できるようになされている。

またホームネット入出力制御部１３は、このようにしてディジタル衛星放送、ディジタル地上波放送による番組をビデオディスクレコーダー８に記録する際に、内部制御部４の制御により、併せてこれらの番組に関する番組情報、インデックス画像等を記録し、また内部制御部４の制御によりこれらの情報、インデックス画像を選択的に再生して内部制御部４等に通知する。

またホームネット入出力制御部１３は、これらの処理に加えて、このホームネットワークに接続された通信機器１４より、例えば電話回線を介して所定のサーバーより取得した詳細な番組情報、録画予約のデータ等を内部制御部４に通知する。またビデオディスクレコーダー８に装填されたＣＤ－ＲＯＭより取得した詳細な番組情報ついても、同様に内部制御部４に通知する。これによりセットトップボックス１は、ユーザーに提供可能な各種番組に関して、種々の情報源より詳細な番組情報を取得できるようになされている。

グラフィックス表示信号作成部１０は、内部制御部４の制御により、このようにして取得した情報により後述する種々の表示画面による画像データを生成して出力する。このときグラフィックス表示信号作成部１０は、必要に応じてビデオディスクレコーダー８に記録したインデックス画像により画像データを生成して映像ミックス部９に出力し、これによりセットトップボックス１は、ユーザーの

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所望する番組を簡易に選択できるようになされている。

通信制御部１５は、内部制御部４の制御により課金処理に必要な番組について、電話回線を介して所定の課金センターをアクセスし、必要なデータ交換の処理を実行する。これによりセットトップボックス１は、いわゆるペイパービュー等の番組を視聴できるようになされている。

操作制御部１６は、リモートコマンダ１８より送出される赤外線による遠隔制御信号を受信して、またこのセットトップボックス１の操作パネルに配置された操作子の操作を検出して、内部制御部４に対応する制御信号を送出する。

内部制御部４は、このセットトップボックス１の動作を制御すると共に、必要に応じてビデオディスクレコーダー８の動作を制御するマイクロコンピュータであり、図２に示すように、メモリ１９に格納した制御プログラムの実行により一連の制御を実行する。

すなわちメモリ１９は、制御プログラムを格納した領域と、中央処理ユニット（ＣＰＵ）４Ａのワークエリアであるデータエリアの領域とで構成される。内部制御部４は、中央処理ユニット４Ａによりこの制御プログラムを実行し、必要に応じてＩ／Ｏ制御部４Ｂを介して各回路ブロックに制御コマンドを発行すると共に、これら各回路ブロックより種々のデータを取得し、これにより全体の動作を制御する。

これらの制御において、内部制御部４は、このセットトップボックス１に接続されたモニタ装置１１、スピーカ１２により提供可能な全ての番組について、番組情報抽出部５より出力される電子番組情報、サーバーより取得した詳細な番組情報、ビデオディスクレコ

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000106

ーダー８に装填されたＣＤ－ＲＯＭより取得した詳細な番組情報、光ディスクより提供される番組情報、さらにはビデオディスクレコーダー８に記録した番組に関するこれらの情報を取得し、これらの情報を総合的に体系化した番組情報によるメニュー画面を表示するように、グラフィックス表示信号作成部１０の動作を制御する。

またビデオディスクレコーダー８によりディジタル衛星放送等の番組を記録する場合には、このようにして取得した番組情報を併せて記録し、この記録した番組情報によりビデオディスクレコーダー８に記録した番組についても管理できるようになされている。

この番組の管理において、内部制御部４は、これらセットトップボックス１により提供可能な番組を簡易に選択できるように、一元的にこれらの番組情報を管理し、さらには階層化したメニュー画面によりユーザーの選択操作を受け付ける。

また内部制御部４は、このセットトップボックス１を使用するユーザーにおける番組視聴の履歴を記録し、この履歴に従ってユーザーの好みのチャンネルを優先的に選択可能に表示するように、グラフィックス表示信号作成部１０の動作を制御する。

これらによりセットトップボックス１は、放送番組、光ディスク等のメディアにより供給される番組等の情報を画面表示して、種々の情報である情報画面を提供する情報提供装置を構成する。

（１－２）リモートコマンダの構成

図３は、リモートコマンダ１８の外観構成を示す斜視図である。このリモートコマンダ１８は、略棒形状により形成され、先端側の端面に赤外線を送出する窓１８Ａが形成される。リモートコマンダ１８は、この先端側の上面にテンキー等の操作子１８Ｂが配置され、

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これらの操作子１８Ｂの操作により所望の番組を選択できるようになされている。

リモートコマンダ１８は、このようにテンキー等の操作子１８Ｂより手前側の上面が緩やかな曲面を描いて階段状に立ち下がり、この立ち下がった手前側が片手により把持できるように形成される。リモートコマンダ１８は、親指を上面側にしてこの手前側を把持した際に、親指の当たる部分に、比較的大径のボタン１８Ｃが配置され、このボタン１８Ｃの手前側にキャンセルの操作子１８Ｄが配置される。

ここでボタン１８Ｃは、選択及び決定の操作子であり、矢印Ａ～Ｄにより示すように、上下左右に操作してメニュー画面におけるアイコンのフォーカスを切り換えることができるようになされ、また矢印Ｅにより示すように、押圧してフォーカスしたアイコンを開くことができるようになされている。ボタン１８Ｃは、矢印Ａ～Ｄに示す方向に操作されて選択の操作子として機能することにより、この場合は以下において選択の操作子と記述する。またボタン１８Ｃは、矢印Ｅにより示すように押圧操作されて決定の操作子として機能することにより、この場合は以下において決定の操作子と記述する。これに対してキャンセルの操作子１８Ｄは、現在表示中の画面より、１階層上位のメニュー画面に戻る操作子である。

さらにリモートコマンダ１８は、親指を上面側にして手前側を把持した際に、人指し指が引っ掛かるように、下面が階段状に立ち下がり、この立ち下がって人指し指が引っ掛かる部分に、拳銃の引き金に類似した押圧操作子（以下シフト操作子と呼ぶ）１８Ｅが配置されるようになされている。ここでこのシフト操作子１８Ｅは、表

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示モード切り換えの操作子であり、このセットトップボックス１においては、このシフト操作子１８Ｅを押圧操作した状態で所定の操作子を操作することにより、表示画面を番組案内の画面、サーチ画面に切り換えることができるようになされている。

これらによりセットトップボックス１においては、片手によりリモートコマンダ１８を把持して所望の番組を選択できるようになされ、また必要に応じて片手によりリモートコマンダ１８を把持したままシフト操作子１８Ｅを押圧操作して表示画面を切り換えることができるようになされている。

図４は、このリモートコマンダ１８を示すブロック図である。リモートコマンダ１８は、所定のインターフェースを介して中央処理ユニット（ＣＰＵ）１８Ｇにより操作子１８Ｂ、１８Ｃ、１８Ｄ、１８Ｅの操作を検出し、この検出結果に基づいて送信部１８Ｈを駆動することにより、赤外線による遠隔制御信号を送出する。このとき中央処理ユニット１８Ｇは、シフト操作子１８Ｅが押圧操作された状態で、他の操作子１８Ｃ、１８Ｄが操作されると、一定の周期で他の操作子１８Ｃ、１８Ｄが操作されていることを示す遠隔制御信号を介挿して、シフト操作子１８Ｅの押圧操作を示す遠隔制御信号を連続して送出し、これによりこれらの操作子が同時に操作されていることをセットトップボックス１側で検出可能に遠隔制御信号を出力する。

（１－３）メニュー画面の階層表示

図５は、このセットトップボックス１によりモニタ装置１１に表示されるメインメニュー画面を示す平面図である。内部制御部４は、このセットトップボックス１の動作が立ち上げられると、またこの

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メインメニュー画面の下位階層のメニュー画面における操作に応動して、このメインメニュー画面を表示する。なお以下の説明において、各アイコンは、目視により内容を把握できるように、内部に図形と文字を表示して形成されるが、図面上は一部記載を省略して示す。

ここでこのメインメニュー画面は、それぞれ９個のアイコンを表示した推奨チャンネルのメニュー（Ｒｅｃｏｍｍｅｎｄｅｄ）、カテゴリーのメニュー（Ｃａｔｅｇｏｒｉｅｓ）、メディアのメニュー（Ｍｅｄｉａ）とにより構成される。推奨チャンネルのメニュー（Ｒｅｃｏｍｍｅｎｄｅｄ）は、推奨チャンネルのメニュー画面を選択するためのアイコンであり、この推奨チャンネルは、チューナ２を介して受信可能なチャンネルから、過去の履歴を基準にして選択頻度の高い上位のチャンネルを割り振った仮想のチャンネルである。

これに対してカテゴリーのメニュー（Ｃａｔｅｇｏｒｉｅｓ）は、カテゴリーにより分類されたメニュー画面を開くためのアイコンであり、このカテゴリーにより分類されたメニュー画面は、このセットトップボックス１により視聴可能な各番組（現在放送中の番組に加えて、ビデオディスクレコーダー８に記録された番組を含む）をカテゴリー別に開くメニュー画面である。またメディアのメニュー（Ｍｅｄｉａ）は、このセットトップボックス１により視聴可能なメディア選択のメニュー画面を開くアイコンである。

これらによりこのメインメニュー画面における各メニューは、下位階層のメニュー画面を開くアイコンを構成するようになされている。なお、このメインメニュー画面を含めて、各表示画面には、画

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面の上部に現在フォーカスしているメニュー画面、チャンネル等を示すタイトルが表示され、画面の下部に、操作の案内、番組の詳細な解説等が表示されるようになされている。

内部制御部４は、グラフィックス表示信号作成部１０を制御して、電源を立ち上げた直後の初期状態において、このメインメニューの中央にカテゴリーのメニュー（Ｃａｔｅｇｏｒｉｅｓ）を表示し、このカテゴリーのメニュー（Ｃａｔｅｇｏｒｉｅｓ）の左右に、それぞれ推奨チャンネルのメニュー（Ｒｅｃｏｍｍｅｎｄｅｄ）、メディアのメニュー（Ｍｅｄｉａ）を表示する。さらに内部制御部４は、この初期状態において、中央のカテゴリーのメニュー（Ｃａｔｅｇｏｒｉｅｓ）を囲むように、枠形状の表示Ｗ（以下フォーカスの表示と呼ぶ）を表示し、中央のメニュー（Ｃａｔｅｇｏｒｉｅｓ）に現在フォーカスしていることをこのフォーカスの表示Ｗによりユーザーに通知する。なおこのフォーカスの表示Ｗには、選択の操作子１８Ｃの操作可能な方向を示す矢印の表示が併せて表示され、これによりユーザーの使い勝手を向上するようになされている。

さらに内部制御部４は、リモートコマンダ１８における選択の操作子１８Ｃの左右方向の操作に応動して、このフォーカスの表示Ｗを画面中央に表示したまま、推奨チャンネルのメニュー（Ｒｅｃｏｍｍｅｎｄｅｄ）、カテゴリーのメニュー（Ｃａｔｅｇｏｒｉｅｓ）、メディアのメニュー（Ｍｅｄｉａ）によるメインメニュー画面全体を左右に移動させ、これによりこの選択の操作子１８Ｃの左右方向の操作に応動してフォーカスの合ったメニューを切り換える。なお、下位階層のメニュー画面よりこのメインメニュー画面に表示を切り換えた場合、内部制御部４は、直前のメニュー画面に対応す

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るメニューにフォーカスを合わせてこのメインメニュー画面を表示する。

この実施の形態においては、このようなメニュー画面において、内部制御部４は、画面中央に固定したフォーカスの領域を形成し、操作子１８Ｃの操作によりメニュー画面全体を移動させて、このフォーカスの領域にフォーカスのアイコンを表示する。これによりセットトップボックス１においては、視点の移動を低減し、簡易にユーザーの選択したアイコンを確認できるようになされている。

これに対して図６は、推奨チャンネルのメニュー（Ｒｅｃｏｍｍｅｎｄｅｄ）について、このメインメニュー画面と下位階層のメニュー画面との関係を示す略線図である。内部制御部４は、推奨チャンネルのメニュー（Ｒｅｃｏｍｍｅｎｄｅｄ）がフォーカスされた状態で、決定の操作子１８Ｃが押圧操作されると、推奨チャンネルのメニュー画面を開く。さらにこの推奨チャンネルのメニュー画面を表示した状態で決定の操作子１８Ｃが押圧操作されると、この推奨チャンネルのメニュー画面で選択されたチャンネルについて、最下位の階層である番組を表示する。またこれとは逆に、キャンセルの操作子１８Ｄが押圧操作されると、順次上位階層のメニュー画面に表示を切り換える。

これに対して推奨チャンネルのメニュー画面を表示した状態で、シフト操作子１８Ｅと決定の操作子１８Ｃが同時に押圧操作されると、フォーカスされている推奨チャンネルについての番組案内に表示画面を切り換え、さらにこの番組案内の表示画面において、キャンセルの操作子１８Ｄが押圧操作されると、元の推奨チャンネルのメニュー画面に戻る。これによりこの実施の形態では、シフト操作

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子１８Ｅと決定の操作子１８Ｃとが併せて操作された場合には、単に決定の操作子１８Ｃが操作された場合とは異なる画面を表示するようになされている。

図７は、推奨チャンネルのメニュー（Ｒｅｃｏｍｍｅｎｄｅｄ）の下位階層のメニュー画面である推奨チャンネルのメニュー画面を示す平面図である。内部制御部４は、この推奨チャンネルのメニュー画面において、メインメニュー画面で示した推奨チャンネル数に対応して、８個のアイコンと１つの子画面を表示する。内部制御部４は、過去の履歴より最も選択頻度の高い上位９チャンネルのアイコン、子画面をこの初期画面に表示する。すなわち内部制御部４は、メニュー画面の中央に子画面を配置し、この中央の子画面に、中央のチャンネルである第５チャンネルの仮想チャンネルに割り当てた番組を表示する。またこの中央のチャンネルを囲むように、第１チャンネル～第４チャンネル（１ｃｈ～４ｃｈ）のアイコン、第６チャンネル～第９チャンネル（６ｃｈ～９ｃｈ）のアイコンを表示する。

内部制御部４は、この推奨チャンネルのメニュー画面の表示を切り換える際に、所定の遷移画面を間に挟んで表示を切り換えるように、グラフィックス表示信号作成部１０の動作を制御する。すなわち図８において矢印Ｆにより示すように、フォーカスの表示Ｗを表示したまま、フォーカスされたメニューを徐々に拡大させ（図８（Ａ）及び図８（Ｂ））、最終的な初期画面の大きさまでこのメニューを拡大すると、画面中央のである第５チャンネルのアイコンがフォーカスの表示Ｗにより囲まれるようにする。

これにより内部制御部４は、ユーザーの選択したアイコンをズー

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ムインするように表示画面を遷移させる。続いて矢印Ｇにより示すように、このフォーカスの表示Ｗで囲まれた第５チャンネル（５ｃｈ）のアイコンを徐々に拡大し（図８（Ｃ））、このアイコンの拡大表示に伴い、アイコンの表示が徐々にこの第５チャンネル（５ｃｈ）に割り当てた番組の表示に切り換わるように、映像ミックス部９にクロスフェードの処理を指示する。

これにより内部制御部４は、最終的にこの推奨チャンネルのメニュー画面を図７について上述したような表示に設定する。

これに対してこの推奨チャンネルのメニュー画面を表示した状態でユーザーが選択の操作子１８Ｃを操作すると、図９に示すように、この操作に応動してフォーカスの表示Ｗは画面中央に保持したまま、矢印Ｈにより示すように、メニュー画面全体を移動させ（図９（Ａ））、この枠形状の表示Ｗに囲まれたアイコンにフォーカスを切り換える。このとき画面全体の移動と同時に、それまでフォーカスの表示Ｗで囲まれて番組の子画面が割り当てられていた表示を徐々に縮小してアイコンの表示に切り換える。さらにこの縮小の表示と相補的に、続いてフォーカスの表示Ｗで囲まれるアイコンの表示を徐々に拡大すると共に、クロスフェードによりこの拡大表示のアイコンを番組の子画面に切り換える（図９（Ｂ）及び図９（Ｃ））。

内部制御部４は、このようにして表示した推奨チャンネルのメニュー画面において、選択の操作子１８Ｃの操作によりユーザーによる仮想チャンネルの選択操作を受け付け、決定の操作子１８Ｃが押圧操作されると、フォーカスされた番組に表示を切り換える。この場合図１０に示すように、メニュー画面において、画面中央でフォーカスされた子画面を徐々に拡大表示し（図１０（Ａ）～図１０

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（Ｄ））、最終的にこの子画面の表示を表示画面全体に拡大する。これにより内部制御部４は、仮想チャンネルのメニュー画面における選択操作により現在放送中の番組を選択できるようになされている。

これに対してこのように選択した番組を表示した状態で、キャンセルの操作子１８Ｄが操作されると、上述の説明とは逆に元のメニュー画面にズームアウトするように、表示画面を徐々に縮小して表示を切り換える。このとき内部制御部４は、それまで表示していた番組に対応するアイコンが画面中央でフォーカスの表示Ｗで囲まれるように、メニュー画面をズームアウトさせる。これによりセットトップボックス１においては、上位階層のメニュー画面に遷移する場合でも、それまでフォーカスされていたアイコンを簡易に確認できるようになされている。

また内部制御部４は、推奨チャンネルのメニュー画面を表示した状態でユーザーがキャンセルの操作子１８Ｃを押圧操作すると、同様に、上述の説明とは逆に元のメインメニュー画面にズームアウトするように、表示画面を徐々に縮小して表示を切り換える。この場合にも、内部制御部４は、それまで選択されていた推奨チャンネルのメニューが画面中央にてフォーカスの表示Ｗで囲まれるように、メインメニュー画面にズームアウトする。

図１１は、図６について説明した番組案内の画面を示す平面図である。この番組案内は、上側より番組の放送開始時間、番組の内容とを順次配置して形成される。さらにカテゴリー別に文字の色を代えて表示され、これにより視覚的に番組のジャンルを簡易に認識できるようになされている。

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図１２は、メインメニュー画面のカテゴリーのメニュー（Ｃａｔｅｇｏｒｉｅｓ）について、このメインメニュー画面と下位階層のメニュー画面との関係を示す略線図である。内部制御部４は、カテゴリーのメニュー（Ｃａｔｅｇｏｒｉｅｓ）がフォーカスされた状態で、決定の操作子１８Ｃが押圧操作されると、カテゴリーのメニュー画面を開く。さらにこのカテゴリーのメニュー画面を表示した状態で決定の操作子１８Ｃが押圧操作されると、このカテゴリーのメニュー画面で選択されたカテゴリーについてさらに下位階層のメニュー画面に遷移する。さらにこの下位階層のメニュー画面において、決定の操作子１８Ｃが押圧操作されると、内部制御部４は、フォーカスされている番組に表示を切り換える。

またこれらとは逆に、キャンセルの操作子１８Ｄが押圧操作されると、順次上位階層のメニュー画面に表示を切り換える。

さらにカテゴリーのメニュー画面を表示した状態で、シフト操作子１８Ｅと決定の操作子１８Ｃが同時に押圧操作されると、フォーカスされているカテゴリーに関する番組案内に表示画面を切り換え、さらにこの番組案内の表示画面において、キャンセルの操作子１８Ｄが押圧操作されると、元のカテゴリーのメニュー画面に戻る。これによりこの実施の形態では、シフト操作子１８Ｅと決定の操作子１８Ｃとが併せて操作された場合には、単に決定の操作子１８Ｃが操作された場合とは異なる画面を表示するようになされている。

図１３は、カテゴリーのメニュー画面を示す平面図である。内部制御部４は、このメニュー画面において、９個のアイコンを表示する。ここで内部制御部４は、番組情報によりこのセットトップボックス１で提供可能な番組を９つのカテゴリーに分類する。このカテ

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ゴリーのメニュー画面は、これらのカテゴリーを示すスポーツ、映画、ニュース、趣味、音楽、教育等の９個のアイコンにより構成される。このメニュー画面は、初期状態において、メニュー画面の中央にフォーカスされたアイコンが拡大表示される。

内部制御部４は、メインメニュー画面より推奨チャンネルのメニュー画面に表示を切り換えた場合と同様にして、メインメニュー画面よりこのカテゴリーのメニュー画面に表示を切り換える。すなわち内部制御部４は、遷移画面を間に挟んで表示を切り換え、この遷移画面において、ズームインするようにカテゴリーのメニューを徐々に拡大し、またフォーカスの表示Wにより囲まれる中央のアイコンを徐々に拡大する（図８参照）。

これに対してこのカテゴリーのメニュー画面を表示した状態でユーザーが選択の操作子１８Ｃを操作すると、推奨チャンネルのメニュー画面における場合と同様に（図９参照）、フォーカスの表示Wを画面中央に保持したままメニュー画面全体を移動させ、このフォーカスの表示Wに囲まれたアイコンにフォーカスを切り換える。このとき画面全体の移動と同時に、それまでフォーカスの表示Wで囲まれて拡大表示されていたアイコンの表示を徐々に縮小すると共に、続いてフォーカスの表示Wで囲まれるアイコンの表示を徐々に拡大する。

図１４は、このカテゴリーのメニュー画面における１のアイコンに対応する下位階層の番組選択のメニュー画面と、この下位階層にグループ分けされた全アイコンとの関係を示す平面図である。ここでこの実施の形態において、内部制御部４は、例えばカテゴリーのメニュー画面に配置した１つのジャンルについて、提供可能な番組

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のメニューをこの下位階層のメニュー画面で表示する。このとき内部制御部４は、例えばカテゴリーのメニュー画面に配置した１つのアイコンに対応する音楽のジャンルに関して、９種類以上の番組を提供可能な場合、これらの提供可能な全ての番組にそれぞれアイコンを割り当て、これら全てのアイコンを配列した全体画面を形成する。

内部制御部４は、この全体画面の一部をズームインして９個のアイコンを表示し、この９個のアイコンの表示によりこの番組選択のメニュー画面を作成する。さらにこのとき画面中央のアイコンについては、このアイコンの内容である番組を子画面により表示する。

内部制御部４は、カテゴリーのメニュー画面からこの番組選択のメニュー画面に表示を切り換える際に、所定の遷移画面を間に挟んで表示を切り換えるように、グラフィック表示信号作成部１０の動作を制御する。すなわち図１５及び図１６に示すように、フォーカスの表示Wを表示したまま、フォーカスされたメニューを徐々に拡大させ（図１５（A）及び図１５（B））、このメニューが所定値以上大きくなると、このアイコンの表示を徐々に透明化して下位階層のアイコンを目視できるようにする。

さらに続いて内部制御部４は、図１４について上述した全体画面を表示し（図１５（C））、この全体画面を徐々に拡大して番組選択のメニュー画面を表示する（図１６（A）及び図１６（B））。これによりセットトップボックス１においては、この番組選択のメニュー画面に属するアイコンの全体像を視覚的に把握できるようになされている。

さらにこのとき中央のフォーカスの表示Wにより囲まれるアイコ

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ンについては、徐々に拡大して所定値以上になると、このアイコンの表示を子画面の表示に切り換える（図１６（Ｂ））。

これに対してこの番組選択のメニュー画面を表示した状態でユーザーが選択の操作子１８Ｃを操作すると、推奨チャンネルのメニュー画面における場合と同様に（図９参照）、フォーカスの表示Ｗを画面中央に保持したままメニュー画面全体（この場合、全てのアイコンを表示した全体画面）を移動させ、このフォーカスの表示Ｗに囲まれたアイコンにフォーカスを切り換える。このとき画面全体の移動と同時に、それまでフォーカスの表示Ｗで囲まれて拡大表示されていた子画面の表示をアイコンの表示に切り換えて徐々に縮小すると共に、続いてフォーカスの表示Ｗで囲まれるアイコンの表示を徐々に拡大して子画面の表示に切り換える。

また内部制御部４は、このようにして表示した番組選択のメニュー画面において、決定の操作子１８Ｃが押圧操作されると、フォーカスされた番組に表示を切り換える。この場合番組選択のメニュー画面において、画面中央でフォーカスされた子画面を徐々に拡大表示し（図１０参照）、最終的にこの子画面の表示を表示画面全体に拡大する。

これに対してこのように選択した番組を表示した状態で、キャンセルの操作子１８Ｃが操作されると、上述の説明とは逆に元の番組選択のメニュー画面にズームアウトするように、表示画面を徐々に縮小して表示を切り換える。このとき内部制御部４は、それまで表示していた番組に対応するアイコンが画面中央でフォーカスの表示Ｗで囲まれるように、メニュー画面にズームアウトする。

また内部制御部４は、番組選択のメニュー画面を表示した状態で

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000119

ユーザーがキャンセルの操作子１８Ｃを押圧操作すると、同様に、上述の説明とは逆に元のカテゴリーのメニュー画面にズームアウトするように、表示画面を徐々に縮小して表示を切り換える。このとき図１５及び図１６について上述した場合とは逆に、内部制御部４は、ズームアウトの際に、それまでフォーカスしていたアイコンによる全体画面が表示されるまで、全体をズームアウトした後、対応するカテゴリーのアイコンに表示を切り換え、このカテゴリーのアイコンをズームアウトさせる。

なおこの場合にも、内部制御部４は、それまで選択されていたカテゴリーのアイコンが画面中央にてフォーカスの表示Ｗで囲まれるように、カテゴリーのメニュー画面にズームアウトする。

さらにこのカテゴリーのメニュー画面において、ユーザーがキャンセルの操作子１８Ｃを押圧操作すると、同様に、上述の説明とは逆に元のメインメニュー画面にズームアウトするように、表示画面を徐々に縮小して表示を切り換える。この場合にも、内部制御部４は、それまで選択されていたカテゴリーのメニューが画面中央にてフォーカスの表示Ｗで囲まれるように、メインメニュー画面にズームアウトさせる。

図１７は、図１２について説明した番組案内の画面を示す平面図である。この番組案内は、上側より番組の放送開始時間、番組の内容とを順次配置して形成される。なおこの図１７においては、ネットワークに何ら外部機器が接続されていないような場合であって、セットトップボックス１よりチューナ２を介して取得される番組のみ提供可能な場合である。

図１８は、メインメニュー画面のメディアのメニュー（Ｍｅｄｉ

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ａ）について、このメインメニュー画面と下位階層のメニュー画面との関係を示す略線図である。内部制御部４は、メインメニュー画面においてメディアのメニュー（Ｍｅｄｉａ）がフォーカスされた状態で、決定の操作子１８Ｃが押圧操作されると、メディアのメニュー画面を開く。さらにこのメディアのメニュー画面を表示した状態で番組を記録したソースが選択されると、対応する下位階層のメニュー画面である番組選択のメニュー画面に表示を切り換える。さらにこの番組選択のメニュー画面において、決定の操作子１８Ｃが押圧操作されると、内部制御部４は、フォーカスされている番組に表示を切り換える。

またこれらとは逆に、キャンセルの操作子１８Ｄが押圧操作されると、順次上位階層のメニュー画面に表示を切り換える。

さらに最下位の階層である番組を表示した状態で、シフトの操作子１８Ｅが押圧操作されると、動作モードを第１のサーチモードに切り換えると共に、表示画面を対応する第１のサーチ画面に切り換え、シフトの操作子１８Ｅの押圧が解除されると、元の番組表示の画面に切り換える。

これに対して番組選択のメニュー画面において、シフトの操作子１８Ｅが押圧操作された状態で決定の操作子１８Ｃが押圧操作されると、動作モードを第２のサーチモードに切り換えると共に、表示画面を対応する第２のサーチ画面に切り換える。なお内部制御部４においては、このメディアのメニュー画面において、検索等の特定のメニューが選択された場合、この図１８について説明した階層構造の表示とは異なる表示の切り換えにより目的とする処理に対応する表示画面を表示する。

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図１９は、メディアのメニュー画面を示す平面図である。内部制御部４は、このメニュー画面において、９個のアイコンを表示する。すなわち内部制御部４は、左端の上側より、ＣＤ－ＲＯＭを用いた番組案内を開くアイコン（ガイドＲＯＭ）、文字検索による番組検索のメニューを開くアイコン（文字検索）、ディジタル衛星放送によるプロモーションのチャンネルを開くアイコン（プロモーション）が配置される。内部制御部４においては、これら３つのアイコンが選択された場合には、図１７について上述した階層構造によるメニュー画面とは異なる表示画面への切り換えにより対応する処理を実行する。

また中央上側より、ディジタルビデオディスク（ＤＶＤ）、ハードディスク装置（ＨＤＤ）、コンパクトディスクプレイヤー（ＣＤ）をそれぞれ指定するアイコンが配置され、右側の上側より、Ｄ－ＶＨＳ、ＤＶＤ－Ｒ、ＶＨＳの装置を指定するアイコンが順次配置される。内部制御部４は、この場合もメニュー画面の中央のフォーカスされたアイコンを拡大表示する。これらメニュー画面の中央、右側に配置されるアイコンは、図１について上述したビデオディスクレコーダー８等の、ホームネットワークを介してこのセットトップボックス１に接続可能な各種メディアである。

内部制御部４は、メインメニュー画面より推奨チャンネルのメニュー画面に表示を切り換えた場合と同様にして、メインメニュー画面よりこのメディアのメニュー画面に表示を切り換える。すなわち内部制御部４は、遷移画面を間に挟んで表示を切り換え、この遷移画面において、ズームインするようにメディアのメニューを徐々に拡大し、またフォーカスの表示Ｗにより囲まれる中央のアイコンを

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徐々に拡大する（図８参照）。

これに対してこのメディアのメニュー画面を表示した状態でユーザーが選択の操作子１８Ｃを操作すると、推奨チャンネルのメニュー画面における場合と同様に（図９参照）、フォーカスの表示Ｗを画面中央に保持したままメニュー画面全体を移動させ、この枠形状の表示Ｗに囲まれたアイコンにフォーカスを切り換える。このとき画面全体の移動と同時に、それまでフォーカスの表示Ｗで囲まれて拡大表示されていたアイコンの表示を徐々に縮小すると共に、続いてフォーカスの表示Ｗで囲まれるアイコンの表示を徐々に拡大する。

図２０は、このメディアのメニュー画面における１のアイコンに対応する下位階層の番組選択のメニュー画面を示す平面図である。内部制御部４は、例えば記録時に付加したインデックス画像のうち、各番組開始時のインデックス画像を配置してこの番組選択のメニュー画面を形成する。なお、例えば再生専用のメディアであるＤＶＤ等による番組選択メニューにあっては、このＤＶＤディスクに記録されたインデックス画像を表示し、また必要に応じて例えば先頭部分を再生してこのメニュー画面を形成する。

このとき例えばハードディスク装置に９種類以上の番組が記録されていることも考えられることにより、内部制御部４は、図１４について上述したと同様にして、ハードディスク装置等のアイコンにグループ化される全ての番組について、それぞれアイコンを割り当てると共に、この全てのアイコンの配列による全体画面を形成する。

内部制御部４は、この全体画面の一部をズームインして９個のアイコンを表示し、この９個のアイコンの表示によりこの番組選択のメニュー画面を作成する。さらにこのとき画面中央のアイコンにつ

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000123

いては、このアイコンの内容である番組を子画面により表示する。

内部制御部４は、メディアのメニュー画面からこの番組選択のメニュー画面に表示を切り換える際に、図１５及び図１６について上述したと同様の遷移画面を間に挟んで表示を切り換える。すなわちフォーカスの表示Ｗを表示したまま、フォーカスされたメニューを徐々に拡大させ、このメニューが所定値以上大きくなると、このアイコンの表示を徐々に透明化し、下位階層のアイコンを目視できるようにする。さらに続いて内部制御部４は、全てのアイコンによる全体画面を表示し、この全体画面を徐々に拡大して番組選択のメニュー画面を表示する。さらにこのとき中央のフォーカスの表示Ｗにより囲まれるアイコンについては、徐々に拡大して所定値以上になると、このアイコンの表示を子画面の表示に切り換える。

これに対してこの番組選択のメニュー画面を表示した状態でユーザーが選択の操作子１８Ｃを操作すると、推奨チャンネルのメニュー画面における場合と同様に（図９参照）、フォーカスの表示Ｗを画面中央に保持したままメニュー画面全体（この場合、全てのアイコンを表示した全体画面）を移動させ、このフォーカスの表示Ｗに囲まれたアイコンにフォーカスを切り換える。このとき画面全体の移動と同時に、それまでフォーカスの表示Ｗで囲まれて拡大表示されていた子画面の表示をアイコンの表示に切り換えて徐々に縮小すると共に、続いてフォーカスの表示Ｗで囲まれるアイコンの表示を徐々に拡大して子画面の表示に切り換える。

また内部制御部４は、このようにして表示した番組選択のメニュー画面において、決定の操作子１８Ｃが押圧操作されると、フォーカスされた番組に表示を切り換える。この場合番組選択のメニュー

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000124

画面において、画面中央でフォーカスされた子画面を徐々に拡大表示し（図１０参照）、最終的にこの子画面の表示を表示画面全体に拡大する。

これに対してこのように選択した番組を表示した状態で、キャンセルの操作子１８Ｃが操作されると、上述の説明とは逆に元の番組選択のメニュー画面にズームアウトするように、表示画面を徐々に縮小して表示を切り換える。このとき内部制御部４は、それまで表示していた番組に対応するアイコンが画面中央でフォーカスの表示Ｗで囲まれるように、メニュー画面にズームアウトさせる。

また内部制御部４は、番組選択のメニュー画面を表示した状態でユーザーがキャンセルの操作子１８Ｃを押圧操作すると、同様に、上述の説明とは逆に元のメディアのメニュー画面にズームアウトするように、表示画面を徐々に縮小して表示を切り換える。このときそれまでフォーカスしていたアイコンによる全体画面が表示されるまで、全体をズームアウトした後、対応するメディアのアイコンに表示を切り換え、このメディアのアイコンをズームアウトさせる。なおこの場合にも、内部制御部４は、それまで選択されていたメディアのアイコンが画面中央にてフォーカスの表示Ｗで囲まれるように、メディアのメニュー画面にズームアウトする。

さらにこのメディアのメニュー画面において、ユーザーがキャンセルの操作子１８Ｃを押圧操作すると、同様に、上述の説明とは逆に元のメインメニュー画面にズームアウトするように、表示画面を徐々に縮小して表示を切り換える。この場合にも、内部制御部４は、それまで選択されていたメディアのメニューが画面中央にてフォーカスの表示Ｗで囲まれるように、メインメニュー画面にズームアウ

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000125

トする。

（１－４）階層表示における内部制御部４の処理手順

図２１及び図２２は、このようなアイコンの拡大縮小によるズーミング処理によりメニュー画面等を切り換える場合の、内部制御部４の処理手順を示すフローチャートである。この処理手順において、内部制御部４は、ステップＳＰ１からステップＳＰ２に移り、表示に供する選択肢より対応するアイコンを選択し、またこの選択したアイコンの配置等を決定する。

続いて内部制御部４は、ステップＳＰ３に移り、ここで該当する全アイコンによる全体画面を表示した後、続くステップＳＰ４において、目的とするメニュー画面を表示する。このとき内部制御部４は、全体画面よりズームインするように、メニュー画面を表示する。例えばメインメニュー画面のように、表示に供するアイコンが限られている場合であって、全体画面がメニュー画面と等しいような場合、内部制御部４においては、直接メニュー画面を表示することになる。

続いて内部制御部４は、ステップＳＰ５に移り、画面中央のフォーカスしたアイコンについて、これを拡大表示する。なおこの場合、最下位階層である番組選択のメニュー画面においては、この拡大表示に子画面が割り当てられることになる。

続いて内部制御部４は、ステップＳＰ６に移り、選択の操作子（選択キー）１８Ｃが操作されたか否か判断し、ここで肯定結果が得られると、ステップＳＰ７に移り、画面中央のアイコンを縮小させる。続いて内部制御部４は、ステップＳＰ８に移り、メニュー画面を移動させてフォーカスを切り換え、続いてステップＳＰ５に戻

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000126

って、この新たにフォーカスされたアイコンを拡大表示する。

これに対して何ら選択の操作子（選択キー）１８Ｃが操作されていない場合、内部制御部４は、ステップＳＰ６からステップＳＰ９に移る（図２２）。ここで内部制御部４は、決定の操作子（決定キー）１８Ｃが押圧操作されたか否か判断し、否定結果が得られると、ステップＳＰ１０に移る。ここで内部制御部４は、キャンセルの操作子（キャンセルキー）１８Ｄが操作されたか否か判断し、否定結果が得られると、ステップＳＰ６に戻る。

これにより内部制御部４は、決定の操作子１８Ｃ、キャンセルの操作子１８Ｄ、選択の操作子１８Ｃが操作されるまでの間、ステップＳＰ６－ＳＰ９－ＳＰ１０－ＳＰ６の処理手順を繰り返すことになる。

内部制御部４は、このようにして処理手順を繰り返している際に、決定の操作子１８Ｃが操作されると、ステップＳＰ９で肯定結果が得られることにより、ステップＳＰ９からステップＳＰ１１に移る。ここで内部制御部４は、画面中央の画像が番組にリンクを張られた画像か否か、すなわち画面中央の画像が番組を紹介する子画面か否か判断する。

ここで現在表示中のメニュー画面が番組選択のメニュー画面以外のメニュー画面の場合、内部制御部４は、否定結果が得られることにより、ステップＳＰ１１からステップＳＰ１２に移り、更に下位階層のメニュー画面に表示を切り換えるように、この画面中央のアイコンにズームインした後、ステップＳＰ２に戻る。これにより内部制御部４は、決定の操作子１８Ｃの操作に応動して、順次メニュー画面を下位段層に切り換えるようになされている。

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これに対して現在表示中のメニュー画面が番組選択のメニュー画面の場合、ステップＳＰ１１において肯定結果が得られることにより、この場合内部制御部４は、ステップＳＰ１１からステップＳＰ１３に移る。ここで内部制御部４は、この子画面による番組を表示画面の全体に表示するように全体の動作を切り換える。これにより内部制御部４は、順次階層を辿ってユーザーの選択した番組を表示するようになされている。

続いて内部制御部４は、ステップＳＰ１４に移り、キャンセルの操作子１８Ｄが操作されたか否か判断し、否定結果が得られると、ステップＳＰ１４を繰り返す。これにより内部制御部４は、キャンセルの操作子１８Ｄが操作されるまで、番組の表示を継続する。

これに対して番組を表示中にキャンセルの操作子１８Ｄが操作されると、内部制御部４は、ステップＳＰ１４からステップＳＰ１５に移り、ここで直前のメニュー画面である番組選択のメニュー画面にズームアウトするよう表示を切り換えた後、ステップＳＰ４に戻る。これにより内部制御部４は、必要に応じて視聴中のチャンネル等を切り換えることができるようになされている。

内部制御部４は、このようにして番組選択のメニュー画面に戻った場合、さらには誤ってメニュー画面等を選択した場合等にあっては、キャンセルの操作子１８Ｄの操作によりステップＳＰ１０からステップＳＰ１６に移る。ここで内部制御部４は、現在表示中のメニュー画面に対して上位階層のメニュー画面が存在するか否か判断し、ここでメインメニュー画面を表示している場合にあっては、否定結果が得られることにより、ステップＳＰ１６からステップＳＰ６に戻る。

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これに対して上位階層が存在する場合、ステップＳＰ１６において肯定結果が得られることにより、内部制御部４は、ステップＳＰ１６からステップＳＰ１７に移り、上位階層のメニュー画面に対してズームアウトするように表示を切り換える。さらに内部制御部４は、続くステップＳＰ１８において、この上位階層のメニュー画面について、選択肢よりアイコンを選択すると共に、配置等を決定し、ステップＳＰ４に戻る。

（１－５）サーチ画面の表示

図２３は、番組を表示した状態でシフトの操作子１８Ｅが押圧操作された場合の、第１のサーチ画面を示す平面図である。内部制御部４は、番組を表示中のメディアがランダムアクセス可能なハードディスク装置等の場合、この表示画面を表示する。

この第１のサーチ画面において、内部制御部４は、画面中央に、それまで全画面により表示していた番組を縮小して表示する。さらに画面の下側に、左側より時系列で並べて、この番組のインデックス画像を表示する。このとき内部制御部４は、画面中央に表示した現在表示中の画像に対して、対応するインデックス画像（すなわちフォーカスしているインデックス画像）を下側の中央に、他の静止画像に比して拡大して表示する。

さらにこのシフトの操作子１８Ｅが継続して押圧操作された状態で、選択の操作子１８Ｃが操作されると、この操作に応動して下側に配置した静止画像を左右に移動させる。このときこの画像の移動に伴い、下側中央に表示される静止画像にフォーカスを切り換え、このフォーカスのインデックス画像を拡大すると共に、それまで拡大していたインデックス画像を他の画像と同じ大きさに切り換える。

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000129

これに対してこのシフトの操作子１８Ｅが継続して押圧操作された状態で、決定の操作子１８Ｃが押圧操作されると、このフォーカスしているインデックス画像に対応するように、画面中央の表示画像を切り換える。

これに対してシフトの操作子１８Ｅの押圧操作が解除されると、内部制御部４は、画面中央に表示した画面を全体に表示し、元の表示画面に戻る。これによりセットトップボックス１においては、シフトの操作子１８Ｅを押圧している期間の間、この第１のサーチ画面を表示して、あたかもビデオテープレコーダにおける早送り、巻き戻しのように、所望のシーンを選択できるようになされ、さらにこの早送り、巻き戻しに相当する処理を瞬時に実行できるようになされている。

内部制御部４は、これらの処理を実行するにつき、必要に応じてハードディスク装置等に発行する制御コマンドを切り換えることにより、このサーチ画面に形成に必要なインデックス画像をグラフィックス表示信号作成部１０に供給する。

これに対して図２４は、メディアがビデオテープレコーダ等のランダクアクセス困難な場合に表示する第１のサーチ画面を示す平面図である。この場合ランダムアクセスして簡易に頭だしすることが困難なことにより、内部制御部４は、時系列による静止画像に代えて、ビデオテープレコーダの操作子と同様のアイコンを表示する。

さらにシフトの操作子１８Ｅが継続して押圧操作された状態で、選択の操作子１８Ｃが操作されると、この操作に応動してこれらのアイコンの明るさを切り換え、これによりフォーカスのアイコンを目視できるようにする。さらに内部制御部４は、シフトの操作子１

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000130

８Ｅが継続して押圧操作された状態で、決定の操作子１８Ｃが押圧操作されると、フォーカスしているアイコンに対応して、例えば早送り、巻き戻し等による制御コマンドをビデオテープレコーダ等に出力し、その結果得られる再生画像を画面中央に表示する。

これに対してシフトの操作子１８Ｅの押圧操作が解除されると、内部制御部４は、画面中央に表示した画面を全体に表示し、元の表示画面に戻る。

これに対して図２５は、メディアにおける番組選択のメニュー画面を表示した状態で、シフトの操作子１８Ｅと決定の操作子１８Ｃとが同時に操作された場合の、第２のサーチ画面を示す平面図である。内部制御部４は、子画面により表示中のメディアがランダムアクセス可能なハードディスク装置等のメディアの場合、この表示画面を表示する。

ここでこの第２のサーチ画面においては、画面中央の下側に、現在フォーカスされている番組についての先頭のインデックス画像が、フォーカスの表示Ｗに囲まれて表示される。さらにこのインデックス画像より反時計回りに、表示画面の中心に向かってらせん状に、順次時間軸に沿った方向に、このフォーカスされている番組に関するインデックス画像が順次縮小するように表示される。さらに外周側よりらせん状の中心に近づくに従って徐々に表示が薄くなって背景が透過するように表示される。

これに対して、フォーカスされているインデックス画像の時計方向には、現在フォーカスされているインデックス画像より早い時点のインデックス画像が、らせん状のインデックス画像の配置において順次変化する表示の大きさに対応して表示される。なおこのイン

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000131

デックス画像においても、背景が透過するように薄く表示される。ちなみに図２５においては、現在フォーカスされているインデックス画像が番組の先頭であることから、この現在フォーカスされているインデックス画像より早い時点のインデックス画像の表示領域には、編掛によるダミーのインデックス画像が表示される。

さらに第２のサーチ画面は、これらのインデックス画像が、らせんの中心より放射状に広がる背景の上に表示される。これによりこのセットトップボックス１においては、遠近法を利用した時間軸に沿った配置により、フォーカスされたインデックス画像を基準にして、時間経過と共に変化する番組の流れを視覚的に把握できるようになされ、所望のシーンを簡易に選択できるようになされている。

すなわち図２６に示すように、内部制御部４は、選択の操作子１８Ｅが右向きに操作されると、この操作に応動して図２６（Ｂ）との対比により図２６（Ａ）により示すように、フォーカスの表示Ｗを現在の表示位置に保持したまま、時計方向に、各インデックス画像の表示位置を１画面分過去側の表示位置に移動させ、さらにこの移動の際に各インデックス画像を移動後の位置に対応する大きさに変化させる（なお、らせん状の内部に存在する画像ほど過去になるようにして、時計方向に各インデックス画像の表示位置を１画面分未来側の表示位置に移動させるようにしてもよい。）。さらに内部制御部４は、この移動によりインデックス画像が失われる最も内周側のインデックス画像配置位置に、続く未来インデックス画像を配置する。さらに内部制御部４は、フォーカスの表示Ｗの内側に移動したインデックス画像にフォーカスを設定し、これによりフォーカスのインデックス画像を時間軸を遡る方向に切り換える。

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000132

これに対してこれとは逆に選択の操作子１８Ｃが左向きに操作されると、この操作に応動して図２６（Ｂ）との対比により図２６（Ｃ）により示すように、フォーカスの表示Ｗを現在の表示位置に保持したまま、反時計方向に、各インデックス画像の表示位置を１画面分未来側の表示位置に移動させ、さらにこの移動の際に、各インデックス画像を移動後の位置に対応する大きさに変化させる（なお、らせん状の内側に存在する画像ほど過去になるようにして、反時計方向に各インデックス画像の表示位置を１画面分過去側の表示位置に移動させるようにしてもよい。）。またこの移動によりインデックス画像が失われる最も外周側のインデックス画像配置位置に、続くインデックス画像を配置する。同時に内部制御部４は、フォーカスの表示Ｗの内側に移動したインデックス画像にフォーカスを切り換え、これによりフォーカスのインデックス画像を時間軸方向に切り換える。

これに対して選択の操作子１８Ｃが上向きに操作されると、この操作に応動して図２７（Ｂ）との対比により図２７（Ａ）により示すように、フォーカスの表示Ｗを現在の表示位置に保持したまま、らせん状に配置した各インデックス画像を外周側のインデックス画像の表示位置に移動させ、さらにこの移動の際に、各インデックス画像を移動後の位置に対応する大きさに変化させる。さらにこの移動によりインデックス画像が失われる内周側のインデックス画像配置位置に、続くインデックス画像を順次配置する。同時に内部制御部４は、フォーカスの表示Ｗの内側に移動したインデックス画像にフォーカスを切り換え、これによりインデックス画像を時間軸方向に切り換える。これにより内部制御部４は、あたかも手前側からら

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000133

せん状に配置したインデックス画像について、らせん状の配列の中心軸に沿って１周分視点を奥に移動させたようにサーチ画面の表示を切り換え、このらせん状の配置によるインデックス画像の１周分をジャンプして、時間軸に沿った方向にフォーカスのインデックス画像を切り換える。

これに対して選択の操作子１８Ｃが下向きに操作されると、この操作に応動して図２７（Ｂ）との対比により図２７（Ｃ）により示すように、フォーカスの表示Ｗを現在の表示位置に保持したまま、らせん状に配置した各インデックス画像を内周側のインデックス画像の表示位置に移動させ、さらにこの移動の際に各インデックス画像を移動後の位置に対応する大きさに変化させる。さらにこの移動によりインデックス画像が失われる外周側のインデックス画像配置位置に、続くインデックス画像を順次配置する。同時に内部制御部４は、フォーカスの表示Ｗの内側に移動したインデックス画像にフォーカスを切り換え、これによりインデックス画像を時間軸を遡る方向に切り換える。これにより内部制御部４は、あたかも手前側かららせん状に配置したインデックス画像について、らせん状の配列の中心軸に沿って１周分視点を手前側に移動させたようにサーチ画面の表示を切り換え、このらせん状の配置によるインデックス画像の１周分をジャンプして、時間軸を遡った方向にフォーカスのインデックス画像を切り換える。

これに対して決定の操作子１８Ｃが押圧操作されると、内部制御部４は、フォーカスしているインデックス画像を全体に表示し、このインデックス画像より記録された映像の再生を開始する。

さらにこのようにして第２のサーチ画面を介して番組表示を開始

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000134

した場合にあって、この番組の表示中に決定の操作子１８Ｃが操作されると、内部制御部４は、この第２のサーチ画面に表示を切り換え、上述したと同様にしてインデックス画像を表示する。

これに対して第２のサーチ画面を表示した状態でキャンセルの操作子１８Ｄが操作されると、元の番組選択のメニュー画面に戻る。

（１－６）サーチ画面、検索画面の表示における内部制御部４の処理手順

図２８は、このサーチ画面の表示及び検索画面の表示における内部制御部４の処理手順について、シフトの操作子１８Ｅの操作を基準にして示すフローチャートである。内部制御部４は、電源が立ち上げられると、ステップＳＰ２０からステップＳＰ２１に移り、シフトの操作子１８Ｅ（シフトキー）が押圧操作されているか否か判断する。ここでシフトの操作子１８Ｅが押圧操作されていない場合、内部制御部４は、ステップＳＰ２２に移り、メニュー画面の階層表示について上述した通常の画面表示モードに動作を切り換える。

続いて内部制御部４は、ステップＳＰ２３に移り、他の操作子が操作されているか否か判断し、操作されていない場合には、ステップＳＰ２１に戻るのに対し、操作されている場合には、ステップＳＰ２４に移り、操作子の操作に応動して上位階層、下位階層等に表示を切り換えた後、ステップＳＰ２１に戻る。

これに対してシフトの操作子１８Ｅが押圧操作された場合、内部制御部４は、ステップＳＰ２１において肯定結果が得られることにより、ステップＳＰ２５に移り、特別な画面表示モードに移る。さらに続いて内部制御部４は、ステップＳＰ２６に移り、他の操作子が操作されているか否か判断し、操作されていない場合には、ステ

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000135

ップＳＰ２１に戻るのに対し、操作されている場合には、ステップＳＰ２７に移り、操作子の操作に応動して表示画面を番組案内の表示画面又はサーチ画面に切り換えた後、ステップＳＰ２１に戻る。

これにより内部制御部４は、シフトの操作子１８Ｅが押圧操作された場合に限って、通常とは異なる画面を表示し、その分少ない操作子により種々の操作を実行できるようになされている。番組を表示している場合には、この処理手順において、シフトの操作子１８Ｅが押圧操作されている期間の間、第１のサーチ画面を表示することになる。

図２９及び図３０は、第１のサーチ画面における内部制御部４の処理手順を示すフローチャートである。内部制御部４は、ステップＳＰ４０からステップＳＰ４１に移り、モニタ装置１１の全画面にユーザーの選択した番組を表示し、ステップＳＰ４２に移る。ここで内部制御部４は、シフトの操作子１８Ｅが操作されたか否か判断し、否定結果が得られるとステップＳＰ４１に戻る。

これに対してステップＳＰ４２で肯定結果が得られると、内部制御部４は、ステップＳＰ４３に移り、番組である動画の表示を縮小する（図２３参照）。続いて内部制御部４は、ステップＳＰ４４に移り、再生中の動画についての位置情報（タイムコード等である）を取得した後、ステップＳＰ４５に移り、この位置情報を基準にして前後するインデックス画像をビデオディスクレコーダー８より取得し、このインデックス画像を縮小した動画の下側に配列して表示する。

続いて内部制御部４は、ステップＳＰ４６に移り、シフトの操作子１８Ｅの押圧操作が継続されているか否か判断し、ここで否定結

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000136

果が得られるとステップＳＰ４７に移り、表示画面よりインデックス画像を消去すると共に、続くステップＳＰ４８において縮小して表示していた動画を元の大きさに戻し、ステップＳＰ４２に戻る。

これにより内部制御部４は、シフトの操作子１８Ｅが押圧操作されると、第１のサーチ画面を表示し、このシフトの操作子１８Ｅの押圧操作が解除されると、元の表示画面を表示する。

これに対してシフトの操作子１８Ｅが継続して押圧操作されている場合、内部制御部４は、ステップＳＰ４６からステップＳＰ４９に移り（図３０）、ここでこのシフトの操作子１８Ｅに加えて、選択の操作子１８Ｃが操作されたか否か判断する。ここで肯定結果が得られると、内部制御部４は、ステップＳＰ５０に移り、選択の操作子１８Ｃの操作に応動してインデックス画像の位置を移動させてフォーカスのインデックス画像を切り換え、ステップＳＰ４６に戻る。

これに対してステップＳＰ４９において否定結果が得られると、内部制御部４は、ステップＳＰ５１に移り、シフトの操作子１８Ｅに加えて、決定の操作子１８Ｃが操作されたか否か判断する。ここで否定結果が得られると、内部制御部４は、ステップＳＰ４６に戻るのに対し、肯定結果が得られると、ステップＳＰ５２に移り、フォーカスされているインデックス画像のシーンについて、対応する再生画像に表示を切り換え、ステップＳＰ４６に戻る。

これにより内部制御部４は、シフトの操作子１８Ｅを押圧した状態で操作子１８Ｃを操作して所望のシーンより番組を視聴できるようになされている。

図３１、図３２及び図３３は、第２のサーチ画面に関する内部制

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000137

御部４の処理手順を示すフローチャートである。なおこの処理手順においては、番組を記録する際の処理手順を併せて示す。すなわち内部制御部４は、ステップＳＰ６０からステップＳＰ６１に移り、記録時、例えば順次ディジタル衛星放送により提供される画像データをビデオディスクレコーダー８に記録しながら、インデックス画像の候補を選択する。さらに内部制御部４は、続くステップＳＰ６２において、この選択したインデックス画像の候補より各シーン毎にインデックス画像を設定し、このインデックス画像をサムネイル画像により番組録画中のメディアに記録する。

このようにして番組録画を完了した後、メディアの番組選択メニューにおいて、シフトの操作子１８Ｅが押圧操作された状態で決定の操作子１８Ｃが操作されると、内部制御部４は、ステップＳＰ６３に移り、インデックス画像を指定するカウント値（ｃｏｕｎｔ）を値０にセットし、また画面に表示するインデックス画像の数（ｍａｘ）を第２のサーチ画面において表示可能な最大値にセットする。

続いて内部制御部４は、ステップＳＰ６４に移り、フォーカスされた番組のシーケンスの先頭より変数（ｍａｘ）－（ｃｏｕｎｔ）で表されるインデックス画像をビデオディスクレコーダー８より取得した後、ステップＳＰ６５に移り、このインデックス画像の表示位置を示す座標、大きさ、透過度、奥行きを計算する。

続くステップＳＰ６６において、内部制御部４は、この計算した結果に従って取得したインデックス画像を表示画面に表示した後、ステップＳＰ６７に移り、カウント値（ｃｏｕｎｔ）を値１だけインクリメントする。続いて内部制御部４は、ステップＳＰ６８に移り、カウント値（ｃｏｕｎｔ）が第２のサーチ画面において表示可

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000138

能な最大値（ｍａｘ）以下か否か判断し、ここで肯定結果が得られると、ステップＳＰ６４に戻る。

これにより内部制御部４は、ステップＳＰ６４－ＳＰ６５－ＳＰ６６－ＳＰ６７－ＳＰ６８－ＳＰ６４の処理手順を繰り返して、順次インデックス画像をらせん状に配置した後、ステップＳＰ７０に移る（図３２）。

内部制御部４は、このステップＳＰ７０において、何れかの操作子が操作されたか否か判断し、ここで否定結果が得られるとステップＳＰ７０を繰り返す。これに対して何れかの操作子が操作されると、肯定結果が得られることにより、内部制御部４は、ステップＳＰ７０からステップＳＰ７１に移り、ここで決定の操作子１８Ｃが押圧操作されたか否か判断する。ここで否定結果が得られると、内部制御部４は、ステップＳＰ７２に移り、選択の操作子１８Ｃが右方向又は左方向に操作されたか否か判断する。

ここで肯定結果が得られると、内部制御部４は、ステップＳＰ７３に移り、らせん状に配置したインデックス画像を操作子１８Ｃの操作方向に応動してらせん状の配列方向に又はこれとは逆方向に移動させると共に大きさを可変し（図２６参照）、ステップＳＰ７０に戻る。

これに対してステップＳＰ７２において否定結果が得られると、内部制御部４は、ステップＳＰ７２からステップＳＰ７４に移り、選択の操作子１８Ｃが上方向又は下方向に操作されたか否か判断する。

ここで肯定結果が得られると、内部制御部４は、ステップＳＰ７５に移り、らせん状に配置したインデックス画像を操作子１８Ｃの

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000139

操作方向に応動して外周側又は内周側に移動させると共に大きさを可変し（図２７参照）、ステップＳＰ７０に戻る。

これに対してステップＳＰ７４において否定結果が得られると、内部制御部４は、ステップＳＰ７６に移り、キャンセルの操作子１７Ｄが操作されたか否か判断する。ここで否定結果が得られると、内部制御部４は、ステップＳＰ７０に戻るのに対し、肯定結果が得られると、ステップＳＰ７７に移り、表示画面を番組選択のメニュー画面（図２０）に切り換える。

これに対して決定の操作子１８Ｃが押圧操作されると、内部制御部４は、ステップＳＰ７１からステップＳＰ７８に移る（図３３）。ここで内部制御部４は、フォーカスの表示Ｗで囲まれた位置であるカレントポジションに配置されたインデックス画像を全画面に拡大する。続いて内部制御部４は、ステップＳＰ７９に移り、このインデックス画像により特定されるシーンより再生を開始するように、ビデオディスクレコーダー８に再生を指示し、この再生結果をモニタ装置１１に表示する。これによりセットトップボックス１は、時間の流れを視覚的に把握して所望のシーンを簡易に選択できるようになされている。

続いて内部制御部４は、ステップＳＰ８０に移り、決定の操作子１８Ｃが再び押圧操作されたか否か判断する。ここで否定結果が得られると、内部制御部４は、ステップＳＰ８０を繰り返すのに対し、肯定結果が得られると、ステップＳＰ８１に移る。

ここで内部制御部４は、現在表示中の場面に対応するインデックス画像をビデオディスクレコーダー８より取得し、続くステップＳＰ８２において、ビデオディスクレコーダー８による動画の再生を

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000140

中止する。同時に、内部制御部４は、動画の表示をインデックス画像に切り換えた後、ステップＳＰ８３に移り、このインデックス画像を徐々に縮小して第２のサーチ画面のカレントポジションに配置する。さらにこのとき内部制御部４は、同時に、この第２のサーチ画面に必要な前後するインデックス画像をビデオディスクレコーダー８より取得して配置する。

内部制御部４は、このようにして第２のサーチ画面を表示すると、ステップＳＰ７０に戻って続く操作を待機する。これによりセットトップボックス１においては、第２のサーチ画面により所望のシーンを取得して視聴する場合には、必要に応じて速やかにこの第２のサーチ画面に戻ることができるようになされている。

このようにセットトップボックス１より提供可能な各種番組をメインメニュー画面等により体系化して管理する場合、外部機器であるビデオディスクレコーダー８等より提供可能な番組情報の取得が必要となる。このため内部制御部４は、電源が立ち上げられると、また他の機器の電源が立ち上げられると、さらには記録媒体を交換したビデオディスクレコーダー８等の通知により、図３４に示す処理手順を実行し、これによりこのような体系化した管理に必要となる各種番組情報を取得する。

すなわち内部制御部４は、ステップＳＰ９０からステップＳＰ９１に移り、ここでホームネットワークに接続された外部機器の有無を判定する。なおここでこの判定は、ブロードキャストによりＩＥＥＥ１３９４バスに所定のコマンドを送出して応答を監視することにより実行される。なお、外部機器が新たに加わると、バスリセットが生じるので、このバスリセット時に外部機器の有無を判定して

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000141

もよい。

ここで否定結果が得られると、内部制御部４は、ステップＳＰ９２に移ってこの処理手順を終了するのに対し、肯定結果が得られると、ステップＳＰ９３に移る。ここで内部制御部４は、ブロードキャストに対する応答に基づいて、機器個別に順次制御コマンドを発行して応答を取得することにより、又はブロードキャストの応答に付加された機器の属性情報により、ホームネットワークに接続された機器が電子番組情報を有しているか否か判断する。

ここで否定結果が得られると、内部制御部４は、ステップＳＰ９２に移ってこの処理手順を終了するのに対し、肯定結果が得られると、ステップＳＰ９４に移る。このステップＳＰ９４において、内部制御部４は、電子番組情報を有する機器に対して制御コマンドを発行して全ての電子番組情報を取得する。

このようにして取得した電子番組情報に従って、上述した操作子の操作により検索のメニューが選択されると、またメディアのメニュー画面に割り当てられたＣＤ－ＲＯＭを用いた番組案内を開くアイコン（ガイドＲＯＭ）、文字検索による番組検索のメニューを開くアイコン（文字検索）等が選択されると、内部制御部４は、ステップＳＰ９５に移り、対応する表示画面における電子番組情報の表示位置を計算し、続くステップＳＰ９６においてこの計算した位置に電子番組情報による文字情報を表示した後、ステップＳＰ９２に移ってこの処理手順を終了する。

またこの処理に加えて内部制御部４においては、例えば１週間毎に、通信機器１４を起動して所定のサーバーより詳細な番組情報を取得し、これにより放送波により提供される番組情報を補う。

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000142

（２）実施の形態の動作

以上の構成において、セットトップボックス１は（図１）、ユーザーがディジタル衛星放送、ディジタル地上波による番組の視聴を選択すると、アンテナ３を介して得られる放送波がチューナ２により選局されてトランスポートストリームが復調され、このトランスポートストリームより所望のチャンネルが選択される。さらにこのチャンネルの画像データ及び音声データがモニタ装置１１、スピーカ１２に出力され、これによりユーザーの所望する番組が提供される。

またこの番組の記録をユーザーが選択すると、映像信号処理部６、音声信号処理部７を介して得られる画像データ及び音声データがホームネットワークによりビデオディスクレコーダー８に出力され、このビデオディスクレコーダー８であるハードディスク装置、光ディスク装置等により記録される。

またこのとき放送波より取得される電子番組情報、電話回線を介して所定のサーバーより取得した詳細な番組情報、ビデオディスクレコーダー８に装填されたＣＤ－ＲＯＭより取得した詳細な番組情報等により、この記録に供する番組の番組情報が併せて記録される。

またハードディスク装置等のランダムアクセス可能な記録媒体に記録する場合には、連続する画像データよりシーンチェンジの位置が検出され、このシーンチェンジの画像である各シーンの先頭画像がサムネイル画像に縮小されて、インデックス画像として併せて記録される。

またこのようにしてビデオディスクレコーダー８に記録された番組の視聴、さらには市販の記録媒体を介して提供される番組の視聴

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000143

をユーザーが選択すると、ビデオディスクレコーダー８より得られる画像データ及び音声データがホームネットワークにより映像信号処理部６、音声信号処理部７に入力され、この映像信号処理部６、音声信号処理部７の出力信号によりモニタ装置１１、スピーカ１２が駆動され、この場合もユーザーの所望する番組が提供される。

このようにしてユーザーがディジタル衛星放送、ディジタル地上波による番組を視聴する場合、さらにはビデオディスクレコーダー８より提供される番組を視聴する場合、セットトップボックス１においては、これら各番組の番組情報により簡易かつ迅速に目的とする番組を視聴できるように、メニュー画面が提供される。

すなわちセットトップボックス１においては（図３４）、電源が立ち上げられると、また他の機器の電源が立ち上げられると、さらには記録媒体を交換したビデオディスクレコーダー８等の通知により、内部制御部４からホームネットワークに接続された外部機器が認証され（ステップＳＰ９１、９３）、この認証に基づいて外部機器より記録時に付加した番組情報、さらには再生専用の記録媒体より提供される映画等の番組について、この記録媒体より番組情報を取得する。

さらに放送波に付加された電子番組情報より番組情報を取得し、さらには専用のＣＤ－ＲＯＭより提供される番組情報、所定のサーバーより提供される番組情報より、受信可能な番組、再生可能な番組についての番組情報を取得する。セットトップボックス１においては、これらの番組情報より提供可能な番組が映画、音楽等のカテゴリーに分類される。

またセットトップボックス１においては、過去にユーザーの視聴

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000144

した番組の情報が記録され、この記録に従って、放送されるチャンネルよりユーザーの好みのチャンネルが選択され、選択頻度の高い順に、この選択された放送チャンネルが第１の仮想チャンネルから第９の仮想チャンネルまでに分類される。

このようにして過去の履歴、番組情報に従って、このセットトップボックス１により提供可能な番組が分類され、セットトップボックス１においては、電源が立ち上げられると、この分類にメディアによる分類を加えたメニューがメインメニュー画面として表示され（図５）、さらにこのメインメニュー画面上における操作により順次階層を辿って所望の番組を選択することが可能となる。

これによりセットトップボックス１においては、情報画面である番組を一元的に管理してメニュー画面を表示し、複数の情報源より番組を取得して多数の番組を提供可能な場合でも、情報源を意識させることなく、情報の内容を主体に情報を選択することが可能となる。従ってユーザーにおいては、例えばビデオテープレコーダ、光ディスク装置等のメディアを意識することなく、簡易、迅速かつ的確に所望の番組を選択するこができ、その分使い勝手を向上することができる。

すなわち例えばユーザーにおいて、ディジタル衛星放送、地上波の放送を視聴する場合には、メインメニュー画面において、推奨チャンネルのメニュー（Ｒｅｃｏｍｍｅｎｄｅｄ）を選択して順次階層を辿ることにより（図６）、ディジタル衛星放送、地上波の放送、チャンネル等を意識することなく、所望の放送チャンネルの番組を視聴することができる。

またユーザーが音楽、映画等の番組の視聴を望む場合には、メイ

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000145

ンメニュー画面において、カテゴリーのメニュー（Ｃａｔｅｇｏｒｉｅｓ）を選択して順次階層を辿ることにより（図１２）、所望のジャンルについて一覧のメニューが表示され、このメニューより目的の番組を選択することにより、現在放送中の番組、過去に録画した番組等を意識することなく、所望の番組を視聴することができる。

さらにユーザーが市販のソフトを視聴するような場合には、メインメニュー画面において、メディアのメニュー（Ｍｅｄｉａ）を選択して順次階層を辿ることにより（図１８）、所望のメディアについて番組一覧のメニューが表示され、このメニューより目的の番組を選択することにより、従来と同様の操作により、さらには他の推奨チャンネルのメニュー、カテゴリーのメニューを操作する場合と同様にして所望の番組を視聴することができる。

このようにしてメインメニュー画面より階層を辿る際に、メインメニュー画面においては、画面中央にフォーカスの領域が形成され、この領域を囲むようにフォーカスの表示Wが形成される。さらにリモートコマンダ１８に配置した選択の操作子１８Ｃの操作に応動して、フォーカスの領域を示すフォーカスの表示Wを固定したまま、メインメニュー画面が移動してフォーカスが切り換わる。

これによりメインメニュー画面において、所望のメニューを選択する場合に、視点をいちいち移動させててフォーカスされたメニューを探すことなく、所望のメニューを選択することが可能となり、その分使い勝手を向上することが可能となる。

またメインメニュー画面において、何れのメニューを選択した場合でも、続く推奨チャンネルのメニュー画面（図７）、カテゴリーのメニュー画面（図１３）、メディアのメニュー画面（図１９）に

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000146

おいては、それぞれメニュー画面における推奨チャンネルのメニュー、カテゴリーのメニュー、メディアのメニューにズームインするように、各メニューが徐々に拡大して表示される（図８）。

これによりセットトップボックス１においては、ユーザー自ら選択した操作の結果を目視確認してメニュー画面の切り換わりを確認することができ、階層化により種々の番組を管理する場合でも、誤操作を有効に回避することができる。またユーザーにおいては、表示画面の切り換えの前後における関係を目視により把握して画面の切り換わりを見守ることができ、画面が瞬時に切り換わっる場合のように、現在の表示画面が何れの階層、分類に位置するかのような、いわゆる迷った状態を回避することができる。これによっても使い勝手を向上することができる。

このようにして移行した各メニュー画面においては、メインメニュー画面の場合と同様に、画面中央にフォーカスの領域が形成され、この領域を囲むようにフォーカスの表示Wが形成される。さらにそれぞれ９個のメニューが配置され、このうちの画面中央のフォーカスに領域に配置されてフォーカスの表示Wにより囲まれるメニューにおいては、拡大表示される。

これにより所望のメニューを選択する場合に、迅速にフォーカスされたメニューを探すことが可能となり、その分使い勝手を向上することが可能となる。

またこれらのメニューは、中央以外のメニューにおいては、アイコンにより表示されるのに対し、中央のフォーカスされたメニューにおいては、さらに下位階層のメニュー画面が存在する場合にはアイコンにより（図１３及び図１９））、下位階層のメニュー画面が

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000147

存在しない場合にはその番組を示す子画面により（図７）により表示される。

これによりセットトップボックス１においては、この子画面を目視して所望の番組か否か判断することができ、これによっても所望の番組を迅速かつ的確に選択することが可能となる。

またこのようなメニュー画面においても、リモートコマンダ１８に配置した選択の操作子１８Ｃの操作に応動して、フォーカスの領域を示すフォーカスの表示Ｗは固定したまま、各画面が移動してフォーカスが切り換わる。またこの移動に伴い、フォーカスの外れたメニューの表示が小さなアイコンの表示に切り換わり、新たにフォーカスされたアイコンが拡大表示され、下位階層のメニュー画面が存在しない場合には子画面に切り換わる（図９）。

これによりメインメニュー画面より１階層下の各メニュー画面においても、所望のメニューを選択する場合に、視点をいちいち移動させてフォーカスされたメニューを探すことなく、簡易かつ確実に所望のメニューを選択することが可能となり、その分使い勝手を向上することが可能となる。またメインメニューと統一した操作により所望のメニューを選択でき、その分使い勝手を向上することができる。

かくしてこのメインメニュー画面の続くメニュー画面が最も下位階層である推奨チャンネルにおいては、このようにして選択したメニューを開くことにより、順次階層を辿って所望の番組を視聴することが可能となる（図１０）。

これに対してさらに下位階層のメニュー画面が存在するカテゴリー及びメディアにおいては、さらに各メニュー画面でメニューを選

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000148

択して開くことにより、続く下位階層のメニュー画面に表示画面を切り換えることができる。

この場合にも、セットトップボックス１においては、メインメニュー画面より下位階層のメニュー画面に表示を切り換えた場合と同様に、フォーカスされたメニューにズームインするように、メニューの表示が徐々に拡大されてメニュー画面が切り換わる（図１５）。

これによりメインメニューより下位階層のメニュー画面の表示を切り換えた場合と同様に、ユーザー自ら選択した操作の結果を目視確認してメニュー画面の切り換わりを確認することができ、階層化により種々の番組を管理する場合でも、誤操作を有効に回避することができ、さらには使い勝手を向上することができる。またメインメニューと統一した操作により所望のメニューを選択でき、その分使い勝手を向上することができる。

このようにしてズームインによりメニュー画面を切り換える際に、アイコンが所定値以上に大きく拡大されると、このアイコンにおいては、透明化の処理により、表示が徐々に薄くなり、続くメニュー画面が表示される。これによりスムーズにメニュー画面の切り換わりが知覚され、違和感なくメニュー画面を切り換えることが可能となる。

さらにこのようにしてメニュー画面を切り換える際に、ズームインするメニューに９個以上の多くのメニューが割り当てられている場合、各メニューに対する全てのアイコンを配列してなる全体画面が一度表示され、この全体画面にズームインするようにしてメニュー画面が切り換えられる（図１５及び図１６）。

これによりユーザーにおいては、例えば映画のカテゴリーについ

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000149

て膨大な番組を記録してあるような場合でも、映画のカテゴリーについてのこの膨大な番組数の全体像を把握して次のメニュー画面を操作することができる。従って例えばこのように映画の下位階層側メニューにおいて、メニュー画面に表示されていない映画を選択するような場合でも、いちいち元の階層のメニュー画面に戻ることなく所望する映画のメニューを選択することができ、その分迅速かつ確実に所望の番組を選択することが可能となる。

さらにこのようにして表示した下位階層のメニュー画面においても、セットトップボックス１においては、フォーカスの領域が画面中央に固定されたまま、各メニュー画面、さらには全体画面が移動してフォーカスが切り換わり、またこれに伴いフォーカスの外れたメニューの表示が小さなアイコンの表示に切り換わり、新たにフォーカスされたアイコンが拡大表示され、下位階層のメニュー画面が存在しない場合には子画面に切り換わる（図９）。

これによりこの下位階層のメニュー画面においても、所望のメニューを選択する場合に、視点をいちいち移動させてフォーカスされたメニューを探すことなく、簡易かつ確実に所望のメニューを選択することが可能となり、その分使い勝手を向上することが可能となる。またメインメニューと統一した操作により所望のメニューを選択でき、その分使い勝手を向上することができる。

かくしてセットトップボックス１においては、カテゴリー及びメディアにおいてこのようにして選択したメニュー画面が最下位階層の番組選択のメニュー画面であることから、所望のメニューを選択して開くことにより、目的の番組を簡易かつ迅速に視聴することが可能となる。

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000150

このようにして選択したメニューについて、下位階層のメニュー画面に移行する場合、さらには番組を選択する場合、セットトップボックス１においては、何れの場合でも、リモートコマンダ１８に配置した選択の操作子１８Ｃを押圧操作して決定の操作子１８Ｃとして操作することにより、順次下位階層側に表示画面を切り換え、また番組を選択することができる。

またこれとは逆に、キャンセルの操作子１８Ｄを操作することにより、上位階層側のメニュー画面に戻ることができる。これにより階層化したメニュー画面を辿る場合に、統一化された操作により番組を選択することができ、その分誤操作を防止して使い勝手を向上することができる。

さらにこのようにしてキャンセルの操作子１８Ｄの操作により上位階層側のメニュー画面に戻る場合にあっては、下位階層側に移行する場合とは逆に、ズームアウトするように表示画面が切り換わり、さらには必要に応じて全体画面が表示される。

これにより上位階層に戻る場合でも、迷うことなく、また全体像を把握して、上位階層に戻ることができ、これによっても迅速かつ的確に所望の番組を選択することが可能となる。

このようにして順次メニュー画面を切り換えるにつき、推奨チャンネル及びカテゴリーにおける最下位階層の番組選択メニュー画面において（図６及び図１２）、シフトの操作子１８Ｅを押圧操作して決定の操作子１８Ｃを操作すると、番組案内の画面に切り換わり、また各番組案内の画面を表示した状態でキャンセルの操作子１８Ｄを操作すると元のメニュー画面に戻る。

この番組案内の画面は、推奨チャンネルにおいては、フォーカス

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000151

されていた各仮想チャンネルについての放送予定が順次カテゴリー別に色分けされて放送時間の順序で表示され、これにより放送予定の番組を確認して必要に応じてタイマー録画等の設定処理を実行することが可能となる。これに対してカテゴリーにおいては、フォーカスされたカテゴリーについて、放送予定と各種メディアより視聴可能な番組とが一覧表により表示され、これによりタイトル等より所望の番組を視聴することが可能となる。

これにより階層を辿って番組を選択する通常の番組選択の操作とは異なる操作により番組を選択する場合には、シフトの操作子１８Ｅを加えた、階層を辿る場合と同様の操作により所望の番組を選択することができ、その分操作の統一性が図られて、使い勝手が向上される。

これに対してメディアの番組選択メニューにおいて、シフトの操作子１８Ｅと決定の操作子１８Ｃが操作されると（図１８）、第２のサーチ画面に表示が切り換えられる（図２５）。

この第２のサーチ画面においては、フォーカスされた番組について、記録時に各シーン毎に設定されたインデックス画像が内周側より順次拡大され、この拡大された画像が時系列の順序により内周側かららせん状に連続するように表示される。これによりユーザーにおいては、時系列の順序で拡大する画像の遠近感により各インデックス画像の前後関係を視覚的に把握することができ、またらせん状に連続する表示により全体の時間経過を視覚的に把握することができる。これにより番組の流れ、各シーンを容易に理解することができ、所望のシーンを簡易かつ迅速に頭出しすることができる。従ってその分使い勝手を向上することができる。また、拡大された画像

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000152

を時系列の順序により、内周側かららせん状に表示すれば、未来の画像が現在に近い画像の上に重なることはない。

またこの第２のサーチ画面においては、詳細に検討することが多い現在時点に近いインデックス画像については、比較的大きく表示されるのに対し、またこれとは逆に、現在時点に比して詳細に検討することの少ない現在時点より遠いインデックス画像については、小さく表示され、これによりユーザーの視聴したい画面については詳細に表示して表示画面を有効に利用することができる。

またこのときらせん状の中央に向かうに従って、表示が徐々に薄くなって背景が透過するように表示されることにより、表示に奥行感が与えられ、これによっても時間経過を容易に把握することができる。

またこのときこのらせん状の配置の中心より放射状に広がる背景に、これらのインデックス画像が配置されていることより、この背景によっても遠近感が付加され、この遠近感により容易に時間経過を把握することができる。

このようにして各インデックス画像により所望のシーンを頭出しする場合にあっては、選択の操作子１８Ｃの左右方向の操作に応動して、フォーカスの領域が固定されたまま、円周方向にインデックス画像が移動すると共に、インデックス画像の大きさが移動後の位置に対応する大きさに変化する（図２６）。これにより視覚的に時間軸を辿るようにインデックス画像を切り換えることができ、その分使い勝手を向上することができる。またこのときもフォーカスの領域が固定されていることにより、視点の移動を防止して、簡易にフォーカスされたインデックス画像を発見することができる。

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000153

また選択の操作子１８Ｃの上下方向の操作に応動して、フォーカスの領域が固定されたまま、内外周方向にインデックス画像が移動すると共に、インデックス画像の大きさが移動後の位置に対応する大きさに変化する（図２７）。これによりこのらせん状の配置の１周分を単位にして、時間軸に沿って大きくジャンプするようにインデックス画像を切り換えることができ、この時間軸方向のジャンプを視覚的に把握することができる。従ってその分使い勝手を向上することができる。またこのときもフォーカスの領域が固定されていることにより、視点の移動を防止して、簡易にフォーカスされたインデックス画像を発見することができる。

このようにしてインデックス画像を移動させてフォーカスを切り換える際に、インデックス画像においては、内周側に向かうに従って徐々に表示が薄くなり、また時間方向の手前側であるインデックス画像についても表示が薄く設定されていることにより、例えば時間軸に沿った方向にフォーカスを切り換える場合には、あたかもらせんの中心よりインデックス画像が浮き上がって接近して来るように表示される。またこれとは逆に時間軸を遡る方向にフォーカスを切り換える場合には、それまで視野に入っていなかったインデックス画像が視野に入るように表示が切り換えられる。

これによりこの第２のサーチ画面においては、あたかも時間軸を基準にして立体的に配置したインデックス画像の中で視点を移動させたかのように表示が切り換えられ、使い勝手を一段と向上することができる。

このようしてインデックス画像を選択した後、下位階層のメニューに移行する場合と同様に、決定の操作子１８Ｃを操作することに

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000154

より、フォーカスしたインデックス画像を先頭にしたシーンより所望の番組を再生することができ（図１８）、またこれとは逆に上位階層のメニュー画面に戻る場合と同様にキャンセルの操作子１８Ｄの操作により元の番組選択メニューに戻ることができ、これにより他のメニュー画面との間で統一された操作により所望のシーンを頭出しすることができる。

これに対してメディアによる番組表示の画面において、シフトの操作子１８Ｅを押圧すると、このシフトの操作子１８Ｅが押圧操作されている期間の間だけ第１のメニュー画面が表示される（図１８）。

ここでこの第１のメニュー画面においては（図２３）、メディアがランダムアクセス可能な場合、それまで表示されていた画面が縮小されて表示され、画面の下側にインデックス画像が順次横並びで配置される。さらにフォーカスの領域が中央のインデックス画像に設定され、このフォーカスされたインデックス画像が他のインデックス画像より拡大されて表示される。

この第１のメニュー画面においても、選択の操作子１８Ｃの操作に応動して、フォーカスの領域は固定されたまま、インデックス画像の配列が移動することによりフォーカスのインデックス画像が切り換えられ、これによりユーザーにおいて簡易にフォーカスされたインデックス画像を見つけ出すことが可能となる。またこのようにインデックス画像を選択した後、決定の操作子１８Ｃを押圧することにより、大きく表示された画像をこのインデックス画像によるシーンに切り換えることができ、このように所望のシーンを選択した後、シフトの操作子１８Ｅの押圧を解除することにより、この頭出

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000155

ししたシーンにより元の番組表示の画面に戻って番組を視聴することができる。

これにより番組の視聴中に必要に応じてシーンをジャンプして番組の視聴を継続することができ、その分使い勝手を向上することができる。

このときこのセットトップボックス１においては、シフトの操作子１８Ｅが操作されている期間の間だけ、第１のサーチ画面を表示することにより、リモートコマンダ１８（図３）における操作子の増大を防止して、この第１のサーチ画面のような他とは異なる情報選択のメニューを提供することが可能となり、その分多量の情報を提供する場合に、この種の情報提供装置の使い勝手を向上することができる。

またこのように操作するシフトの操作子１８Ｅにおいては、リモートコマンダ１８を把持して、人指し指により操作できるように構成されるのに対し、決定、選択の操作子１８Ｃにおいては、同様に把持して親指により操作できるように構成されていることにより、片手でリモートコマンダ１８を操作して簡易に所望のシーンを頭出しすることができる。

またこのときこのシフトの操作子１８Ｅにおいては、他の操作子１８Ａ、１８Ｂ、１８Ｃ、１８Ｄの配置とは切り離して配置されていることにより、他とは異なる情報選択の表示画面であるサーチ画面を、他の情報選択画面であるメニュー画面とは区別させてユーザーに操作させることができ、その分このサーチ画面を選択する操作子を単に他の操作子と区別することなく配置する場合に比して誤操作を防止でき、その分使い勝手を向上することができる。

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000156

またこのシフトの操作子１８Ｅを操作した状態で同時に操作を受け付ける操作子１８Ｃについては、他の情報選択画面であるメニュー画面と同様に選択、決定の機能が割り振られていることにより、その分他のメニュー画面との間で統一された操作により所望のシーンを頭出しすることができる。

これに対して、この第１のメニュー画面を選択する操作をビデオテープレコーダ等のランダムアクセス困難なメディアについて実行した場合、インデックス画像に代えて、ビデオテープレコーダの操作子に類似するアイコンが表示され、このアイコンの操作により同様に頭出しすることができ、またシフトの操作子１８Ｅの押圧操作の解除により、元の画面に戻ることができる。

この場合も、他のメニュー画面における選択、決定の操作、第１のメニュー画面等との間で統一された操作により所望のシーンを頭出しすることができ、その分使い勝手を向上することができる。

（３）実施の形態の効果

以上の構成によれば、インデックス画像を時系列により順次拡大し、この拡大した画像が内周側より時系列の順序でらせん状に連続するように表示することにより、らせん状の連続した配置により全体の流れを把握でき、また拡大された画像の遠近感により各インデックス画像の前後関係を把握することができ、これらによりインデックス画像による番組の流れ、各シーンの関係を容易に理解させることができる。従ってこのインデックス画像による番組について、時間経過と共に変化する番組の流れを視覚的に把握して、簡易に所望のシーンを選択することができる。

またこのようにすれば、詳細に検討することが多い現在時点に近

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000157

いインデックス画像については、比較的大きく表示されるのに対し、またこれとは逆に、現在時点に比して詳細に検討することの少ない現在時点より遠いインデックス画像については、小さく表示され、これによりユーザーの視聴したいシーンについては詳細に表示して表示画面を有効に利用することができる。

またこのときらせん状の中央に向かうに従って、表示を徐々に薄くして背景を透過させて表示することにより、表示に奥行き感を与えることができ、これによっても容易に時間経過を把握することができる。またインデックス画像を移動させてあたかも立体的に配置したインデックス画像の中で視点を移動させたかのような感覚により所望のインデックス画像を選択することができる。

またこのときこのらせん状の配置の中心より放射状に広がる背景に、これらのインデックス画像を配置することにより、この背景によっても遠近感を付加することができ、この遠近感により容易に時間経過を把握することができる。

さらに操作子の操作に応動して、円周方向に、内外周方向にインデックス画像を移動させると共に、インデックス画像の大きさを移動後の位置に対応する大きさに変化させることにより、円周方向による短い時間間隔によるインデックス画像の切り換えと、内外周方向による長い時間間隔によるインデックス画像の切り換えとを必要に応じて選択的に実行することができ、その分所望のシーンを簡易かつ迅速に選択できるようにして、使い勝手を向上することができる。

またフォーカスの表示によるフォーカスの領域を固定してインデックス画像の表示を移動させることにより、視点移動を低減して使

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000158

い勝手を向上することができる。

（４）他の実施の形態

なお上述の実施の形態においては、ランダムアクセス可能なメディアについてのみ第２のサーチ画面を表示してインデックス画像をらせん状に表示する場合について述べたが、本発明はこれに限らず、例えばビデオテープレコーダ等に記録された番組を再生する場合等にあっても、この第２のサーチ画面を表示してインデックス画像をらせん状に表示するようにしてもよい。

また上述の実施の形態においては、シーンチェンジを検出してインデックス画像を設定する場合について述べたが、本発明はこれに限らず、一定の時間間隔によりインデックス画像を設定するようにしてもよい。

さらに上述の実施の形態においては、１つの番組についてインデックス画像をらせん状に表示する場合について述べたが、本発明はこれに限らず、複数の番組についてインデックス画像をらせん状に表示するようにしても良い。なおこの場合、これら複数の番組の先頭の画面をインデックス画像に設定してもよい。

また上述の実施の形態においては、番組の時間経過に対応する時系列の画像であるインデックス画像について、らせん状に配置して表示する場合について述べたが、本発明はこれに限らず、例えば編集装置、さらには電子スチルカメラで記録した静止画像を表示する場合のように、記録順序による時系列により連続する画像を表示する場合等にも広く適用することができる。

また上述の実施の形態においては、セットトップボックスに本発明を適用して種々の番組である情報を提供する場合について述べた

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が、本発明はこれに限らず、例えばインデックスの画像を基準にして静止画像等の種々の情報を提供する情報提供装置、情報の提供方法に広く適用することができる。

産業上の利用可能性

上述のように本発明によれば、インデックス画像等を順次拡大し、この拡大した画像が内周側より時系列の順序でらせん状に連続するように表示することにより、時系列により連続する多くの画像について、前後関係を容易に理解することができる。

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000160

請求の範囲

１．複数の情報源を介して提供される種々の情報データに基づいて画面に情報を表示させる情報提供装置において、

上記複数の情報源のうち第１の情報源から上記第１の情報源に関する第１の情報データを取得する第１の情報取得手段と、

上記複数の情報源のうち第２の情報源から上記第２の情報源に関する第２の情報データを取得する第２の情報取得手段と、

取得した上記第１の情報データ及び上記第２の情報データに基づいて、上記画面に分類したメニュー画面を表示させるメニュー画面表示手段と、

上記メニュー画面における選択操作に応動して上記第１の情報源または上記第２の情報源から必要な情報データを取得し、上記必要な情報データに基づいた情報を上記画面に表示させる表示手段と、を有することを特徴とする情報提供装置。

２．上記第１の情報データは上記第１の情報源から出力されるコンテンツに関するインデックス情報であって、上記必要な情報は上記コンテンツの内容を表示させるための情報データであることを特徴とする請求の範囲第１項記載の情報提供装置。

３．上記第１の情報源と上記情報提供装置とは、ネットワークを介して接続されており、

上記第１の情報取得手段は、上記ネットワークを介して上記第１の情報データを取得することを特徴とする請求の範囲第１項記載の情報提供装置。

４．複数の情報源を介して提供される種々の情報データに基づいて

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000161

画面に情報を表示させる情報提供方法において、

上記複数の情報源のうち第１の情報源から上記第１の情報源に関する第１の情報データを取得する第１の情報取得工程と、

上記複数の情報源のうち第２の情報源から上記第２の情報源に関する第２の情報データを取得する第２の情報取得工程と、

取得した上記第１の情報データ及び上記第２の情報データに基づいて、上記画面に分類したメニュー画面を表示させるメニュー画面表示工程と、

上記メニュー画面における選択操作に応動して上記第１の情報源または上記第２の情報源から必要な情報データを取得し、上記必要な情報データに基づいた情報を上記画面に表示させる表示工程と、を有することを特徴とする情報提供方法。

５．上記第1の情報データは上記第１の情報源から出力されるコンテンツに関するインデックス情報であって、上記必要な情報は上記コンテンツの内容を表示させるための情報データであることを特徴とする請求の範囲第４項記載の情報提供方法。

６．第１の情報取得工程は、上記第１の情報源から上記第１の情報源に関する第１の情報データをネットワークを介して取得することを特徴とする請求の範囲第４項記載の情報提供方法。

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000162

補正書の請求の範囲

［２０００年５月２６日（２６．０５．００）国際事務局受理：出願当初の請求の範囲１,２,４及び５は補正された；他の請求の範囲は変更なし。（２頁）］

１．（補正後）複数の情報源を介して提供される種々の情報データに基づいて画面に情報を表示させる情報提供装置において、

上記複数の情報源のうち第１の情報源から上記第１の情報源から出力されるコンテンツに関するインデックス情報を取得する第１の情報取得手段と、

上記複数の情報源のうち第２の情報源から上記第２の情報源から出力されるコンテンツに関するインデックス情報を取得する第２の情報取得手段と、

取得した上記第１の情報源から出力されるコンテンツに関するインデックス情報及び上記第２の情報源から出力されるコンテンツに関するインデックス情報に基づいて、上記画面に分類したメニュー画面を表示させるメニュー画面表示手段と、

上記メニュー画面に応動して上記第１の情報源または上記第２の情報源から必要な情報データを取得し、上記必要な情報データに基づいた情報を上記画面に表示させる表示手段と、を有することを特徴とする情報提供装置。

２．（補正後）上記必要な情報データは上記コンテンツの内容を表示させるための情報データであることを特徴とする請求の範囲第１項記載の情報提供装置。

３．上記第１の情報源と上記情報提供装置とは、ネットワークを介して接続されており、

上記第１の情報取得手段は、上記ネットワークを介して上記第１の情報データを取得することを特徴とする請求の範囲第１項記載の

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000163

情報提供装置。

４．（補正後）複数の情報源を介して提供される種々の情報データに基づいて画面に情報を表示させる情報提供方法において、

上記複数の情報源のうち第１の情報源から上記第１の情報源から出力されるコンテンツに関するインデックス情報を取得する第１の情報取得工程と、

上記複数の情報源のうち第２の情報源から上記第２の情報源から出力されるコンテンツに関するインデックス情報を取得する第２の情報取得工程と、

取得した上記第１の情報源から出力されるコンテンツに関するインデックス情報及び上記第２の情報源から出力されるコンテンツに関するインデックス情報に基づいて、上記画面に分類したメニュー画面を表示させるメニュー画面表示工程と、

上記メニュー画面に応動して上記第１の情報源または上記第２の情報源から必要な情報データを取得し、上記必要な情報データに基づいた情報を上記画面に表示させる表示工程と、を有することを特徴とする情報提供方法。

５．（補正後）上記必要な情報データは上記コンテンツの内容を表示させるための情報データであることを特徴とする請求の範囲第４項記載の情報提供方法。

６．第１の情報取得工程は、上記第１の情報源から上記第１の情報源に関する第１の情報データをネットワークを介して取得することを特徴とする請求の範囲第４項記載の情報提供方法。

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000164

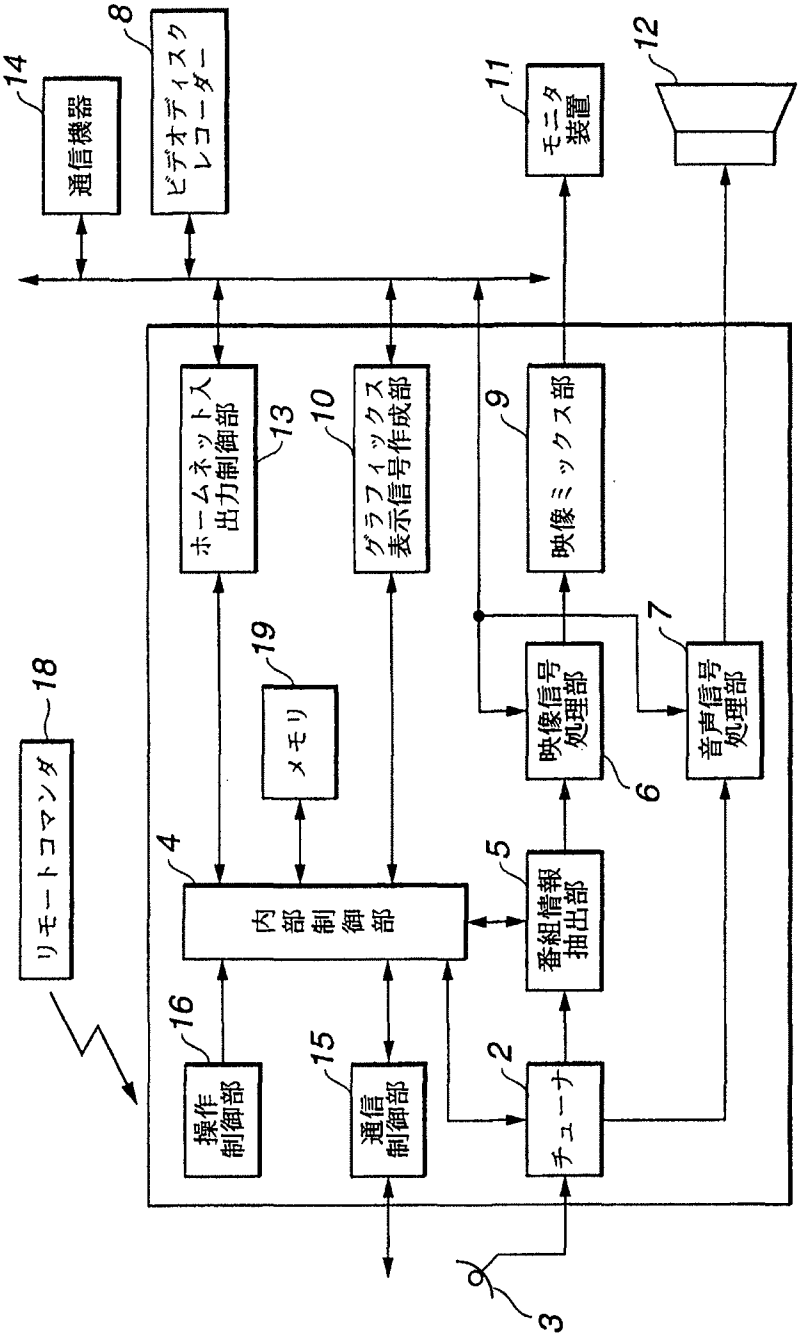


FIG.1

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000165

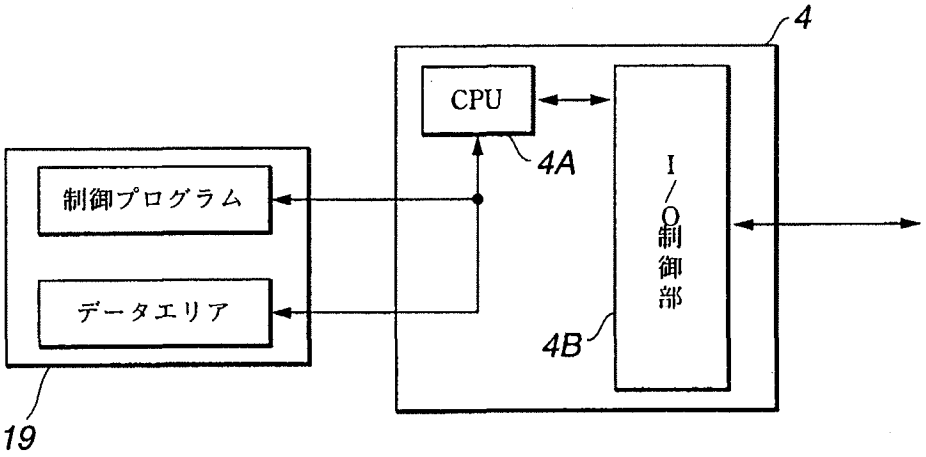


FIG.2

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000166

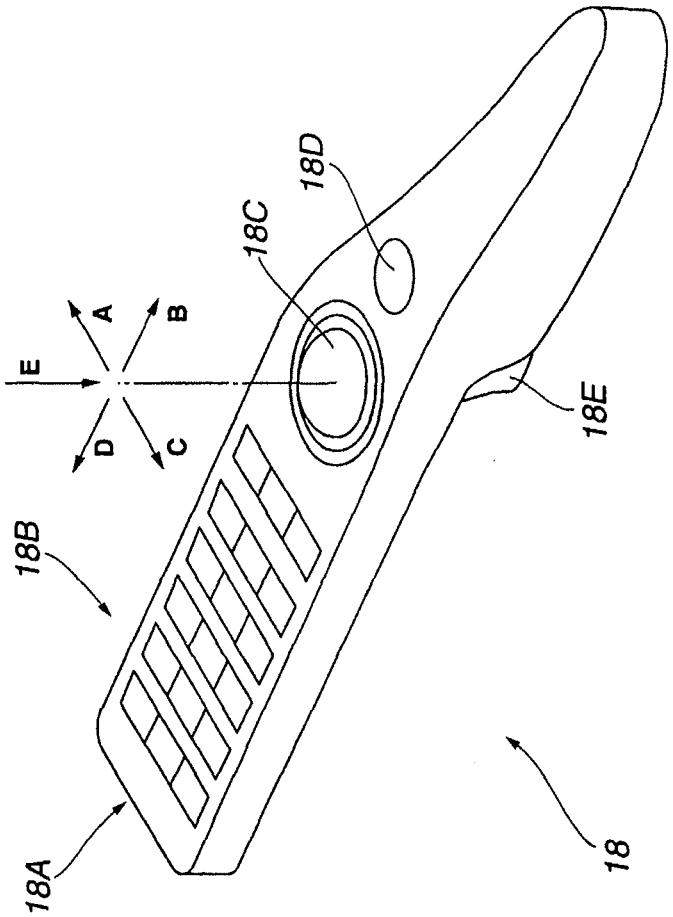


FIG.3

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000167

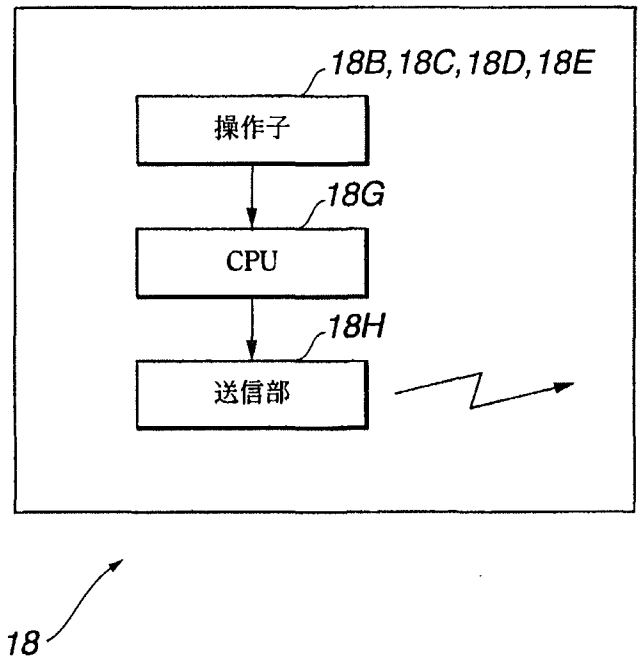


FIG.4

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000168

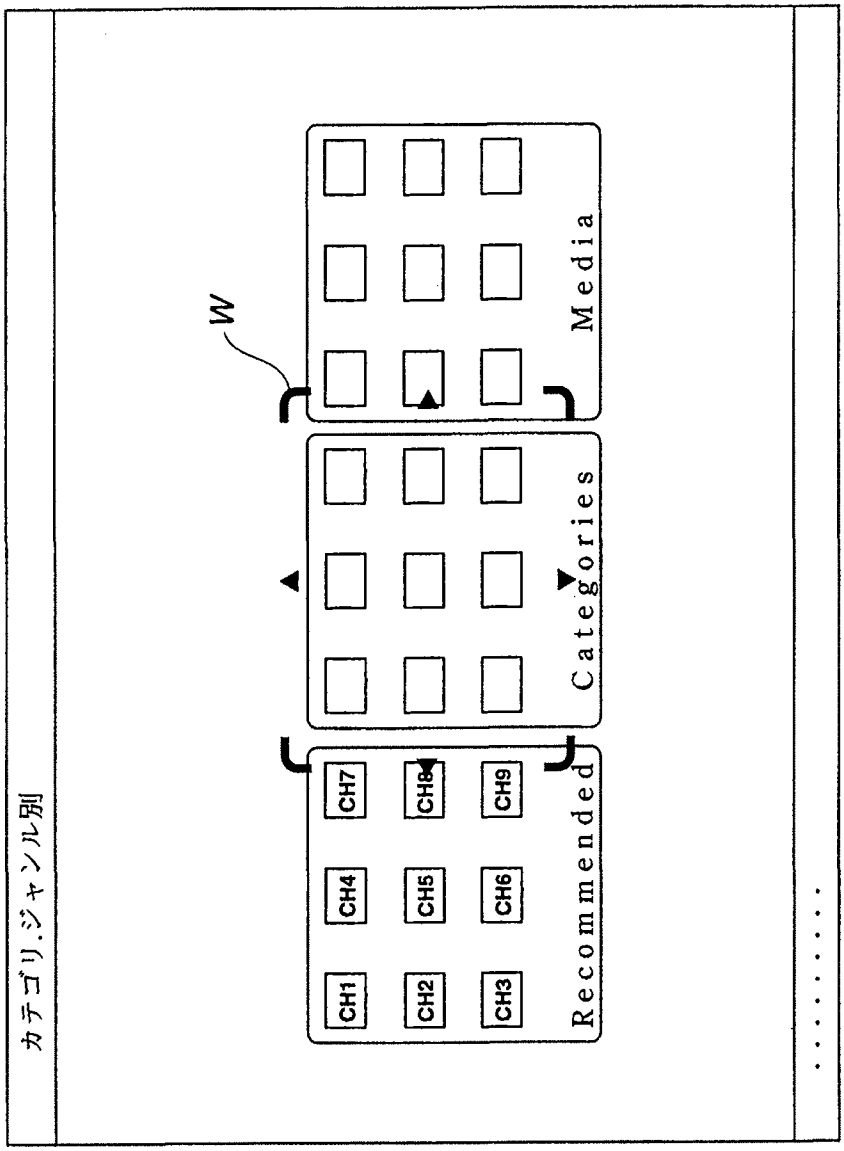


FIG.5

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000169

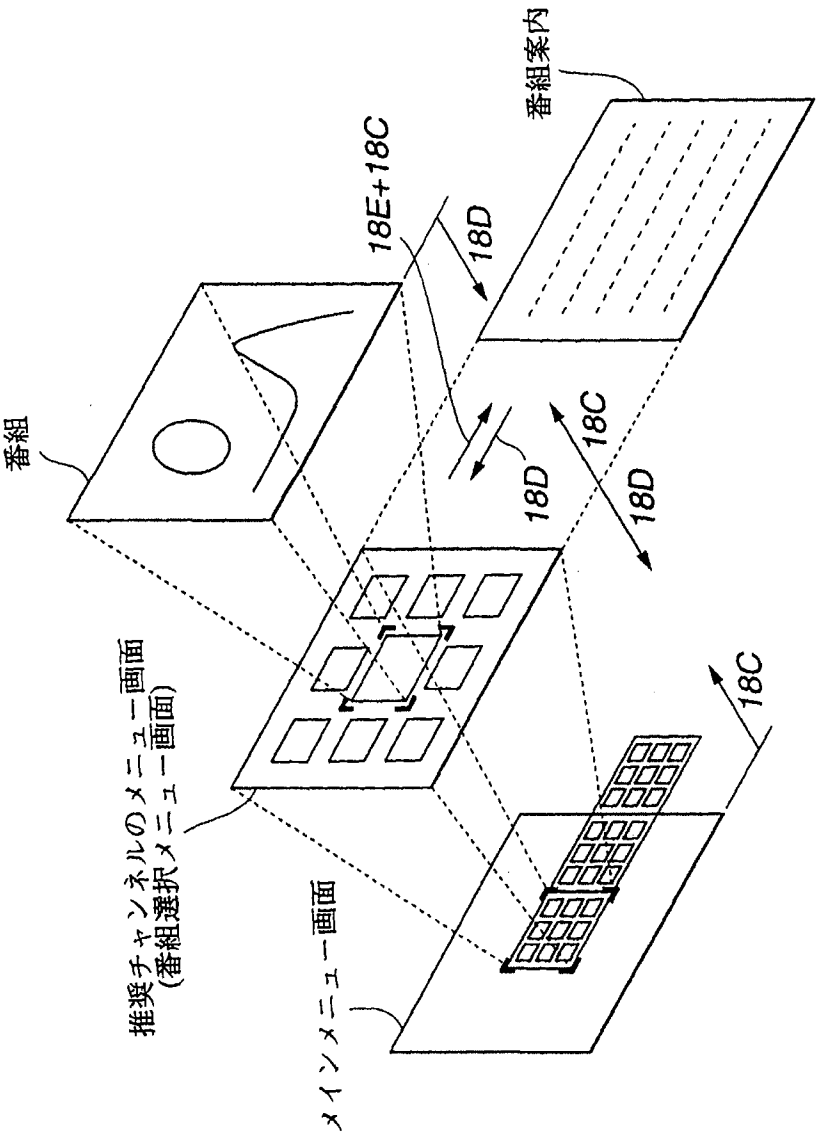


FIG.6

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000170

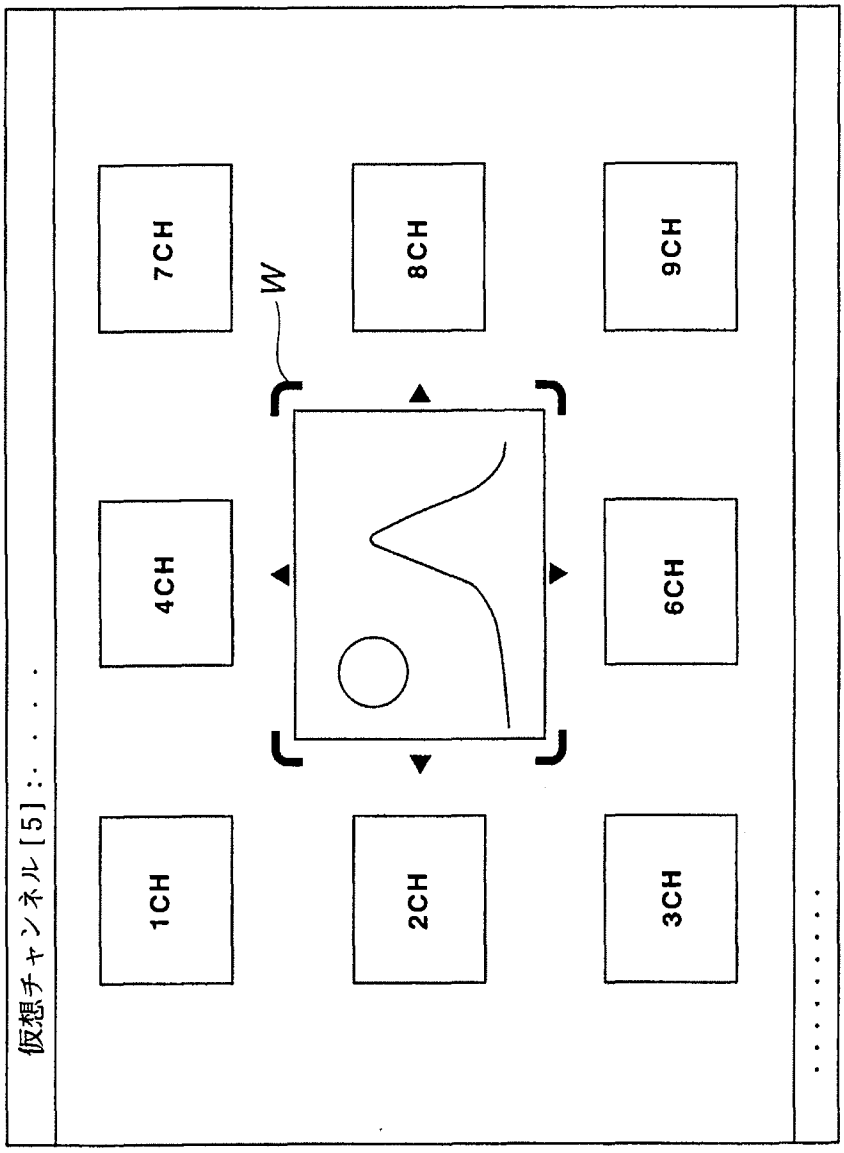


FIG.7

FIG.8(A)

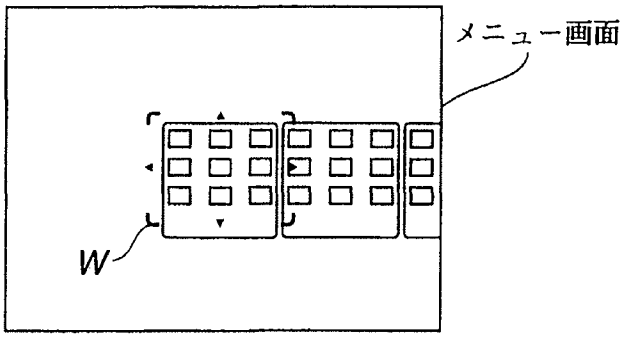


FIG.8(B)

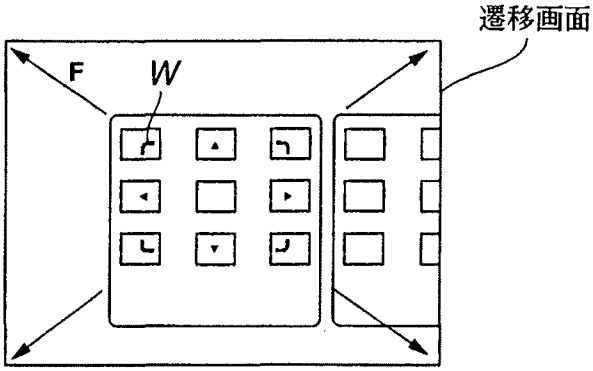
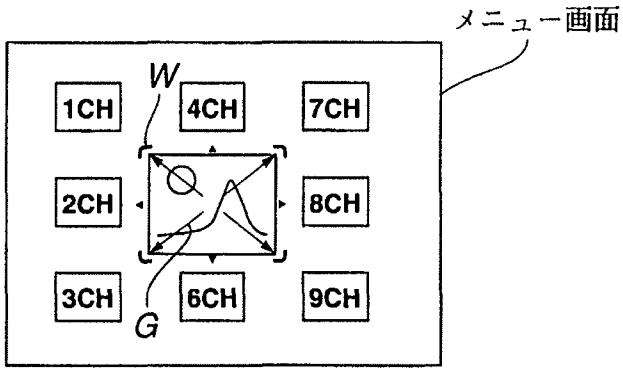


FIG.8(C)



Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000172

FIG.9(A)

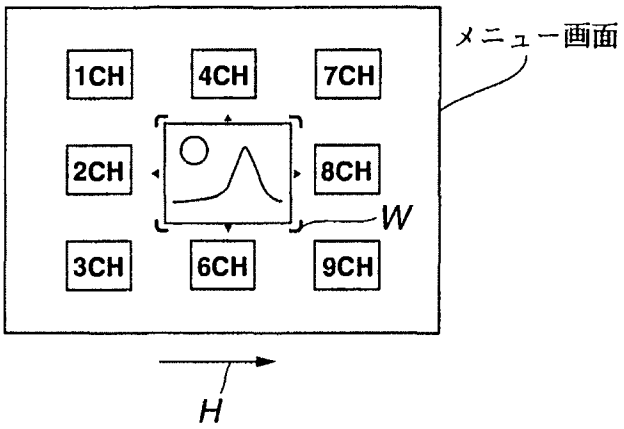


FIG.9(B)

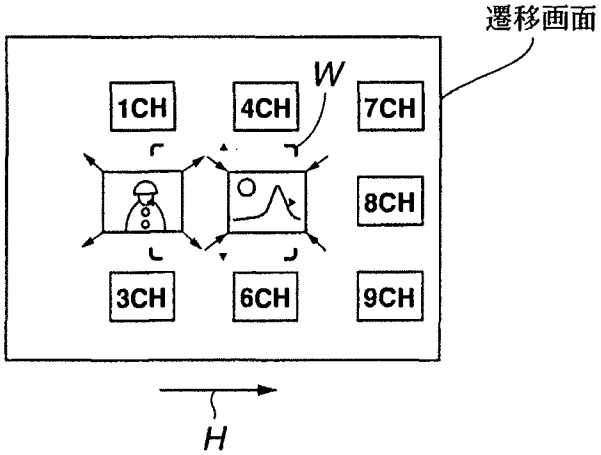
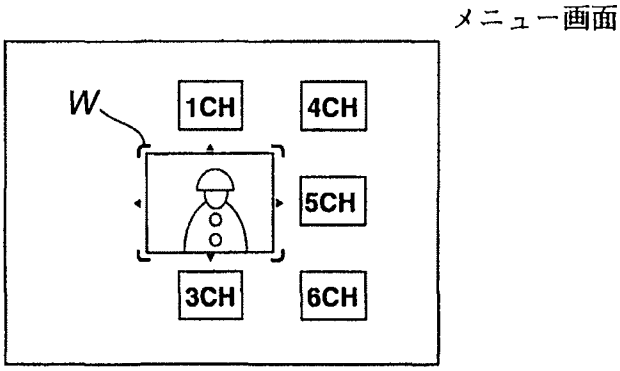


FIG.9(C)



Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000173

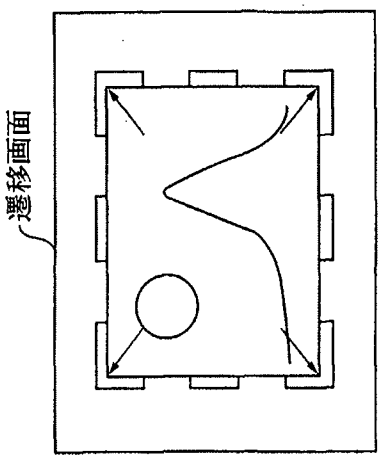


FIG.10(C)

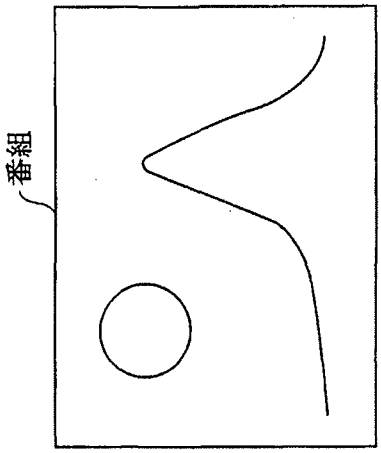


FIG.10(D)

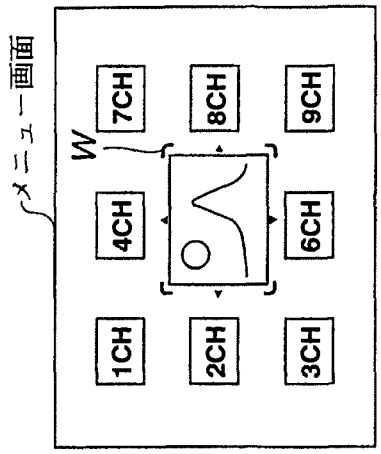


FIG.10(A)

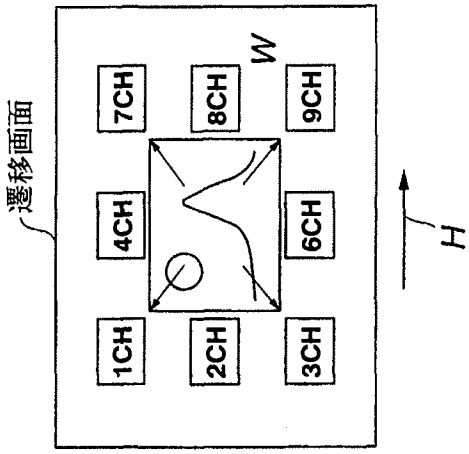


FIG.10(B)

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000174

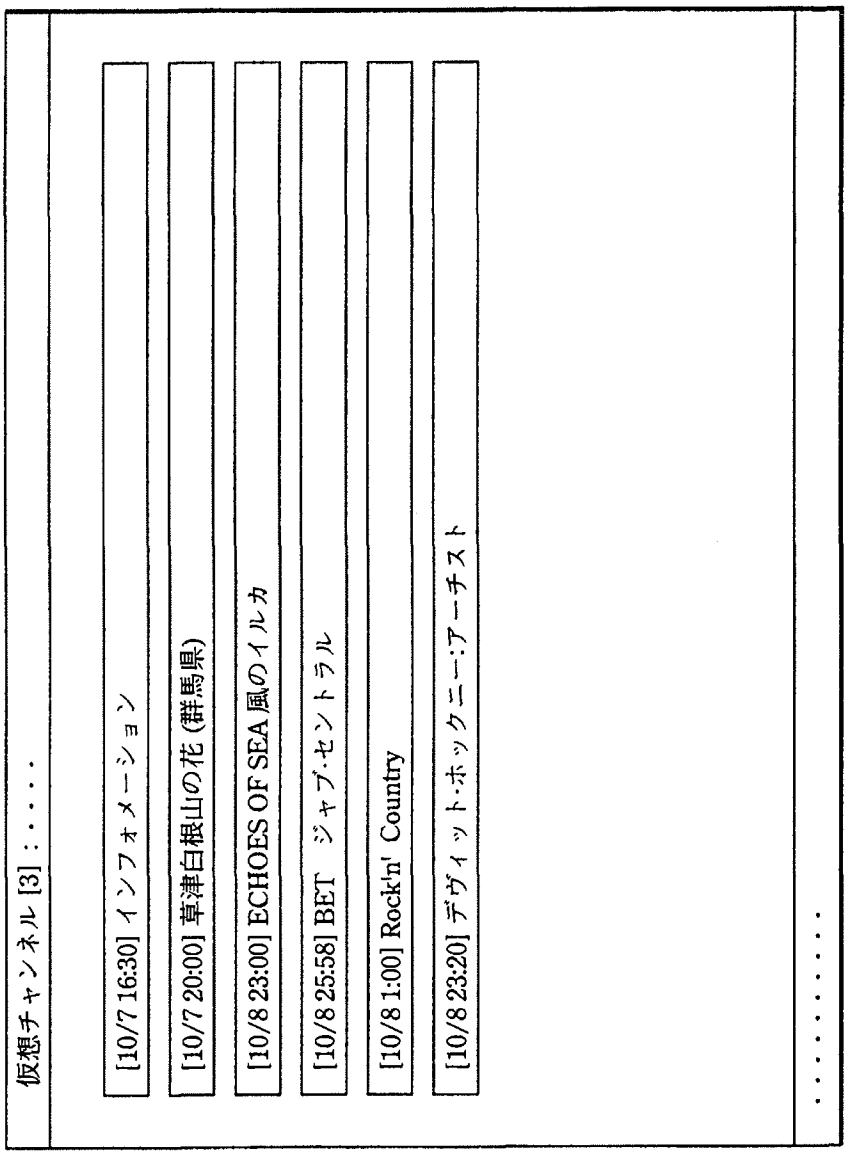


FIG.11

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000175

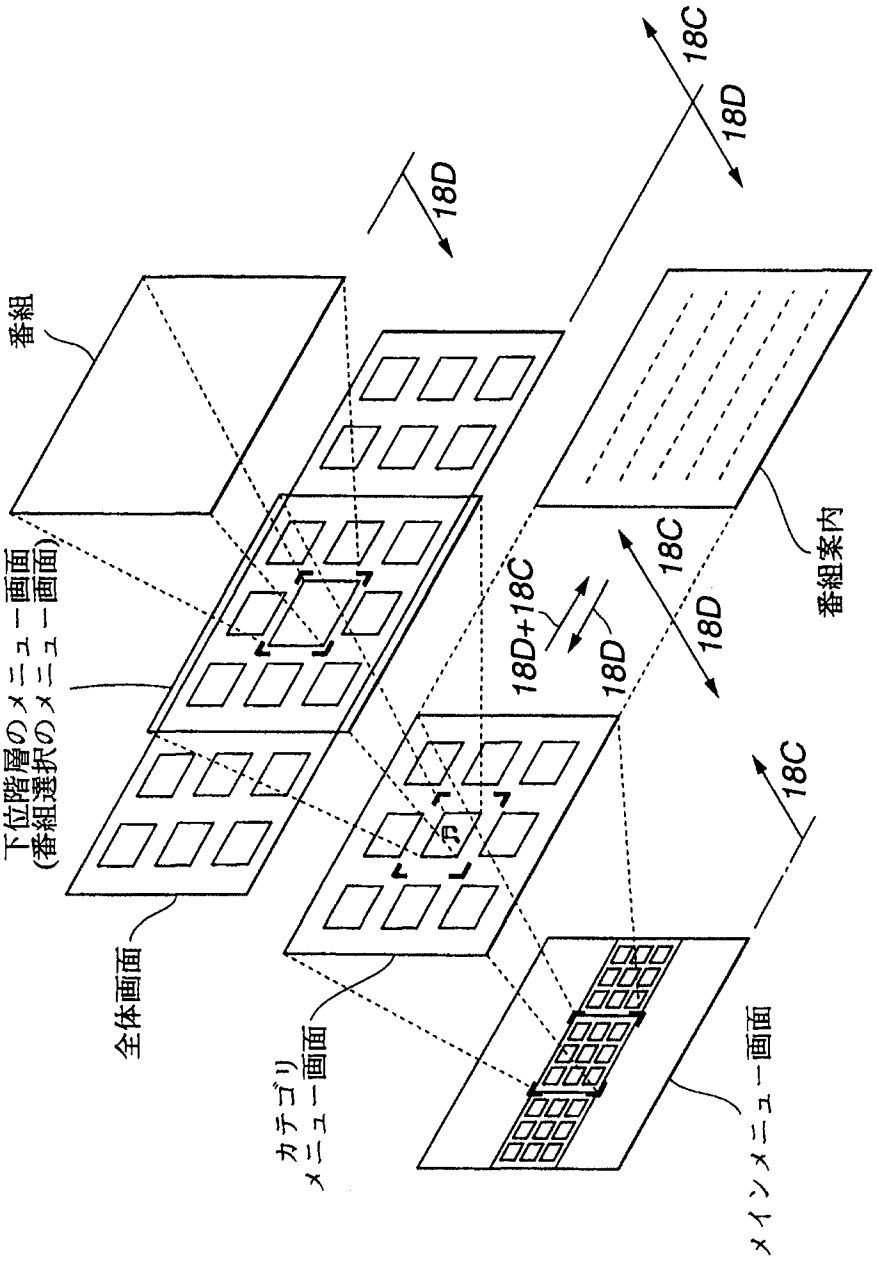


FIG.12

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000176

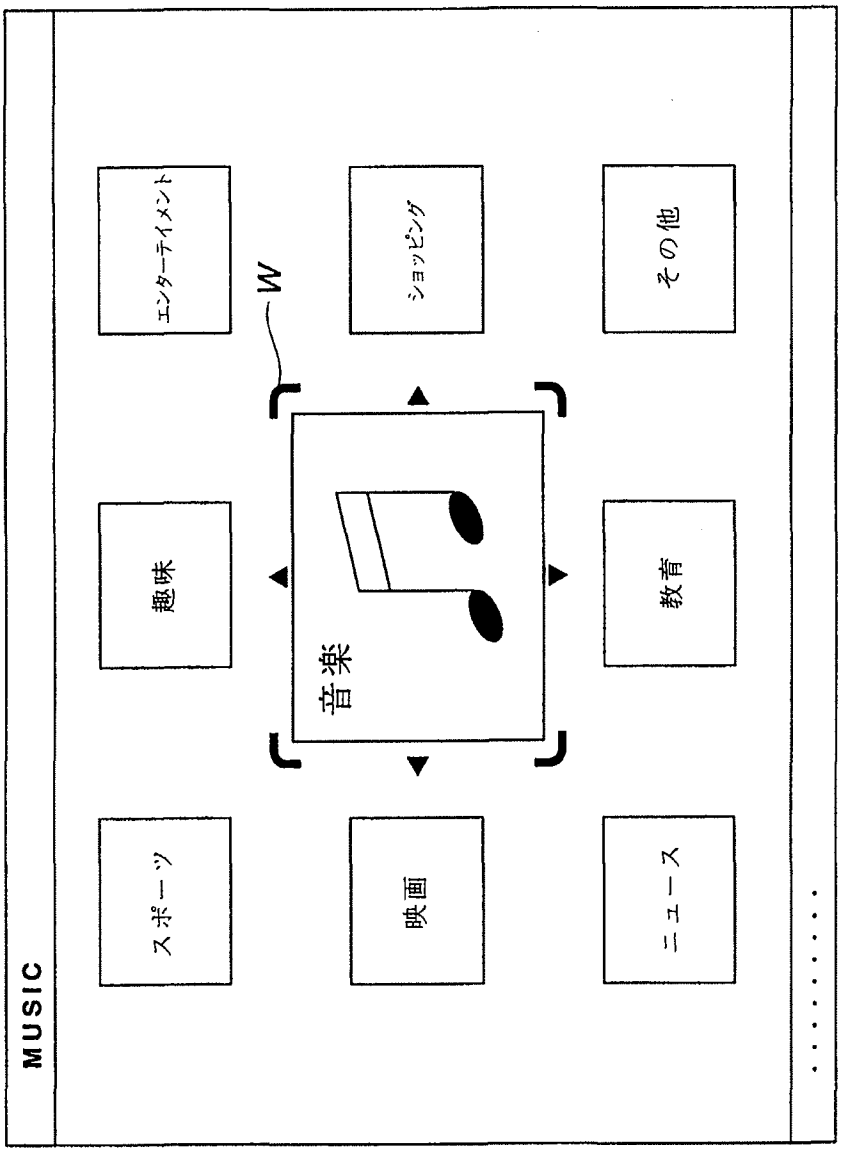


FIG.13

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000177

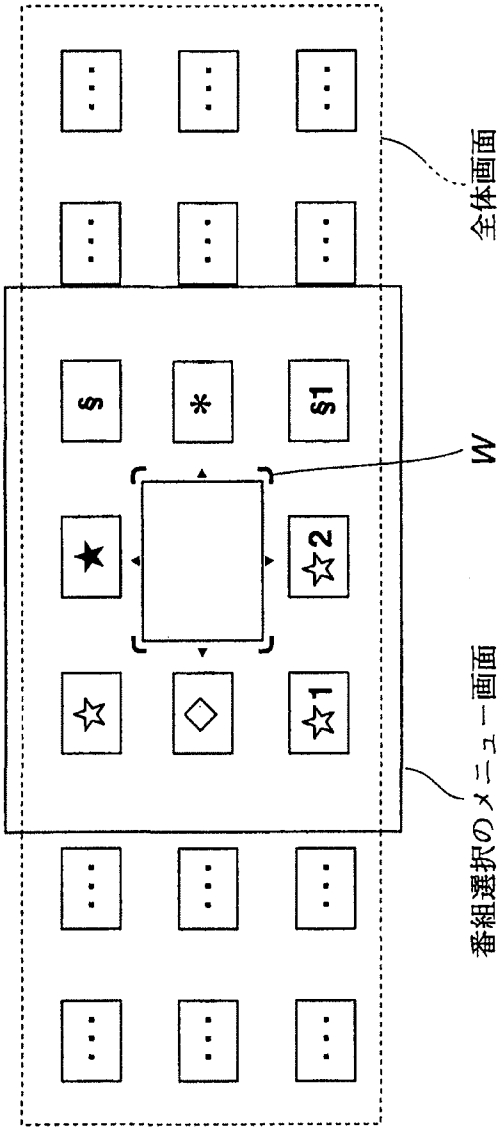


FIG.14

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000178

FIG.15(A)

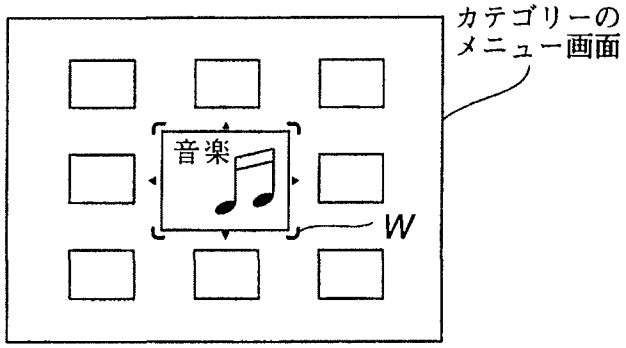


FIG.15(B)

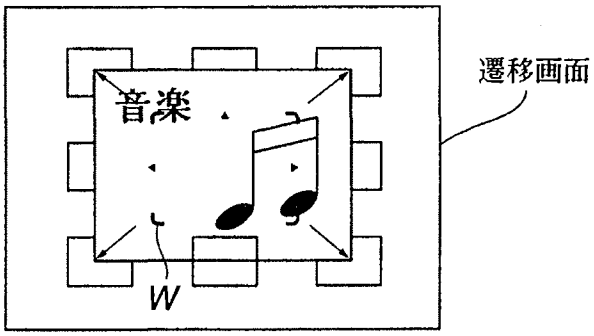
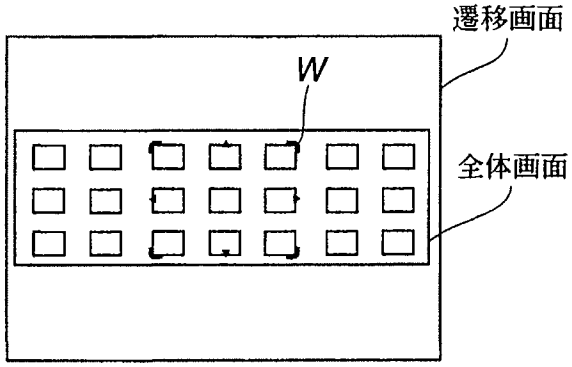


FIG.15(C)



Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000179

FIG.16(A)

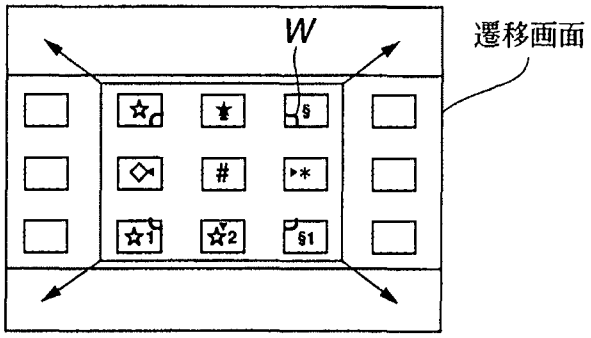
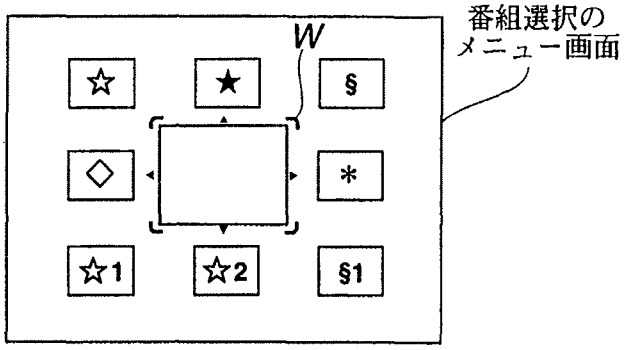


FIG.16(B)



Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000180

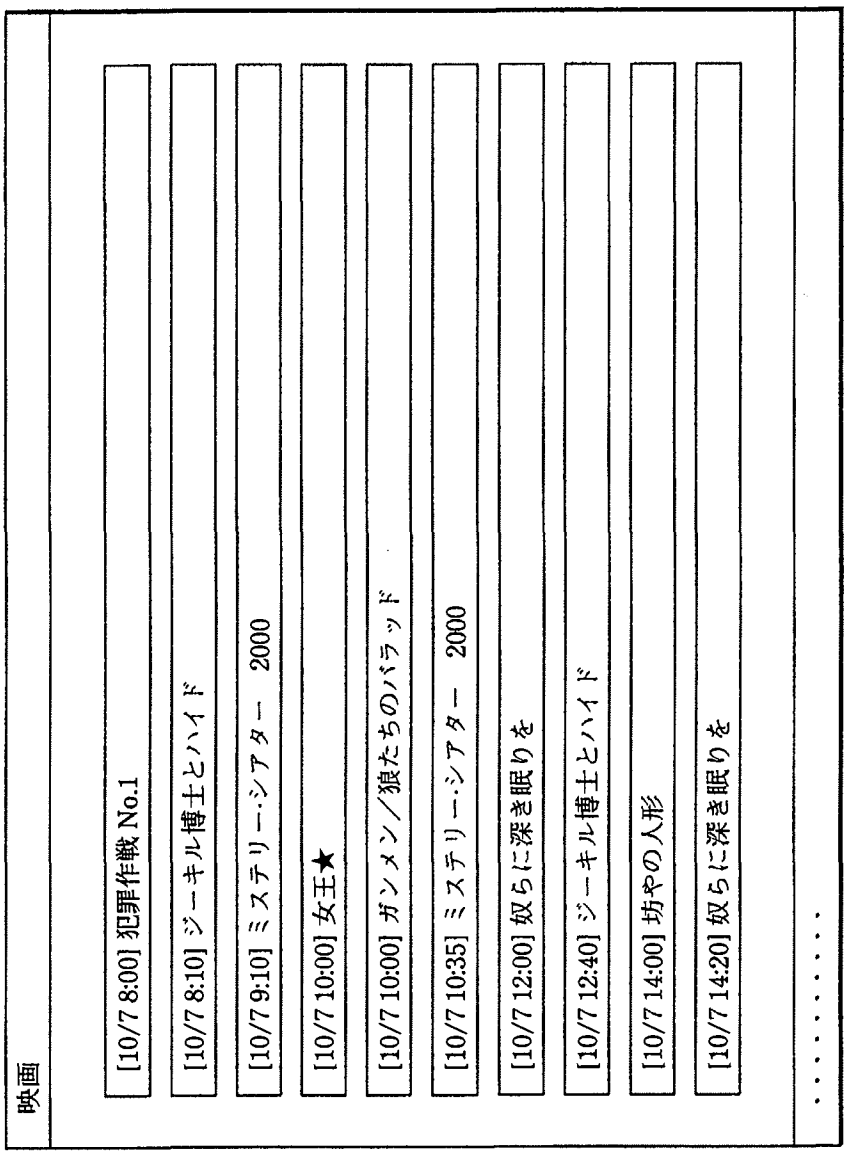


FIG.17

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000181

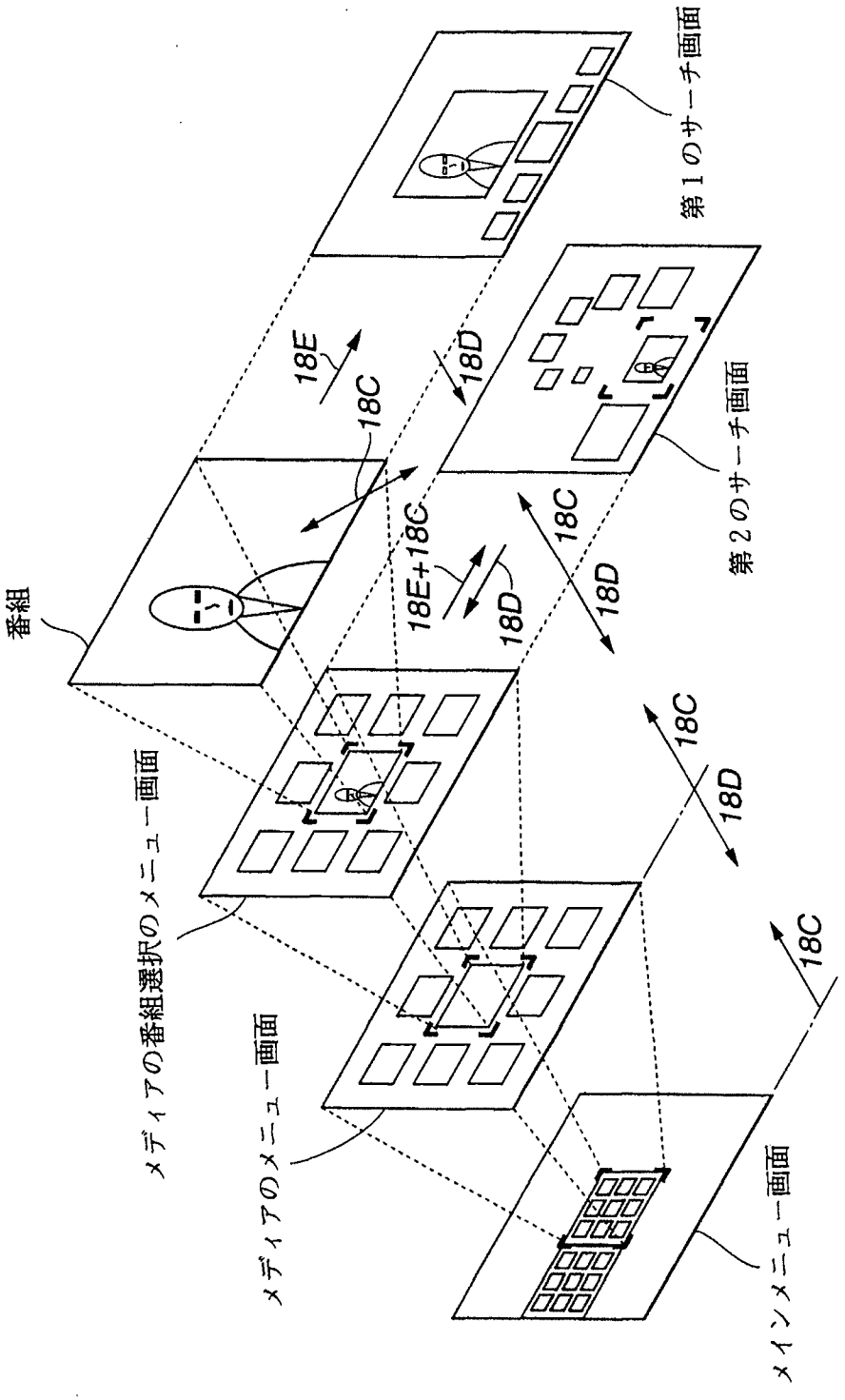

第1のサーチ画面
第2のサーチ画面
番組
メディアの番組選択のメニュー画面
メディアのメニュー画面
メインメニュー画面
18C
18D
18E
18E+18C

FIG.18

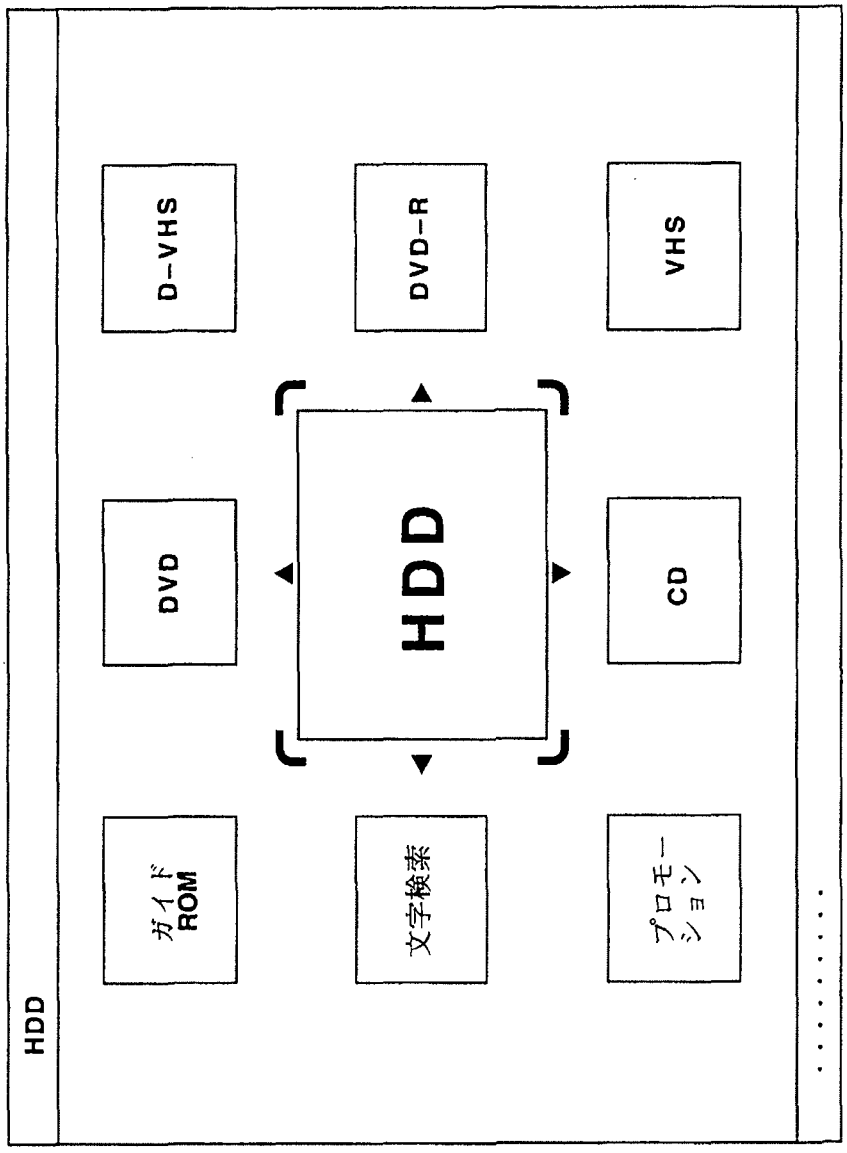


FIG.19

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000183

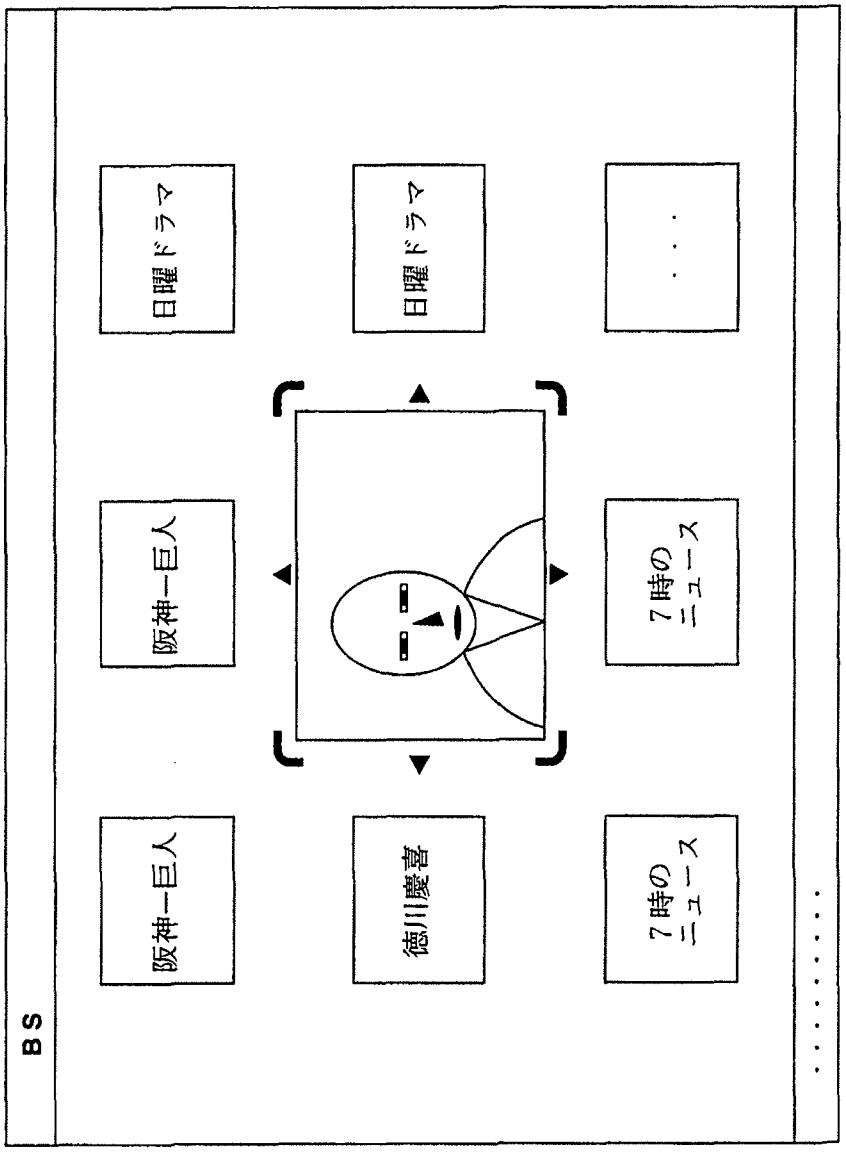


FIG.20

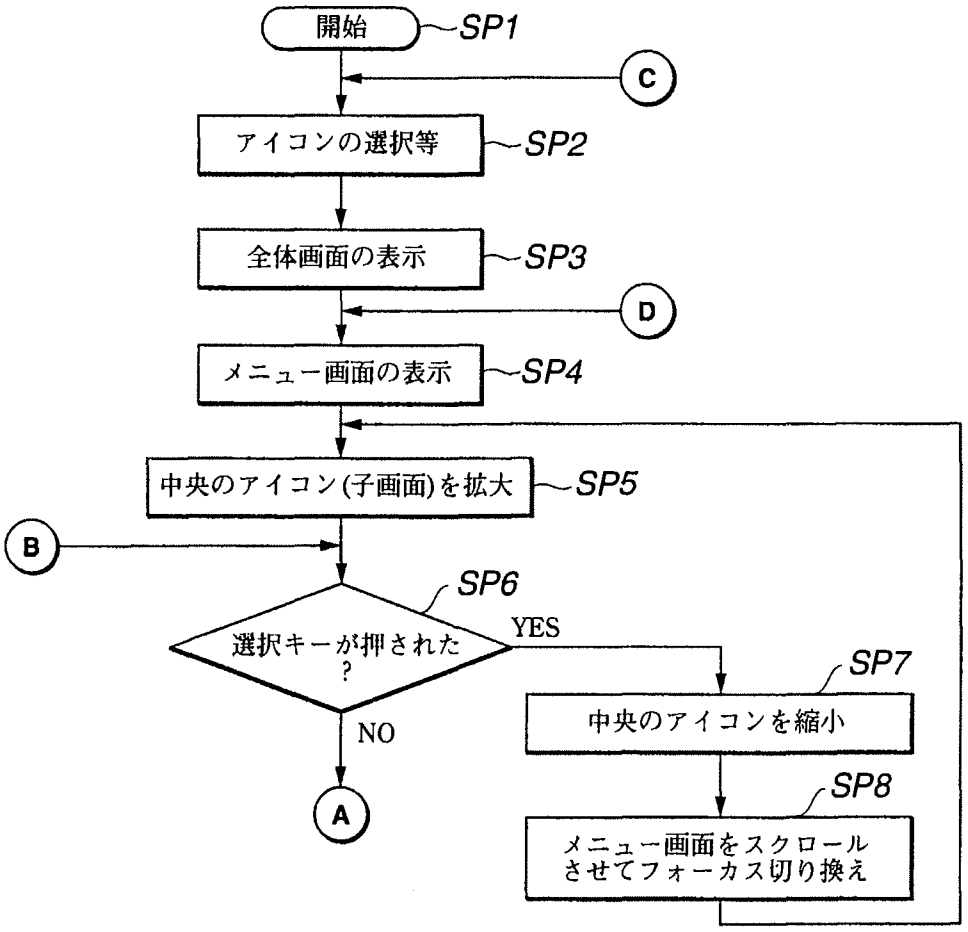


FIG.21

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000185

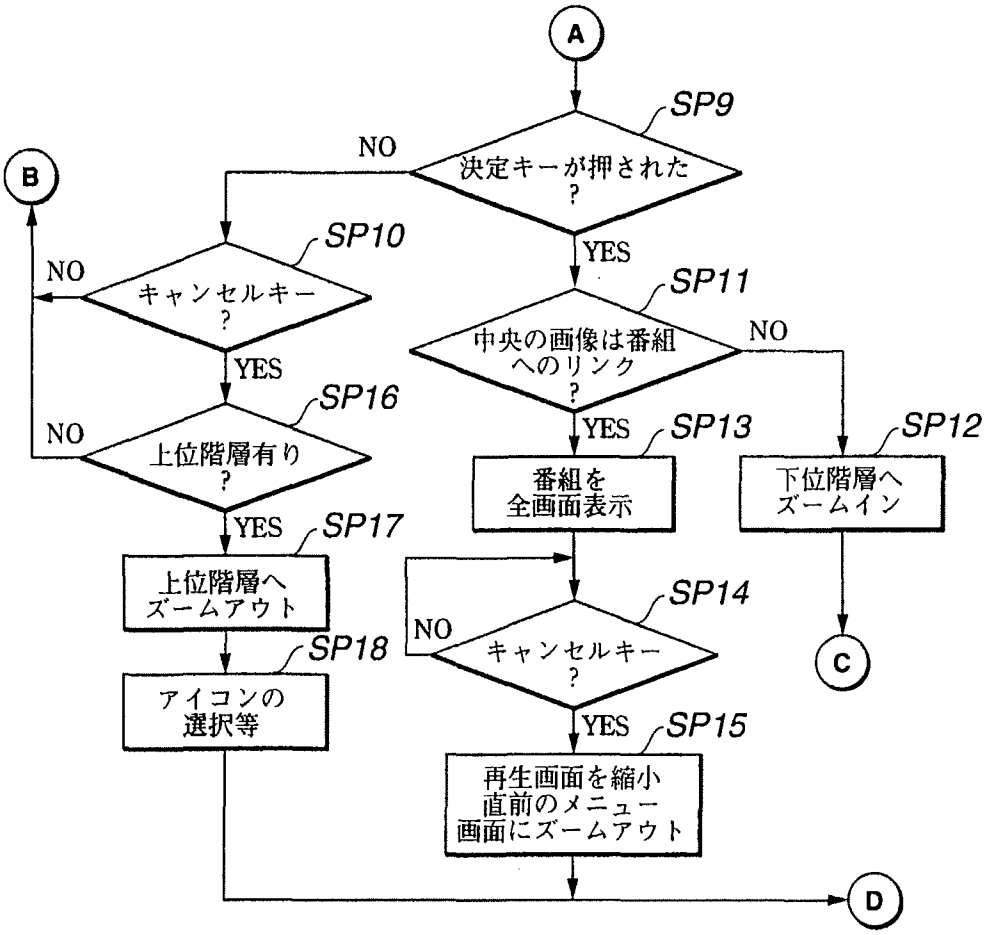


FIG.22

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000186

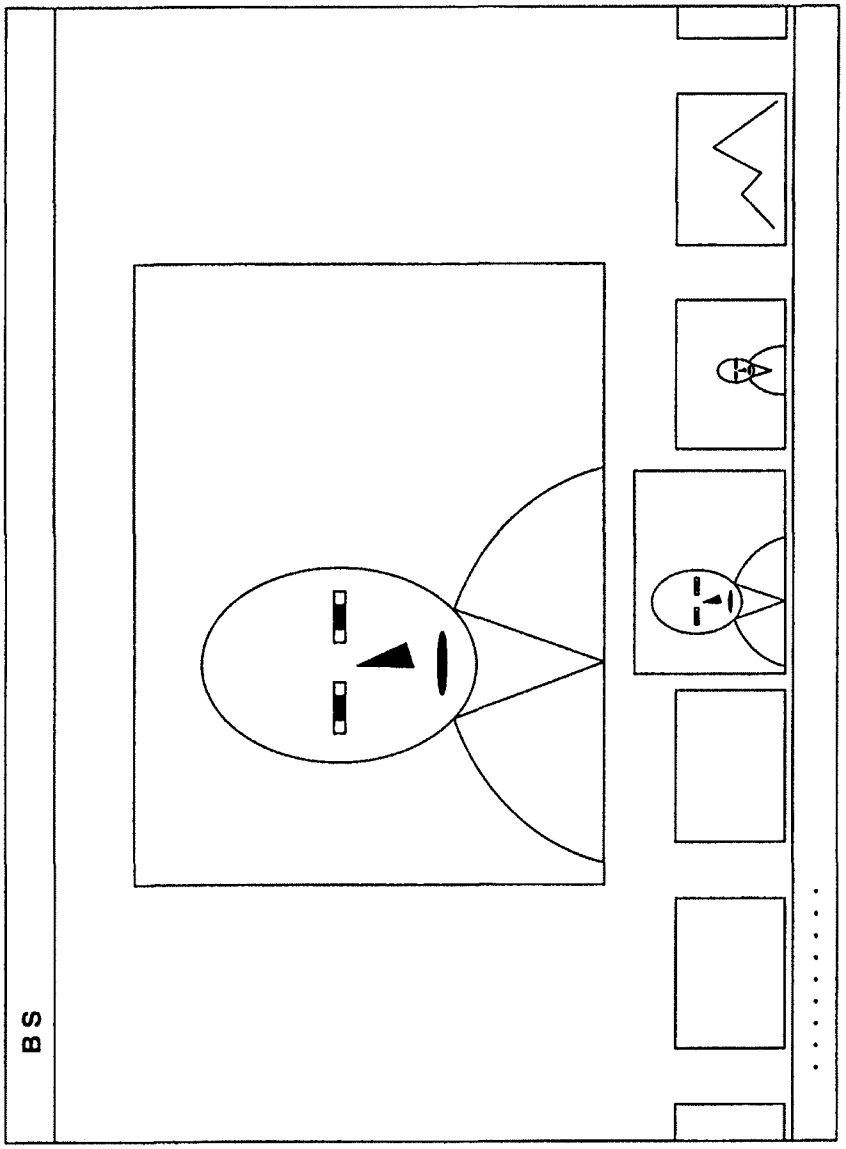


FIG.23

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000187

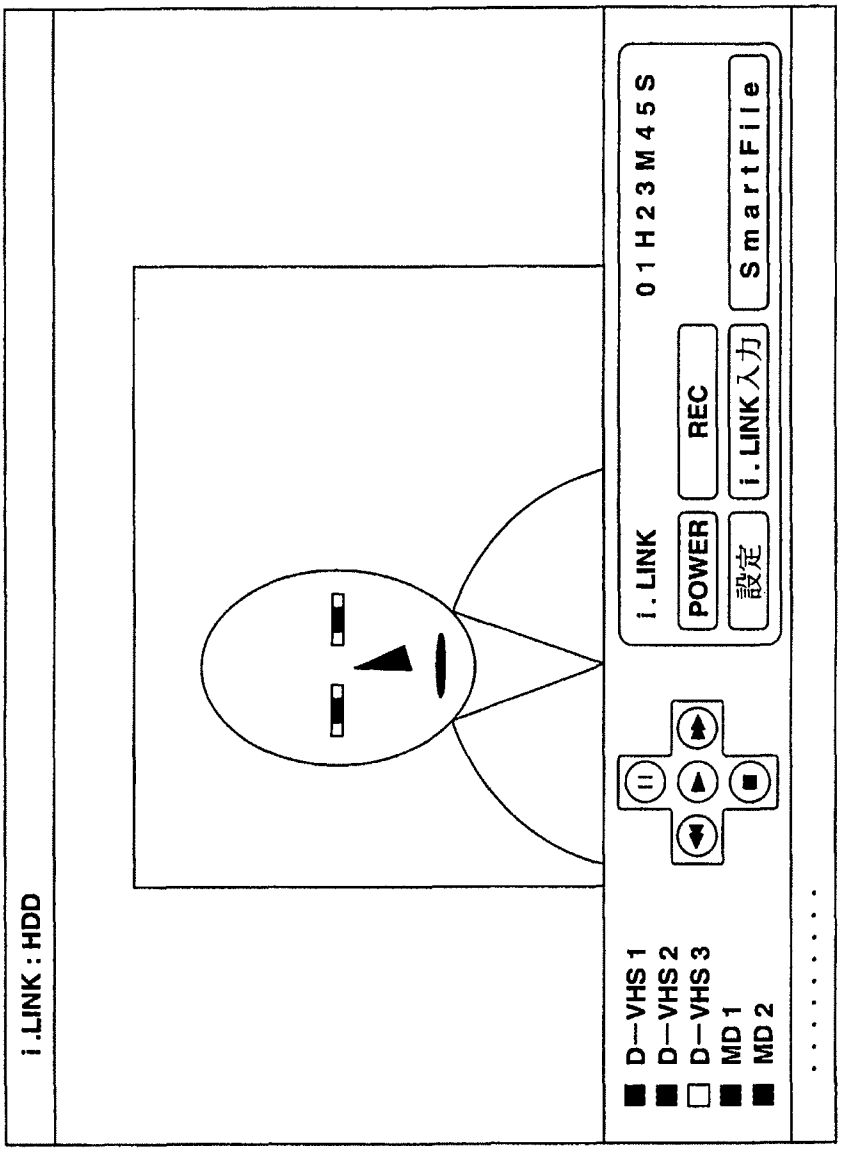


FIG.24

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000188

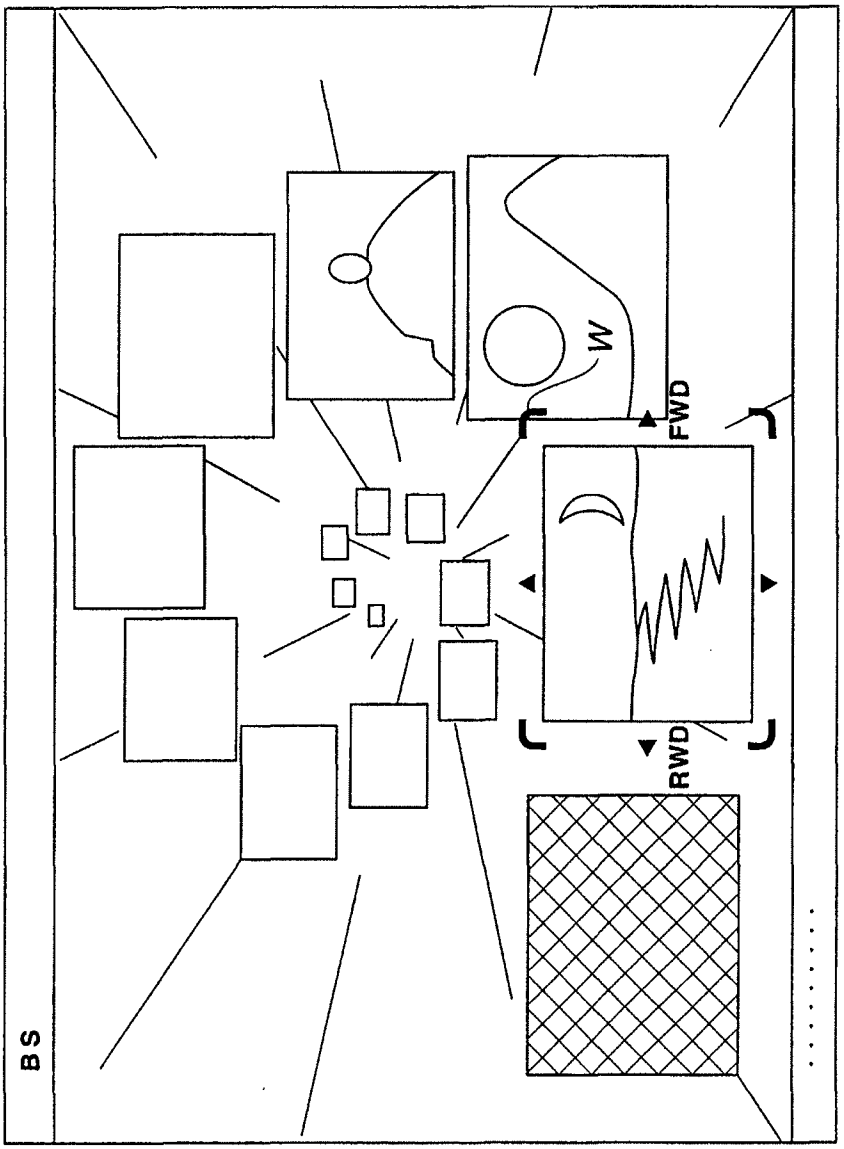


FIG.25

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000189

FIG.26(A)

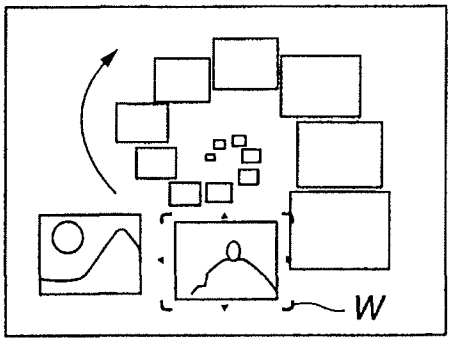


FIG.26(B)

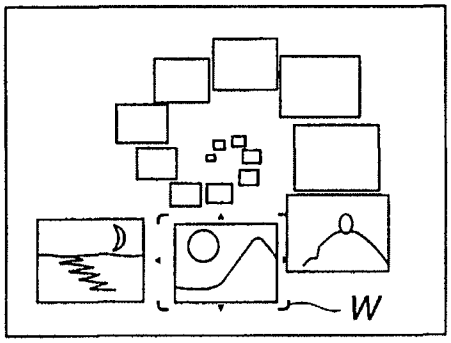
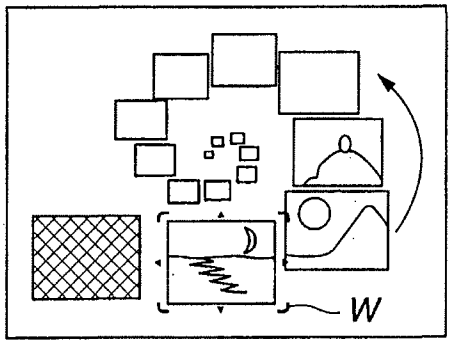


FIG.26(C)



Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000190

FIG.27(A)

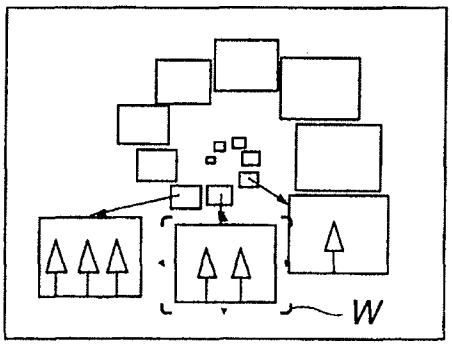


FIG.27(B)

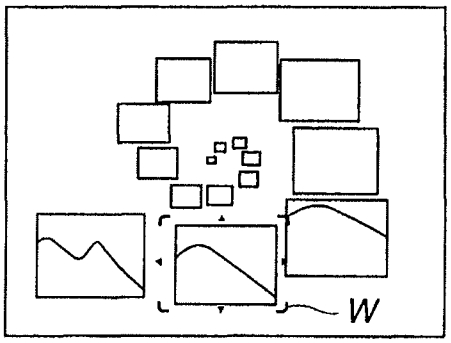
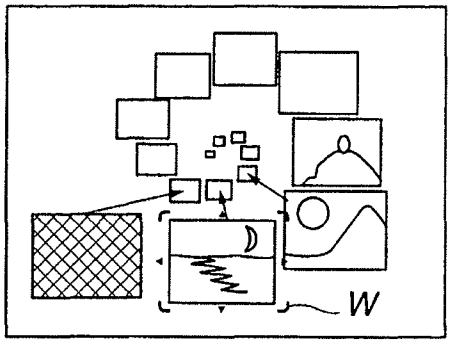


FIG.27(C)



Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000191

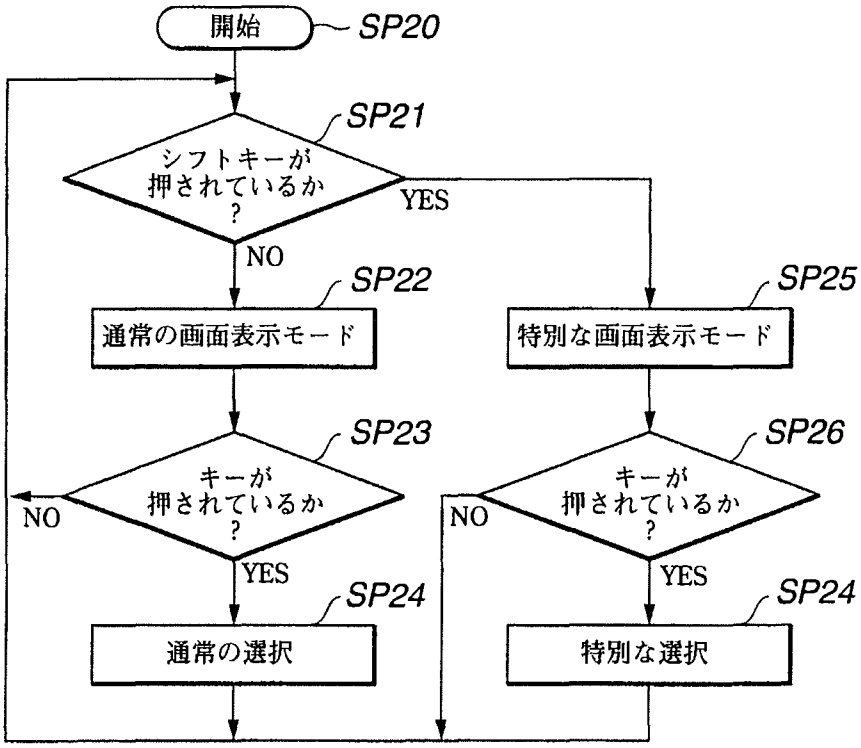


FIG.28

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000192

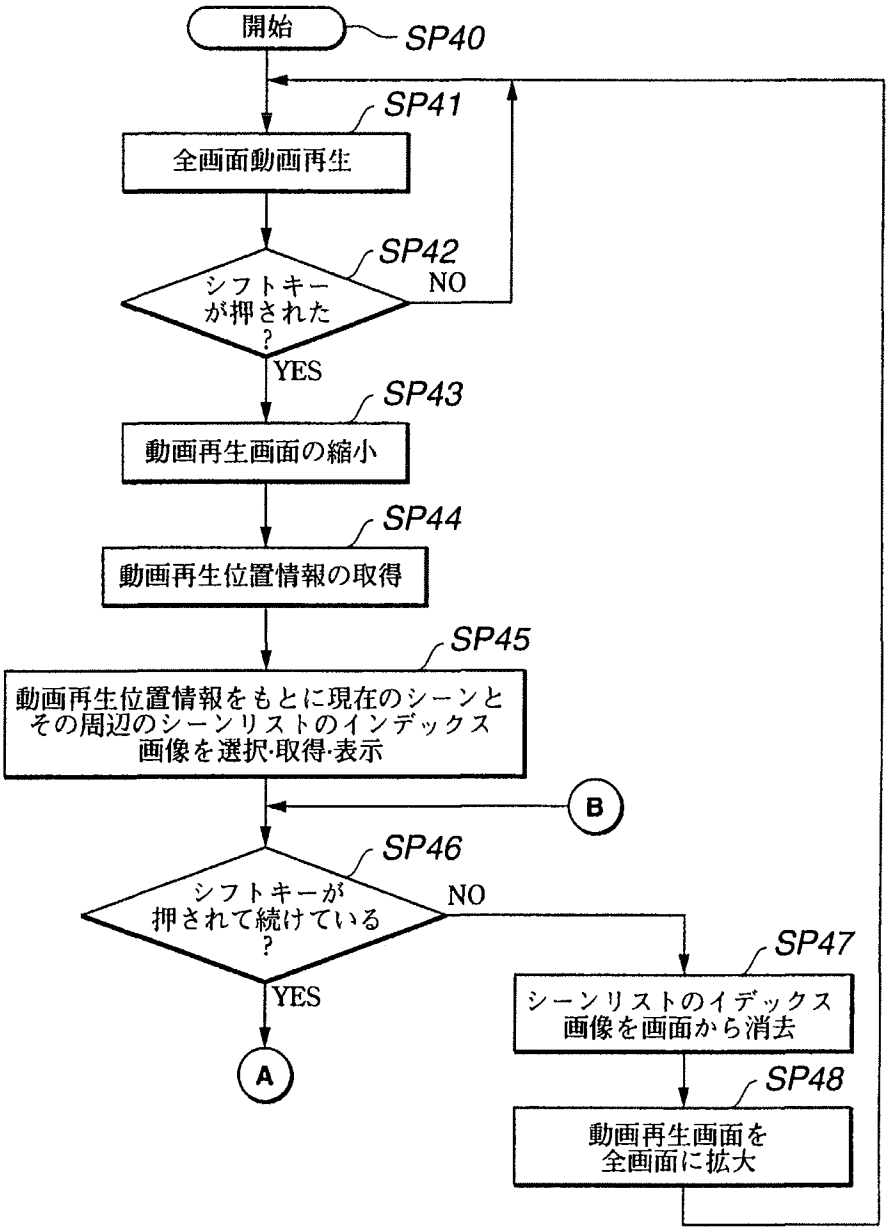


FIG.29

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000193

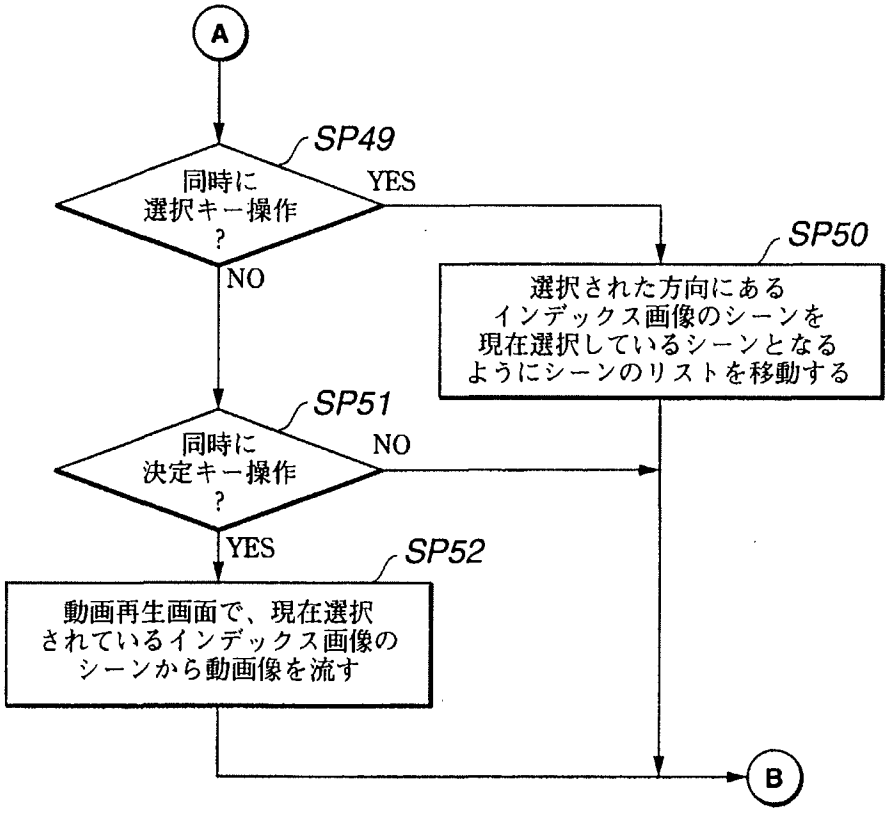


FIG.30

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000194

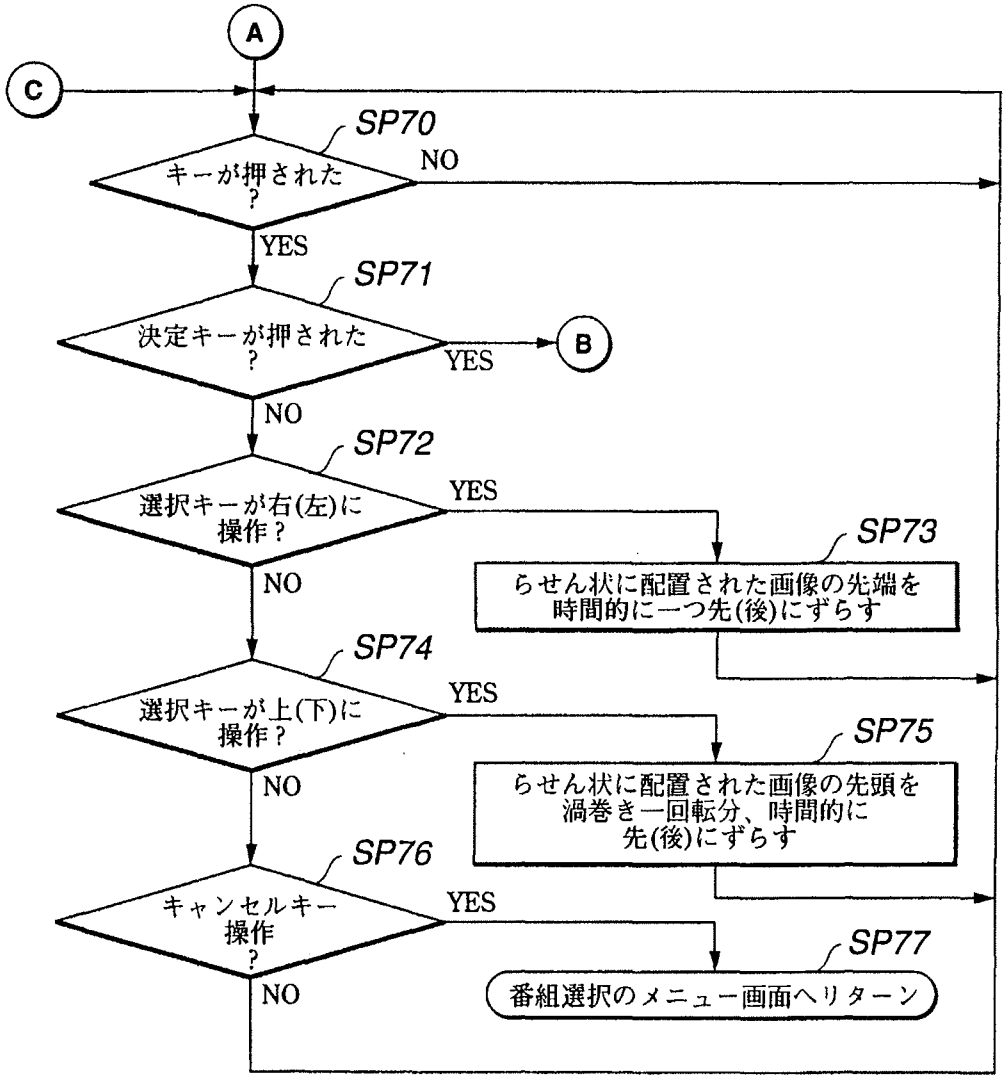


FIG.31

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000195

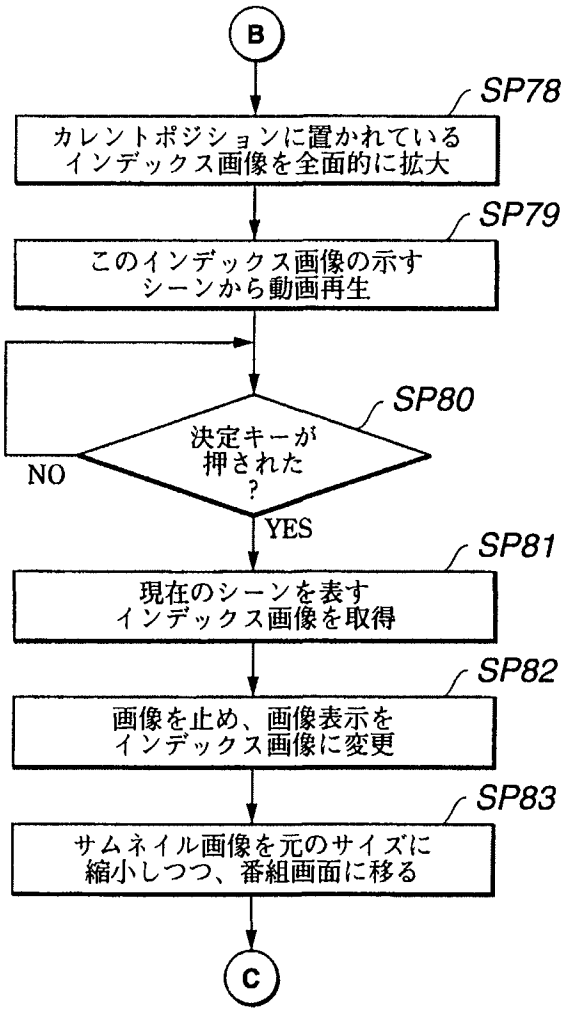


FIG.32

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000196

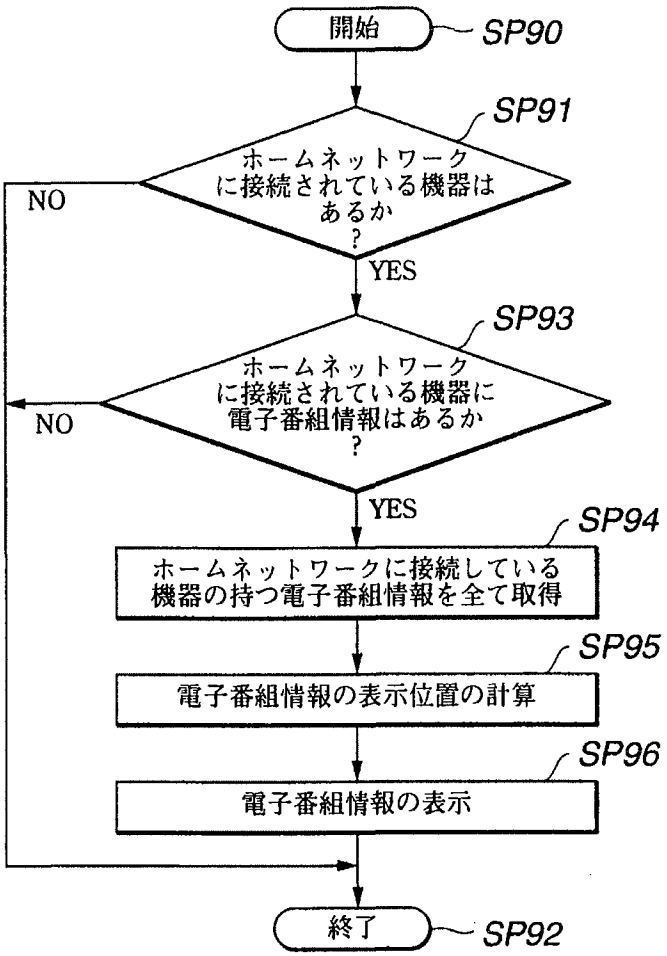


FIG.33

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000197

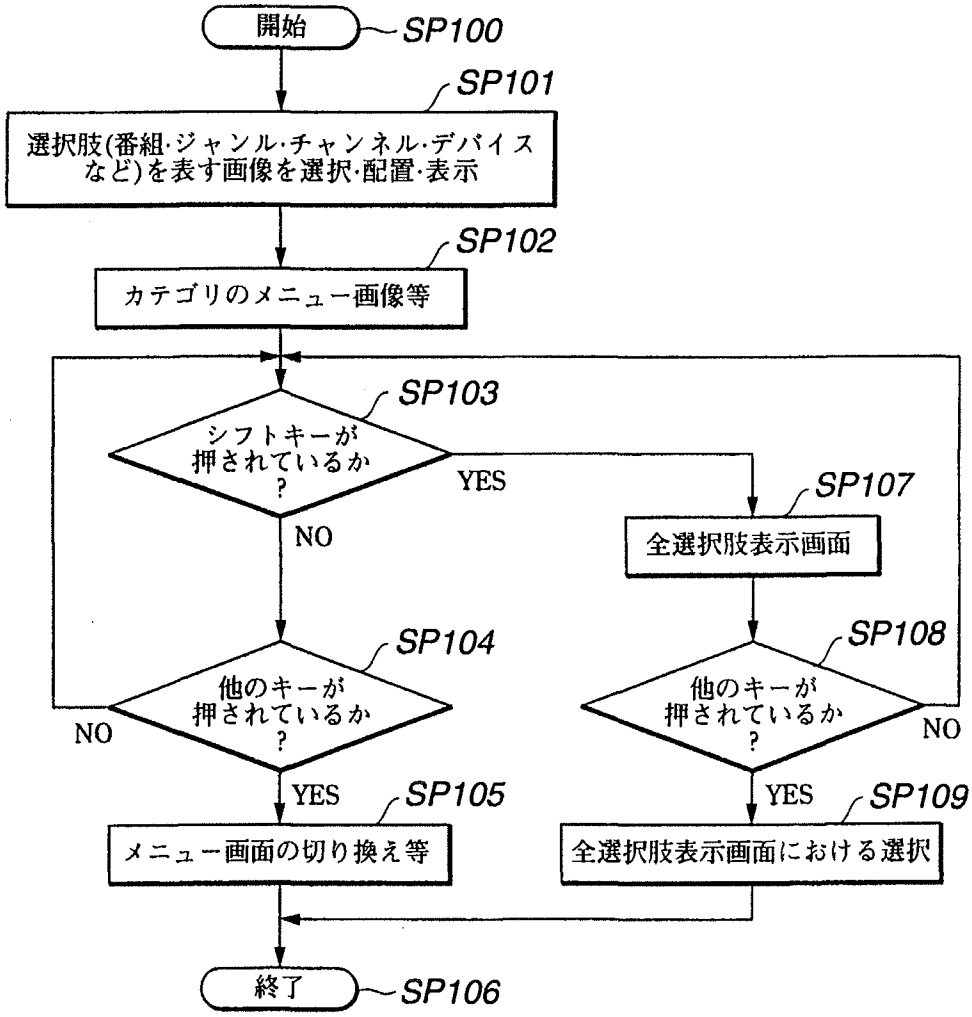


FIG.34

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000198

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP99/06709

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl[7] H04N5/445, H04N7/08, H04Q9/00, 331, G06F3/00, 651

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)
Int.Cl[7] H04N5/38-5/46, H04N7/08, H04Q9/00, 331, G06F3/00, 651

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Toroku Jitsuyo Shinan Koho 1994-1999
Kokai Jitsuyo Shinan Koho 1971-1999 Jitsuyo Shinan Toroku Koho 1996-1999

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	GB, 2322463, A (Sharp Kabushiki Kaisha), 26 August, 1998 (26.08.98), Full text; FIG.1-15 & JP, 10-232757, A Full text; Figs. 1 to 15	1,2,4,5 3,6
Y	EP, 725539, A2 (SONY CORPORATION), 07 August, 1996 (07.08.96), Column 10, line 57 to column 11, line 12 & JP, 8-279966, A Par. No. [0050] & US, 5903314, A	3,6

☐ 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
24 February, 2000 (24.02.00)	07 March, 2000 (07.03.00)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 1992)

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000199

国際調査報告

国際出願番号　ＰＣＴ／ＪＰ９９／０６７０９

A.　発明の属する分野の分類（国際特許分類（ＩＰＣ））

Int Cl' H04N5/445, H04N7/08, H04Q9/00,331, G06F3/00,651

B.　調査を行った分野

調査を行った最小限資料（国際特許分類（ＩＰＣ））

Int Cl' H04N5/38-5/46, H04N7/08, H04Q9/00,331, G06F3/00,651

最小限資料以外の資料で調査を行った分野に含まれるもの

日本国実用新案公報	１９２２－１９９６年
日本国公開実用新案公報	１９７１－１９９９年
日本国登録実用新案公報	１９９４－１９９９年
日本国実用新案登録公報	１９９６－１９９９年

国際調査で使用した電子データベース（データベースの名称、調査に使用した用語）

C.　関連すると認められる文献

引用文献のカテゴリー＊	引用文献名　及び一部の箇所が関連するときは、その関連する箇所の表示	関連する請求の範囲の番号
X Y	GB,2322463,A(Sharp Kabushiki Kaisha)26.8月.1998(26.08.98) 全文、FIG.1-15 & JP,10-232757,A,全文、図1-15	1,2,4,5 3,6
Y	EP,725539,A2(SONY CORPORATION)7.8月.1996(07.08.96) 第10欄第57行目～第11欄第12行目 & JP,8-279966,A,段落番号【0050】 & US,5903314,A	3,6

☐ Ｃ欄の続きにも文献が列挙されている。　☐ パテントファミリーに関する別紙を参照。

＊　引用文献のカテゴリー
「A」特に関連のある文献ではなく、一般的技術水準を示すもの
「E」国際出願日前の出願または特許であるが、国際出願日以後に公表されたもの
「L」優先権主張に疑義を提起する文献又は他の文献の発行日若しくは他の特別な理由を確立するために引用する文献（理由を付す）
「O」口頭による開示、使用、展示等に言及する文献
「P」国際出願日前で、かつ優先権の主張の基礎となる出願の日の後に公表された文献
「T」国際出願日又は優先日後に公表された文献であって出願と矛盾するものではなく、発明の原理又は理論の理解のために引用するもの
「X」特に関連のある文献であって、当該文献のみで発明の新規性又は進歩性がないと考えられるもの
「Y」特に関連のある文献であって、当該文献と他の１以上の文献との、当業者にとって自明である組合せによって進歩性がないと考えられるもの
「&」同一パテントファミリー文献

国際調査を完了した日 24.02.00	国際調査報告の発送日　07.03.00
国際調査機関の名称及びあて先 日本国特許庁（ＩＳＡ／ＪＰ） 郵便番号１００－８９１５ 東京都千代田区霞が関三丁目４番３号	特許庁審査官（権限のある職員） 夏目 健一郎　５Ｐ　４２２７ 電話番号　０３－３５８１－１１０１　内線　３５８１

様式ＰＣＴ／ＩＳＡ／２１０（第２ページ）（１９９８年７月）

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000200

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(11) EP 2 230 623 A1

(12) EUROPEAN PATENT APPLICATION

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G06F 21/20 *(2006.01)*

(21) Application number: **10156753.5**

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AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK SM TR
Designated Extension States:
AL BA ME RS

(30) Priority: **18.03.2009 KR 20090023211**
09.03.2010 KR 20100020866

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(54) Mobile terminal and method of controlling the mobile terminal

(57) A mobile terminal and a method of controlling the mobile terminal are provided. The method includes storing a plurality of pieces of fingerprint information on at least one of a finger-by-finger basis, a user-by-user basis, and a pattern-by-pattern basis; receiving a fingerprint-touch input through a display module capable of performing fingerprint identification; and if fingerprint information of the received fingerprint-touch input matches with one of the plurality of pieces of fingerprint information for locking a predefined operating menu, locking the predefined operating menu. Therefore, it is possible to easily lock or unlock the mobile terminal in response to a fingerprint-touch input. In addition, it is possible to effectively perform various operations performed by the mobile terminal in response to a fingerprint-touch input.

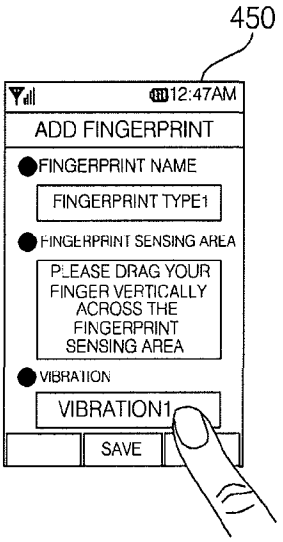


FIG. 15

EP 2 230 623 A1

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000201

Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a mobile terminal and a method of controlling the mobile terminal, and more particularly, to a mobile terminal and a method of controlling the mobile terminal, in which various operations performed by the mobile terminal can be effectively controlled in response to a fingerprint-touch input having fingerprint information.

[0002] Mobile terminals are portable devices, which can provide users with various services such as a voice calling service, a video calling service, an information input/output service, and a data storage service.

[0003] As the types of services provided by mobile terminals diversify, an increasing number of mobile terminals have been equipped with various complicated functions such as capturing photos or moving pictures, playing music files or moving image files, providing game programs, receiving broadcast programs and providing wireless internet services and have thus evolved into multimedia players.

[0004] Various attempts have been made to realize such complicated functions as hardware devices or software programs. For example, various user interface (UI) environments, in which users are allowed to easily search for and choose desired functions, have been developed. In addition, the demand for various designs for mobile terminals such as a double-sided liquid crystal display (LCD) or a full touch screen has steadily grown due to a growing tendency of considering mobile terminals as personal items that can represent personal individuality.

[0005] However, there is a restriction in allocating sufficient space for the installation of a UI such as a display or a keypad without compromising the mobility and the portability of the mobile terminal. Therefore, it is necessary to develop ways to control the operation of a mobile terminal using a new data input method and thus use various complicated functions provided by the mobile terminal with convenience.

SUMMARY OF THE INVENTION

[0006] The present invention provides a mobile terminal and a method of controlling the mobile terminal, in which various operations performed by the mobile terminal can be effectively controlled in response to a fingerprint-touch input having fingerprint information.

[0007] According to an aspect of the present invention, there is provided a method of controlling a mobile terminal, the method including storing a plurality of pieces of fingerprint information on at least one of a finger-by-finger basis, a user-by-user basis, and a pattern-by-pattern basis; receiving a fingerprint-touch input through a display module capable of performing fingerprint identification; and if fingerprint information of the received fingerprint-touch input matches with one of the plurality of pieces of fingerprint information for locking a predefined operating menu, locking the predefined operating menu.

[0008] According to another aspect of the present invention, there is provided a mobile terminal including a display module configured to be capable of performing fingerprint identification; a memory configured to store a plurality of pieces of fingerprint information on at least one of a finger-by-finger basis, a user-by-user basis, and a pattern-by-pattern basis; and a controller configured to receive a fingerprint-touch input through the display module, wherein, if fingerprint information of the received fingerprint-touch input matches with one of the plurality of pieces of fingerprint information for locking a predefined operating menu, the controller locks the predefined operating menu.

[0009] According to another aspect of the present invention, there is provided a method of controlling a mobile terminal, the method including storing a plurality of pieces of fingerprint information on at least one of a finger-by-finger basis, a user-by-user basis, and a pattern-by-pattern basis; displaying an operation screen on a display module capable of performing fingerprint identification; receiving a fingerprint-touch input through the display module; and if fingerprint information of the received fingerprint-touch input matches with one of the plurality of pieces of fingerprint information for controlling the display of a screen, controlling the display of the operation screen in accordance with a control value corresponding to the fingerprint information that matches with the fingerprint information of the received fingerprint-touch input.

[0010] According to another aspect of the present invention, there is provided a mobile terminal including a display module configured to be capable of performing fingerprint identification and display an operation screen; a memory configured to store a plurality of pieces of fingerprint information on at least one of a finger-by-finger basis, a user-by-user basis, and a pattern-by-pattern basis; and a controller configured to receive a fingerprint-touch input through the display module, wherein, if fingerprint information of the received fingerprint-touch input matches with one of the plurality of pieces of fingerprint information for controlling the display of a screen, the controller controls the display of the operation screen in accordance with a control value corresponding to the fingerprint information that matches with the fingerprint information of the received fingerprint-touch input.

[0011] According to another aspect of the present invention, there is provided a method of controlling a mobile terminal, the method including locking a predefined operating mode; receiving a fingerprint-touch input through a display module capable of performing fingerprint identification; and if fingerprint information of the received fingerprint-touch input matches with one of a plurality of pieces of previously-stored fingerprint information for unlocking the predefined operating mode, unlocking the predefined operating mode and entering an operating mode corresponding to the fingerprint information that matches with the fingerprint information of the received

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000202

fingerprint-touch input.

[0012] According to another aspect of the present invention, there is provided a mobile terminal including a display module configured to be capable of performing fingerprint identification; a memory configured to store a plurality of pieces of fingerprint information; and a controller configured to receive a fingerprint-touch input through the display module, wherein, if fingerprint information of the received fingerprint-touch input matches with one of a plurality of pieces of previously-stored fingerprint information for unlocking the predefined operating mode, the controller unlocks the predefined operating mode and enters an operating mode corresponding to the fingerprint information that matches with the fingerprint information of the received fingerprint-touch input.

[0013] According to another aspect of the present invention, there is provided a method of controlling a mobile terminal, the method including storing a plurality of pieces of fingerprint information on at least one of a finger-by-finger basis, a user-by-user basis, and a pattern-by-pattern basis; displaying a first screen showing a number of menu icons on a display module capable of performing fingerprint identification; receiving a fingerprint-touch input through the display module; and if fingerprint information of the received fingerprint-touch input matches with one of the plurality of pieces of fingerprint information, displaying a second screen showing a predefined group of menu icons corresponding to the fingerprint information that matches with the fingerprint information of the received fingerprint-touch input.

[0014] According to another aspect of the present invention, there is provided a mobile terminal including a display module configured to be capable of performing fingerprint identification and display a first screen showing a number of menu icons; a memory configured to store a plurality of pieces of fingerprint information on at least one of a finger-by-finger basis, a user-by-user basis, and a pattern-by-pattern basis; and a controller configured to receive a fingerprint-touch input through the display module, wherein, if fingerprint information of the received fingerprint-touch input matches with one of the plurality of pieces of fingerprint information, the controller displays a second screen showing a predefined group of menu icons corresponding to the fingerprint information that matches with the fingerprint information of the received fingerprint-touch input.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] The above and other features and advantages of the present invention will become more apparent by describing in detail preferred embodiments thereof with reference to the attached drawings in which:

FIG. 1 illustrates a block diagram of a mobile terminal according to an exemplary embodiment of the present invention;

FIG. 2 illustrates a front perspective view of the mobile terminal shown in FIG. 1;

FIG. 3 illustrates a rear perspective view of the mobile terminal shown in FIG. 1;

FIGS. 4 through 8 illustrate the structure of a display module capable of identifying a fingerprint, which can be used in the mobile terminal shown in FIG. 1;

FIGS. 9A and 9B illustrate flowcharts of a method of controlling a mobile terminal according to a first exemplary embodiment of the present invention;

FIG. 10 illustrates a flowchart of a method of controlling a mobile terminal according to a second exemplary embodiment of the present invention;

FIG. 11 illustrates a flowchart of a method of controlling a mobile terminal according to a third exemplary embodiment of the present invention;

FIG. 12 illustrates a flowchart of a method of controlling a mobile terminal according to a fourth exemplary embodiment of the present invention;

FIGS. 13 through 16 illustrate how to register fingerprint information;

FIGS. 17 through 21 illustrate how to lock or unlock a mobile terminal in response to a fingerprint-touch input;

FIGS. 22 through 30 illustrate how to control a screen in response to a fingerprint-touch input;

FIG. 31 illustrates how to unlock a mobile terminal and enter a predetermined operating mode in response to a fingerprint-touch input; and

FIGS. 32 and 33 illustrate how to display menu icons classified into different menu groups in response to a fingerprint-touch input.

DETAILED DESCRIPTION OF THE INVENTION

[0016] The present invention will hereinafter be described in detail with reference to the accompanying drawings in which exemplary embodiments of the invention are shown.

[0017] The term 'mobile terminal', as used herein, may indicate a mobile phone, a smart phone, a laptop computer, a digital broadcast receiver, a personal digital assistant (PDA), a portable multimedia player (PMP), or a navigation device. In this disclosure, the terms 'module' and 'unit' can be used interchangeably.

[0018] FIG. 1 illustrates a block diagram of a mobile terminal 100 according to an embodiment of the present invention. Referring to FIG. 1, the mobile terminal 100 may include a wireless communication unit 110, an audio/video (AN) input unit 120, a user input unit 130, a sensing unit 140, an output unit 150, a memory 160, an interface unit 170, a controller 180, and a power supply unit 190. Two or more of the wireless communication unit 110, the A/V input unit 120, the user input unit 130, the sensing unit 140, the output unit 150, the memory 160, the interface unit 170, the controller 180, and the power supply unit 190 may be incorporated into a single unit, or some of the wireless communication unit 110, the A/V input unit 120, the user input unit 130, the sensing unit

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000203

140, the output unit 150, the memory 160, the interface unit 170, the controller 180, and the power supply unit 190 may be divided into two or more smaller units.

[0019] The wireless communication unit 110 may include a broadcast reception module 111, a mobile communication module 113, a wireless internet module 115, a short-range communication module 117, and a global positioning system (GPS) module 119.

[0020] The broadcast reception module 111 may receive a broadcast signal and/or broadcast-related information from an external broadcast management server through a broadcast channel. The broadcast channel may be a satellite channel or a terrestrial channel. The broadcast management server may be a server which generates broadcast signals and/or broadcast-related information and transmits the generated broadcast signals and/or the generated broadcast-related information or may be a server which receives and then transmits previously-generated broadcast signals and/or previously-generated broadcast-related information.

[0021] The broadcast-related information may include broadcast channel information, broadcast program information and/or broadcast service provider information. The broadcast signal may be a TV broadcast signal, a radio broadcast signal, a data broadcast signal, the combination of a data broadcast signal and a TV broadcast signal or the combination of a data broadcast signal and a radio broadcast signal. The broadcast-related information may be provided to the mobile terminal 100 through a mobile communication network. In this case, the broadcast-related information may be received by the mobile communication module 113, rather than by the broadcast reception module 111. The broadcast-related information may come in various forms. For example, the broadcast-related information may be electronic program guide (EPG) of digital multimedia broadcasting (DMB) or may be electronic service guide (ESG) of digital video broadcast-handheld (DVB-H).

[0022] The broadcast reception module 111 may receive the broadcast signal using various broadcasting systems such as digital multimedia broadcasting-terrestrial (DMB-T), digital multimedia broadcasting-satellite (DMB-S), media forward link only (MediaFLO), DVB-H, and integrated services digital broadcast-terrestrial (ISDB-T). In addition, the broadcast reception module 111 may be configured to be suitable for nearly all types of broadcasting systems other than those set forth herein. The broadcast signal and/or the broadcast-related information received by the broadcast reception module 111 may be stored in the memory 160.

[0023] The mobile communication module 113 may transmit wireless signals to or receives wireless signals from at least one of a base station, an external terminal, and a server through a mobile communication network. The wireless signals may include various types of data according to whether the mobile terminal 100 transmits/receives voice call signals, video call signals, or text/multimedia messages.

[0024] The wireless internet module 115 may be a module for wirelessly accessing the internet. The wireless internet module 115 may be embedded in the mobile terminal 100 or may be installed in an external device. The wireless internet module 115 may be embedded in the mobile terminal 100 or may be installed in an external device. The wireless internet module 115 may use various wireless internet technologies such as wireless local area network (WLAN), Wireless Broadband (WiBro), World Interoperability for Microwave Access (Wimax), and High Speed Downlink Packet Access (HSDPA).

[0025] The short-range communication module 117 may be a module for short-range communication. The short-range communication module 117 may use various short-range communication techniques such as Bluetooth, radio frequency identification (RFID), infrared data association (IrDA), ultra wideband (UWB), and ZigBee.

[0026] The GPS module 119 may receive position information from a plurality of GPS satellites.

[0027] The A/V input unit 120 may be used to receive audio signals or video signals. The A/V input unit 120 may include a camera 121 and a microphone 123. The camera 121 may process various image frames such as still images or moving images captured by an image sensor during a video call mode or an image capturing mode. The image frames processed by the camera 121 may be displayed by a display module 151.

[0028] The image frames processed by the camera 121 may be stored in the memory 160 or may be transmitted to an external device through the wireless communication unit 110. The mobile terminal 100 may include two or more cameras 121.

[0029] The microphone 123 may receive external sound signals during a call mode, a recording mode, or a voice recognition mode with the use of a microphone and may convert the sound signals into electrical sound data. In the call mode, the mobile communication module 113 may convert the electrical sound data into data that can be readily transmitted to a mobile communication base station and then output the data obtained by the conversion. The microphone 123 may use various noise removal algorithms to remove noise that may be generated during the reception of external sound signals.

[0030] The user input unit 130 may generate key input data based on user input for controlling the operation of the mobile terminal 100. The user input unit 130 may be implemented as a keypad, a dome switch, a touch pad (static pressure/static voltage), a jog wheel, or a jog switch. In particular, if the user input unit 130 is implemented as a touch pad and forms a layer structure together with the display module 151, the user input unit 130 and the display module 151 may be collectively referred to as a touch screen.

[0031] The sensing unit 140 determines a current state of the mobile terminal 100 such as whether the mobile terminal 100 is opened up or closed, the position of the mobile terminal 100 and whether the mobile terminal 100 is placed in contact with a user, and generates a sensing

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000204

signal for controlling the operation of the mobile terminal 100. For example, when the mobile terminal 100 is a slider-type mobile phone, the sensing unit 140 may determine whether the mobile terminal 100 is opened up or closed. In addition, the sensing unit 140 may determine whether the mobile terminal 100 is powered by the power supply unit 190 and whether the interface unit 170 is connected to an external device.

[0032] The sensing unit 140 may include a proximity sensor 141, a pressure sensor 143 and a motion sensor 145. The proximity sensor 141 may determine whether there is an object nearby and approaching the mobile terminal 100 without any mechanical contact with the entity. More specifically, the proximity sensor 141 may detect an object that is nearby and approaching by detecting a change in an alternating magnetic field or the rate of change of static capacitance. The sensing unit 140 may include two or more proximity sensors 141.

[0033] The pressure sensor 143 may determine whether pressure is being applied to the mobile terminal 100 or may measure the level of pressure, if any, applied to the mobile terminal 100. The pressure sensor 143 may be installed in a certain part of the mobile terminal 100 where the detection of pressure is necessary. For example, the pressure sensor 143 may be installed in the display module 151. In this case, it is possible to differentiate a typical touch input from a pressure touch input, which is generated using a higher pressure level than that used to generate a typical touch input, based on data provided by the pressure sensor 143. In addition, when a pressure touch input is received through the display module 151, it is possible to determine the level of pressure applied to the display module 151 upon the detection of a pressure touch input based on data provided by the pressure sensor 143.

[0034] The motion sensor 145 may determine the location and motion of the mobile terminal 100 using an acceleration sensor or a gyro sensor.

[0035] In the meantime, acceleration sensors are a type of device for converting a vibration in acceleration into an electric signal. With recent developments in micro-electromechanical system (MEMS) technology, acceleration sensors have been widely used in various products for various purposes ranging from detecting large motions such as car collisions as performed in airbag systems for automobiles to detecting minute motions such as the motion of the hand as performed in gaming input devices. In general, one or more acceleration sensors representing two or three axial directions are incorporated into a single package. There are some cases when the detection of only one axial direction, for example, a Z-axis direction, is necessary. Thus, when an X- or Y-axis acceleration sensor, instead of a Z-axis acceleration sensor, is required, the X- or Y-axis acceleration sensor may be mounted on an additional substrate, and the additional substrate may be mounted on a main substrate.

[0036] Gyro sensors are sensors for measuring angular velocity, and may determine the relative direction of the rotation of the mobile terminal 100 to a reference direction.

[0037] The output unit 150 may output audio signals, video signals and alarm signals. The output unit 150 may include the display module 151, an audio output module 153, an alarm module 155, and a haptic module 157.

[0038] The display module 151 may display various information processed by the mobile terminal 100. For example, if the mobile terminal 100 is in a call mode, the display module 151 may display a user interface (UI) or a graphic user interface (GUI) for making or receiving a call. If the mobile terminal 100 is in a video call mode or an image capturing mode, the display module 151 may display a UI or a GUI for capturing or receiving images.

[0039] If the display module 151 and the user input unit 130 form a layer structure together and are thus implemented as a touch screen, the display module 151 may be used as both an output device and an input device. If the display module 151 is implemented as a touch screen, the display module 151 may also include a touch screen panel and a touch screen panel controller. The touch screen panel is a transparent panel attached onto the exterior of the mobile terminal 100 and may be connected to an internal bus of the mobile terminal 100. The touch screen panel keeps monitoring whether the touch screen panel is being touched by the user. Once a touch input to the touch screen panel is received, the touch screen panel transmits a number of signals corresponding to the touch input to the touch screen panel controller. The touch screen panel controller processes the signals transmitted by the touch screen panel, and transmits the processed signals to the controller 180. Then, the controller 180 determines whether a touch input has been generated and which part of the touch screen panel has been touched based on the processed signals transmitted by the touch screen panel controller.

[0040] The display module 151 may include electronic paper (e-paper). E-paper is a type of reflective display technology and can provide as high resolution as ordinary ink on paper, wide viewing angles, and excellent visual properties. E-paper can be implemented on various types of substrates such as a plastic, metallic or paper substrate and can display and maintain an image thereon even after power is cut off. In addition, e-paper can reduce the power consumption of the mobile terminal 100 because it does not require a backlight assembly. The display module 151 may be implemented as e-paper by using electrostatic-charged hemispherical twist balls, using electrophoretic deposition, or using microcapsules.

[0041] The display module 151 may include at least one of a liquid crystal display (LCD), a thin film transistor (TFT)-LCD, an organic light-emitting diode (OLED), a flexible display, and a three-dimensional (3D) display. The mobile terminal 100 may include two or more display modules 151. For example, the mobile terminal 100 may include an external display module (not shown) and an internal display module (not shown).

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000205

[0042] The audio output module 153 may output audio data received by the wireless communication unit 110 during a call reception mode, a call mode, a recording mode, a voice recognition mode, or a broadcast reception mode or may output audio data present in the memory 160. In addition, the audio output module 153 may output various sound signals associated with the functions of the mobile terminal 100 such as receiving a call or a message. The audio output module 153 may include a speaker and a buzzer.

[0043] The alarm module 155 may output an alarm signal indicating the occurrence of an event in the mobile terminal 100. Examples of the event include receiving a call signal, receiving a message, and receiving a key signal. Examples of the alarm signal output by the alarm module 155 include an audio signal, a video signal and a vibration signal. More specifically, the alarm module 155 may output an alarm signal upon receiving a call signal or a message. In addition, the alarm module 155 may receive a key signal and may output an alarm signal as feedback to the key signal. Therefore, the user may be able to easily recognize the occurrence of an event based on an alarm signal output by the alarm module 155. An alarm signal for notifying the user of the occurrence of an event may be output not only by the alarm module 155 but also by the display module 151 or the audio output module 153.

[0044] The haptic module 157 may provide various haptic effects (such as vibration) that can be perceived by the user. If the haptic module 157 generates vibration as a haptic effect, the intensity and the pattern of vibration generated by the haptic module 157 may be altered in various manners. The haptic module 157 may synthesize different vibration effects and may output the result of the synthesization. Alternatively, the haptic module 157 may sequentially output different vibration effects.

[0045] The haptic module 157 may provide various haptic effects, other than vibration, such as a haptic effect obtained using a pin array that moves perpendicularly to a contact skin surface, a haptic effect obtained by injecting or sucking in air through an injection hole or a suction hole, a haptic effect obtained by giving a stimulus to the surface of the skin, a haptic effect obtained through contact with an electrode, a haptic effect obtained using an electrostatic force, and a haptic effect obtained by realizing the sense of heat or cold using a device capable of absorbing heat or generating heat. The haptic module 157 may be configured to enable the user to recognize a haptic effect using the kinesthetic sense of the fingers or the arms. The mobile terminal 100 may include two or more haptic modules 157.

[0046] The memory 160 may store various programs necessary for the operation of the controller 180. In addition, the memory 160 may temporarily store various data such as a phonebook, messages, still images, or moving images.

[0047] The memory 160 may include at least one of a flash memory type storage medium, a hard disk type storage medium, a multimedia card micro type storage medium, a card type memory (e.g., a secure digital (SD) or extreme digital (XD) memory), a random access memory (RAM), and a read-only memory (ROM). The mobile terminal 100 may operate a web storage, which performs the functions of the memory 160 on the internet.

[0048] The interface unit 170 may interface with an external device that can be connected to the mobile terminal 100. The interface unit 170 may be a wired/wireless headset, an external battery charger, a wired/wireless data port, a card socket for, for example, a memory card, a subscriber identification module (SIM) card or a user identity module (UIM) card, an audio input/output (I/O) terminal, a video I/O terminal, or an earphone. The interface unit 170 may receive data from an external device or may be powered by an external device. The interface unit 170 may transmit data provided by an external device to other components in the mobile terminal 100 or may transmit data provided by other components in the mobile terminal 100 to an external device.

[0049] When the mobile terminal 100 is connected to an external cradle, the interface unit 170 may provide a path for supplying power from the external cradle to the mobile terminal 100 or for transmitting various signals from the external cradle to the mobile terminal 100.

[0050] The controller 180 may control the general operation of the mobile terminal 100. For example, the controller 180 may perform various control operations regarding making/receiving a voice call, transmitting/receiving data, or making/receiving a video call. The controller 180 may include a multimedia player module 181, which plays multimedia data. The multimedia player module 181 may be implemented as a hardware device and may be installed in the controller 180. Alternatively, the multimedia player module 181 may be implemented as a software program.

[0051] The power supply unit 190 may be supplied with power by an external power source or an internal power source and may supply power to the other components in the mobile terminal 100.

[0052] The mobile terminal 100 may include a wired/wireless communication system or a satellite communication system and may thus be able to operate in a communication system capable of transmitting data in units of frames or packets.

[0053] The exterior of the mobile terminal 100 will hereinafter be described in detail with reference to FIGS. 2 and 3. For convenience, assume that the mobile terminal 100 is a slider-type mobile terminal equipped with a touch screen. However, the present invention is not restricted to a slider-type mobile terminal. Rather, the present invention can be applied to various mobile phones, other than a slider-type mobile terminal.

[0054] FIG. 2 illustrates a front perspective view of the mobile terminal 100 shown in FIG. 1. Referring to FIG. 2, the mobile terminal 100 may include a first body 100A and a second body 100B which can slide up or down against the first body 100A.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000206

[0055] When the first body 100A and the second body 100B completely overlap each other, the mobile terminal 100 is referred to as being closed. On the other hand, when the first body 100A is slid up against the second body 100B and thus the front of the second body 100B is partially exposed, as shown in FIG. 2, the mobile terminal 100 is referred to as being open.

[0056] When the mobile terminal 100 is closed, the mobile terminal may generally operate in a standby mode and may be released from the standby mode in response to user manipulation. On the other hand, when the mobile terminal 100 is open, the mobile terminal 100 may generally operate in a call mode and may be switched to the standby mode either manually in response to user manipulation or automatically after the lapse of a predefined amount of time.

[0057] Referring to FIG. 2, the exterior of the first body 100A may be defined by a first front case 100A-1 and a first rear case 100A-2. Various electronic devices may be installed in the space formed by the first front case 100A-1 and the first rear case 100A-2. At least one intermediate case may be additionally provided between the first front case 100A-1 and the first rear case 100A-2. The first front case 100A-1 and the first rear case 100A-2 may be formed of a synthetic resin through injection molding. Alternatively, the first front case 100A-1 and the first rear case 100A-2 may be formed of a metal such as stainless steel (STS) or titanium (Ti).

[0058] The display module 151, a first audio output module 153a, a first camera 121a and a first user input unit 130a may be disposed in the front case 100A-1.

[0059] Examples of the display module 151 include an LCD and an OLED which can visualize information. Since a touch pad is configured to overlap the display module 151 and thus to form a layer structure, the display module 151 may serve as a touch screen. Thus, it is possible for the user to input various information to the mobile terminal 100 simply by touching the display module 151.

[0060] The exterior of the second body 100B may be defined by a second front case 100B-1 and a second rear case 100B-2. A second user input unit 130b may be disposed in the second body 100B, and particularly, at the front of the second front case 100B-1. Third and fourth user input units 130c and 130d, the microphone 123 and the interface unit 170 may be provided in the second front case 100B-1 or the second rear case 100B-2.

[0061] The first through fourth user input units 130a through 130d and fifth and sixth user input units 130e and 130f may be collectively referred to as the user input unit 130. The user input unit 130 may adopt various manipulation methods as long as it can offer tactile feedback to the user.

[0062] The first user input unit 130a may allow the user to input various commands such as 'start', 'end', and 'scroll' to the mobile terminal 100, the second user input unit 130b may be used to input various numerals, characters or symbols, and the third and fourth user input units 130c and 130d may be used as hot keys for activating certain functions of the mobile terminal 100.

[0063] The microphone 123 may be configured to properly receive the user's voice or other sounds.

[0064] FIG. 3 illustrates a rear perspective view of the mobile terminal 100 shown in FIG. 2. Referring to FIG. 3, the fifth user input unit 130e, which is of a wheel type, and the second camera 121 b may be disposed at the rear of the second rear case 100B-2 of the second body 100B, and a sixth user input unit 130f may be disposed on one side of the second body 100B.

[0065] The second camera 121b may have a different photographing direction from that of the first camera 121 a shown in FIG. 2. In addition, the first and second cameras 121 a and 121b may have different resolutions. For example, the first camera 121 a may be used to capture and then transmit an image of the face of the user during a video call. Thus, a low-resolution camera may be used as the first camera 121 a. The second camera 121b may be used to capture an image of an ordinary subject. In this case, the image captured by the second camera 121b may not need to be transmitted. Thus, a high-resolution camera may be used as the second camera 121 b.

[0066] A cameral flash 125 and a mirror 126 may be disposed near the second camera 121 b. The cameral flash 125 may be used to illuminate a subject when the user attempts to capture an image of the subject with the second camera 121 b. The mirror 126 may be used for the user to prepare him- or herself for taking a self shot.

[0067] A second audio output module (not shown) may be additionally provided in the second rear case 100B-2. The second audio output module may realize a stereo function along with the first audio output module 153a. The second audio output module may also be used in a speaker-phone mode.

[0068] An antenna (not shown) for receiving a broadcast signal may be disposed on one side of the second rear case 100B-2. The antenna may be installed so as to be able to be pulled out of the second rear case 100B-2.

[0069] A slide module 100C may be partially exposed on the first rear case 100A-2 of the first body 100A. The slide module 100C may couple the first body 100A and the second body 100B such that the first body 100A and the second body 100B can slide up and down against each other. A portion of the slide module 100C may be hidden from view by the second front case 100B-1 of the second body 100B, and thus may not be exposed.

[0070] The second camera 121b and the other elements that have been described as being provided on the rear case 100A-2 may be provided on the front case 100A-1. In addition, the first camera 121 a may be configured to be rotatable and thus to cover the photographing direction of the second camera 121 b. In this case, the second camera 121 b may be optional.

[0071] The power supply unit 190 may be disposed in the rear case 100A-2. The power supply unit may be a rechargeable battery and may be coupled to the rear case 100A-2 so as to be attachable to or detachable from the rear case 100A-2.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000207

[0072] FIGS. 4 through 8 illustrate the structure of the display module 151, which is capable of identifying a fingerprint. A touch input made by placing a pointer such as a pen in contact with the surface of the display module 151 will hereinafter be referred to as an ordinary touch input, and a touch input made by placing the user's finger in contact with the surface of the display module 151 so as to provide fingerprint information will hereinafter be referred to as a fingerprint-touch input.

[0073] In order to generate a fingerprint-touch input, the display module 151 may need to be configured to be able to identify a fingerprint. For this, the display module 151 may include an LCD module with a photo sensor embedded therein or an LCD module covered with a scan film with a photo sensor.

[0074] Referring to FIGS. 4(a) and 4(b), the display module 151 may include an LCD module having a photo sensor embedded therein. A touch sensor may be disposed on the top or bottom of a window. More specifically, the display module 151 may include a stack of a base layer, an LCD module, a photo sensor, a window, and a touch sensor, as shown in FIG. 4(a), or may include a stack of the base layer, the LCD module, the photo sensor, the touch sensor and the window, as shown in FIG. 4(b).

[0075] The display module 151 may also be configured, without using the touch sensor, to be able to identify a fingerprint by using a scan structure of the photo sensor. In this case, the display module 151 may include a stack of the base layer, the LCD module, the photo sensor and the window.

[0076] Alternatively, referring to FIGS. 5(a) through 6(c), the display module 151 may include an LCD module covered with a scan film having a photo sensor. More specifically, the display module 151 may include a stack of a base layer, an LCD module, a window and a transparent scan film, as shown in FIG. 5(a), or may include a stack of the base layer, the LCD module, the transparent scan film and the window, as shown in FIG. 5(b).

[0077] Referring to FIGS. 6(a) through 6(c), the display module 151 may include both a scan film and a touch sensor. More specifically, the display module 151 may include a stack of a base layer, an LCD module, a window, the touch sensor and the scan film, as shown in FIG. 6(a), may include a stack of the base layer, the LCD module, the window, the scan film and the touch sensor, as shown in FIG. 6(b), or may include a stack of the base layer, the LCD module, the scan film, the window, and the touch sensor, as shown in FIG. 6(c).

[0078] The touch sensor may be disposed at the top or bottom of the window. Thus, the display module 151 may have a structure in which the base layer, the LCD module, the touch sensor, the window and the scan film are sequentially deposited, a structure in which the base layer, the LCD module, the touch sensor, the photo sensor and the window are sequentially deposited, or a structure in which the base layer, the LCD module, the photo sensor, the touch sensor and the window are sequentially deposited.

[0079] Referring to FIG. 7, a scan film may include a transparent film, which is formed of a transparent material such as glass, and a plurality of photodiodes PD and a plurality of transistors TR, which are mounted on the transparent film and are disposed at the intersections of a plurality of rows Ro through R_n and a plurality of columns Co through C_n on the transparent film. Thus, the scan film may be able to scan any object placed thereon by using an electric signal whose level varies according to the amount of light applied to the photodiodes.

[0080] It is possible to perform a black-and-white scan operation including fingerprint identification by using a basic scan function of the scan film. In addition, it is possible to perform a color scan operation. In addition, it is possible to perform a color scan operation by combining light reflected from each pixel of the LCD module at the rear of the display module 151. In this case, the amount of red, green or blue light reflected from each pixel of the LCD module may be calculated using tables shown in FIG. 8, and red, green and blue light may be combined based on the results of the calculation. However, the present invention is not restricted to this. That is, various matrices or functions, other than the tables shown in FIG. 8, may be used to combine red, green and blue light.

[0081] Since the display module 151 can calculate coordinates based on a variation in the amount of light by using a photo sensor, the display module 151 not only can perform a scan operation but also can serve as an input device capable of receiving various types of touch inputs such as a single-or a multi-touch input.

[0082] As described above, the display module 151 may be able not only to perform a scan operation but also to receive various types of touch inputs by using a scan structure of a photo sensor without a requirement of a touch sensor. When no touch sensor is used in the display module 151, the manufacturing cost of the display module 151 can be reduced. On the other hand, when a touch sensor is used in the display module 151, the recognition of a touch input can be stabilized. The display module 151 has been described above as identifying a fingerprint using a photo sensor, but the present invention is not restricted to this. That is, the display module 151 may identify a fingerprint using various methods other than using a photo sensor.

[0083] FIGS. 9A and 9B illustrate flowcharts of a method of controlling a mobile terminal according to a first exemplary embodiment of the present invention. Referring to FIG. 9A, a plurality of pieces of fingerprint information may be stored in the memory 160 on a finger-by-finger basis, on a user-by-user basis and/or on a pattern-by-pattern basis (S200). More specifically, the plurality of pieces of fingerprint information may include fingerprints acquired from different fingers of an individual or fingerprints acquired from different individuals. Alternatively, the plurality of pieces of fingerprint information may include fingerprints having different patterns in consideration that fingerprints acquired even from the same finger

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000208

can often appear different due to variations in the degree to which, and the pressure with which the finger is brought into contact with the display module 151.

[0084] The plurality of pieces of fingerprint information may be stored along with the descriptions of operating menus or operations that can be performed in association with the plurality of pieces of fingerprint information such as locking or unlocking the mobile terminal 100.

[0085] Thereafter, the controller 180 may determine whether there is a fingerprint-touch input received through the display module 151 (S202). A fingerprint-touch input is a touch input generated by touching the display module 151 with a finger and thus includes fingerprint information. If it is determined in operation S202 that there is a fingerprint-touch input received through the display module 151, the method proceeds to operation S210 of FIG. 9B.

[0086] If there is a user input, other than a fingerprint-touch input, received or an event occurred (S204), the controller 180 may control an operation corresponding to the received user input or the occurred event to be performed (S206). Operations S202 through S206 may be repeatedly performed until the user chooses to escape from a current operating mode (S208).

[0087] Referring to FIG. 9B, if it is determined in operation S202 that there is a fingerprint-touch input received through the display module 151, the controller 180 may determine whether fingerprint information of the received fingerprint-touch input matches with previously-stored fingerprint information for locking the mobile terminal 100 (S210). If the fingerprint information of the received fingerprint-touch input matches with previously-stored fingerprint information for locking the mobile terminal 100, the controller 180 may lock the current operating menu (S212).

[0088] When the mobile terminal 100 is locked, the mobile terminal 100 does not respond to any type of user input. The mobile terminal 100 may be locked for all operating menus or only for a certain operating menu such as making a call, accessing the internet, or protecting privacy. If the mobile terminal 100 is locked, an icon may be displayed, or a sound effect or a haptic effect may be generated in order to alert the user.

[0089] If the fingerprint information of the received fingerprint-touch input matches with previously-stored fingerprint information for unlocking the mobile terminal 100 (S214), the controller 180 may unlock the mobile terminal (S216). If the fingerprint information of the received fingerprint-touch input matches with previously-stored fingerprint information for temporarily unlocking the mobile terminal 100 (S218), the controller 180 may temporarily unlock the mobile terminal 100 (S220). If the mobile terminal 100 is unlocked regardless of permanently or temporarily, a sound effect or a haptic effect may be generated in order to alert the user.

[0090] If the fingerprint information of the received fingerprint-touch input does not match with any one of the previously-stored fingerprint information for locking the mobile terminal 100, the previously-stored fingerprint information for unlocking the mobile terminal 100 and the previously-stored fingerprint information for temporarily unlocking the mobile terminal 100, the controller 180 may control the received fingerprint-touch input to be treated as an ordinary touch input (S222), and the method returns to operation S204.

[0091] In this manner, it is possible to lock or unlock the mobile terminal 100 for various operating menus in accordance with fingerprint information of a received fingerprint-touch input. In the first exemplary embodiment, the mobile terminal 100 may be unlocked in response to a fingerprint-touch input. However, the present invention is not restricted to this. That is, the mobile terminal 100 may be unlocked by entering a password. In this case, a menu for entering the password may be additionally provided.

[0092] Alternatively, the mobile terminal 100 may be configured to be locked or unlocked if a fingerprint-touch input is detected from a certain part of the display module 151 or is detected for more than a predefined amount of time. Still alternatively, the mobile terminal 100 may be configured to be locked or unlocked in response to an accelerated fingerprint-touch input, which is generated by touching the display module 151 quickly compared to the case of generating a typical fingerprint-touch input, a pressure fingerprint-touch input, which is generated by touching the display module 151 with pressure.

[0093] Still alternatively, the mobile terminal 100 may be configured to be locked or unlocked in response to a complex fingerprint-touch input, which is generated by, for example, fingerprint-touching the display module 151 with a finger and then dragging the finger toward a certain direction, sequentially touching a first point and a second point on the display module 151 in a row within a predefined amount of time, touching the first point with a finger and then dragging the finger from the first point to the second point, touching the display module 151 with more than one finger, or fingerprint-touching the display module 151 and then dragging the finger in an L- or U-shaped motion. Still alternatively, the mobile terminal 100 may be locked or unlocked by touching the display module 151 with two or more fingers and then either pinching the fingers together or pushing the fingers apart.

[0094] FIG. 10 illustrates a flowchart of a method of controlling a mobile terminal according to a second exemplary embodiment of the present invention. Referring to FIG. 10, a plurality of pieces of fingerprint information may be stored in the memory 160 on a finger-by-finger basis, on a user-by-user basis and/or on a pattern-by-pattern basis (S250). More specifically, the plurality of pieces of fingerprint information may include fingerprints acquired from different fingers of an individual or fingerprints acquired from different individuals. Alternatively, the plurality of pieces of fingerprint information may include fingerprints having different patterns in consideration that fingerprints acquired even from the same finger can often appear different due to variations in the degree

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000209

to which, and the pressure with which the finger is brought into contact with the display module 151.

[0095] Thereafter, the controller 180 may display an operation screen corresponding to a current menu or operation selected by the user on the display module 151 (S252). Examples of the operation screen include an idle screen, a list screen, a message reception screen, a main menu screen, a text- or image-viewer screen, a moving image screen, a broadcast screen, a map screen and a webpage screen.

[0096] Thereafter, the controller 180 may determine whether there is a fingerprint-touch input received through the display module 151 (S254). A fingerprint-touch input is a touch input generated by touching the display module 151 with a finger and thus includes fingerprint information.

[0097] Thereafter, if it is determined in operation S254 that there is a fingerprint-touch input received through the display module 151, the controller 180 may determine whether fingerprint information of the received fingerprint-touch input matches with previously-stored fingerprint information for controlling the display of a screen (S256). Thereafter, if it is determined in operation S256 that the fingerprint information of the received fingerprint-touch input matches with the previously-stored fingerprint information for controlling the display of a screen, the controller 180 may control the display of the operation screen in accordance with a control value corresponding to the previously-stored fingerprint information for controlling the display of a screen (S256). For example, the controller 180 may scroll the operation screen at a speed corresponding to the control value, may control the playback speed of the operation screen in accordance with the control value, or may move the operation screen by a distance corresponding to the control value. The control value may be set by the user for each of the plurality of pieces of fingerprint information present in the memory 160. During the control of the display of the operation screen in accordance with the control value, the controller 180 may generate a haptic effect in order to alert the user.

[0098] If there is no match for the fingerprint information of the received fingerprint-touch input in the memory 160, the controller 180 may control the received fingerprint-touch input to be treated as an ordinary touch input (S260).

[0099] If there is a user input, other than a fingerprint-touch input, received or an event occurred (S262), the controller 180 may control an operation corresponding to the received user input or the occurred event to be performed (S264). Operations S254 through S264 may be repeatedly performed until the user chooses to escape from the current menu or operation (S266).

[0100] In this manner, it is possible to scroll a screen at various speeds or control the playback speed of a screen in accordance with fingerprint information of a fingerprint-touch input.

[0101] More specifically, the control of the display of a screen in response to a fingerprint-touch input may be performed in various manners according to fingerprint information of the fingerprint-touch input. For example, if the user fingerprint-touches a scroll bar, a navigation key or a side key, a screen (e.g., a list screen or a thumbnail-viewer screen) currently being displayed on the display module 151 may be scrolled, or may be replaced with another screen according to fingerprint information. For this, the current screen may be configured to be scrolled at different speeds according to with what finger the user fingerprint-touches the display module 151. If the user fingerprint-touches the display module 151 with a thumb, the current screen may be scrolled at a lowest speed. If the user fingerprint-touches the display module 151 with an index finger, the current screen may be scrolled at a second lowest speed. If the user fingerprint-touches the display module 151 with a middle finger, the current screen may be scrolled at a normal speed. If the user fingerprint-touches the display module 151 with a ring finger, the current screen may be scrolled at a second highest speed. If the user fingerprint-touches the display module 151 with a little finger, the current screen may be scrolled at a highest speed. Similarly, if the user flickers the current screen with an index finger, the current screen may be flickered at a low speed. On the other hand, if the user flickers the current screen with a ring finger, the current screen may be flickered at a high speed.

[0102] If the user fingerprint-touches a navigation key, a fast forward key, a rewind key or a progressive bar, playback speed may be varied, or switching between items may be performed. For example, if the user fingerprint-touches a progressive bar with an index finger and then drags the index finger in a certain direction, playback speed may slowly increase or decrease. On the other hand, if the user fingerprint-touches the progressive bar with a ring finger, the playback speed may quickly increase or decrease.

[0103] Alternatively, a screen may be configured to be scrolled at different speeds in response to different fingerprints acquired from different users. For example, if a first user fingerprint-touches a screen, the screen may be scrolled at low speed. On the other hand, if a second user fingerprint-touches the screen, the screen may be scrolled at high speed.

[0104] If a screen such as a mini-map screen is fingerprint-touched, the screen may be moved or scrolled, and the distance by which the screen is moved or scrolled may vary from one fingerprint information to another fingerprint information. More specifically, a screen may be moved or scrolled in accordance with a fingerprint-touch input on a block-by-block basis, a letter-by-letter basis, a line-by-line basis, or a page-by-page basis. For example, if the user fingerprint-touches an e-book screen with an index finger, the user may return to a previous page of the e-book screen. On the other hand, if the user fingerprint-touches the e-book screen with a middle finger, the user may proceed to a subsequent page of the e-book screen. Alternatively, if the user fingerprint-touches the e-book screen with an index finger, the user may

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000210

return to a first page of the e-book screen. On the other hand, if the user fingerprint-touches the e-book screen with a middle finger, the user may proceed to a last page of the e-book screen. Still alternatively, if the user fingerprint-touches the e-book screen with an index finger, the e-book screen may be scrolled up by one line. On the other hand, if the user fingerprint-touches the e-book screen with a middle finger, the e-book screen may be scrolled down by one line.

[0105] A screen may be configured to be scrolled at various speeds according to the duration in which a fingerprint-touch input is detected. In this case, a screen may be scrolled at different speeds in response to the same fingerprint. For example, when the user fingerprint-touches a scrollbar with an index finger, the scroll speed may increase in accordance with the duration in which a fingerprint-touch input is detected.

[0106] Scrolling may be automatically initiated or terminated in response to a fingerprint-touch input. For example, if the user fingerprint-touches an e-book screen with an index finger, the e-book screen may begin to be automatically scrolled at default speed. On the other hand, if the user fingerprint-touches the e-book screen with a middle finger, the automatic scrolling of the e-book screen may be terminated.

[0107] In the second exemplary embodiment, fingerprint information may be detected from where a corresponding fingerprint-touch is detected. However, the present invention is not restricted to this. That is, the detection of fingerprint information may be performed in various manners. For example, if a fingerprint touch and then a drag are detected, fingerprint information may be detected only once from where the fingerprint-touch is detected, and then, an operation corresponding to the drag may be performed without the need to additionally detect fingerprint information. Alternatively, the operation corresponding to the drag may be performed only if fingerprint information detected during the drag matches with the fingerprint information detected from where the fingerprint-touch is detected. Still alternatively, the operation corresponding to the drag may be performed only if fingerprint information detected from where the drag begins matches with fingerprint information detected from where the drag ends.

[0108] The operation of the mobile terminal 100 may be controlled not only in consideration of whether a fingerprint-touch input and a drag input are detected but also in consideration of the patterns of the fingerprint-touch input and the drag input. For example, if the user finger-touches the display module 151 with a finger and then drags the finger to draw an up-arrow '↑', the user may return to a previous page. On the other hand, if the user finger-touches the display module 151 with a finger and then drags the finger to draw a down-arrow '↓', the user may proceed to a next page. That is, various screen control operations may be performed in accordance with in what motion the user drags a finger after fingerprint-touching the display module 151.

[0109] FIG. 11 illustrates a flowchart of a method of controlling a mobile terminal according to a third exemplary embodiment of the present invention. Referring to FIG. 11, a plurality of pieces of fingerprint information may be stored in the memory 160 on a finger-by-finger basis, on a user-by-user basis and/or on a pattern-by-pattern basis (S300). The plurality of pieces of fingerprint information may be stored along with the descriptions of operating menus or operations that can be performed in association with the plurality of pieces of fingerprint information such as locking or unlocking the mobile terminal 100. For this, a menu for associating fingerprint information with a function such as locking or unlocking the mobile terminal 100 and choosing an operating mode to be entered when the mobile terminal 100 is unlocked may be additionally provided.

[0110] Thereafter, if no touch input or key input is received for more than a predefined amount of time or if a command to lock the mobile terminal 100 is received, the controller 180 may lock the mobile terminal 100 (S302). More specifically, the controller 180 may lock the mobile terminal 100 for all operating menus or only for a certain operating menu. The controller 180 may display an icon or generate a sound effect or a haptic effect in order to alert the user.

[0111] Thereafter, the controller 180 may determine whether there is a fingerprint-touch input received through the display module 151 (S304). A fingerprint-touch input is a touch input generated by touching the display module 151 with a finger and thus includes fingerprint information.

[0112] Thereafter, if it is determined in operation S304 that there is a fingerprint-touch input received through the display module 151, the controller 180 may determine whether fingerprint information of the received fingerprint-touch input matches with previously-stored fingerprint information for unlocking the mobile terminal 100 (S306).

[0113] If it is determined in operation S306 that the fingerprint information of the received fingerprint-touch input matches with the previously-stored fingerprint information for unlocking the mobile terminal 100, the controller 180 may unlock the mobile terminal 100, and may enter a predefined operating mode corresponding to the previously-stored fingerprint information for unlocking the mobile terminal 100 (S308). In this case, the controller 180 may generate a sound effect or a haptic effect in order to alert the user to the unlocking of the mobile terminal 100. Thereafter, if a fingerprint-touch input whose fingerprint information matches with previously-stored fingerprint information for locking the mobile terminal 100 is received, the controller 180 may lock the mobile terminal 100 again.

[0114] In this manner, it is possible to readily unlock the mobile terminal 100 and enter a predefined operating mode in response to a predefined fingerprint-touch input. In the third exemplary embodiment, the mobile terminal 100 may be unlocked in response to a fingerprint-touch

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000211

input. However, the present invention is not restricted to this. That is, the mobile terminal 100 may be unlocked by entering a password. In this case, a menu for entering the password may be additionally provided.

[0115] FIG. 12 illustrates a flowchart of a method of controlling a mobile terminal according to a fourth exemplary embodiment of the present invention. Referring to FIG. 12, a plurality of pieces of fingerprint information may be stored in the memory 160 on a finger-by-finger basis, on a user-by-user basis and/or on a pattern-by-pattern basis (S350). Each of the plurality of pieces of fingerprint information may be associated with a group of menu icons.

[0116] Thereafter, the controller 180 may display a screen showing a group of menu icons on the display module 151 (S352).

[0117] Thereafter, the controller 180 may determine whether there is a fingerprint-touch input received through the display module 151 (S354). A fingerprint-touch input is a touch input generated by touching the display module 151 with a finger and thus includes fingerprint information.

[0118] Thereafter, if it is determined in operation S354 that there is a fingerprint-touch input received through the display module 151, the controller 180 may determine whether there is a match for fingerprint information of the received fingerprint-touch input in the memory 160 (S358), and may display a screen showing a group of menu icons corresponding to previously-stored fingerprint information that matches with the fingerprint information of the received fingerprint-touch input on the display module 151 (S358). The group of menu icons corresponding to the previously-stored fingerprint information that matches with the fingerprint information of the received fingerprint-touch input may include menu icons corresponding to operating system native applications, menu icons corresponding to applications downloaded from web stores, or menu icons corresponding to applications preferred or selected by the user. Thereafter, the controller 180 may generate a sound effect or a haptic effect in order to alert the user.

[0119] If it is determined in operation S356 that there is no match for the fingerprint information of the received fingerprint-touch input in the memory 160, the controller 180 may control the received fingerprint-touch input to be treated as an ordinary touch input (S360).

[0120] If there is a user input, other than a fingerprint-touch input, received or an event occurred (S362), the controller 180 may control an operation corresponding to the received user input or the occurred event to be performed (S364). Operations S354 through S364 may be repeatedly performed until the user chooses to escape from the current menu or operation (S366).

[0121] In this manner, it is possible to display various groups of menu icons on the display module 151 in accordance with a fingerprint-touch input.

[0122] FIGS. 13 through 17 illustrate how to register fingerprint information in the mobile terminal 100.

[0123] Referring to FIG. 13, if no fingerprint is registered in the mobile terminal 100 when the mobile terminal 100 is turned on, a fingerprint registration alert screen 400 recommending that fingerprint information be registered may be displayed on the display module 151. When no fingerprint is registered in the mobile terminal 100, a fingerprint-touch input may be treated as an ordinary touch input.

[0124] FIG. 14(a) illustrates a fingerprint registration setting screen 420. Referring to FIG. 14(a), a 'fingerprint touch on/off item may be used to turn on or off a fingerprint touch function, and a 'fingerprint storage' item may provide various fingerprint management functions such as the registration, editing, and deletion of fingerprints, and the setting or cancellation of main fingerprints.

[0125] Referring to FIG. 14(b), if the 'fingerprint storage' item is selected when no fingerprint is registered in the mobile terminal 100, a screen 423 indicating that there is no fingerprint registered in the mobile terminal 100 may be displayed. On the other hand, referring to FIG. 14(c) or 14(d), if the 'fingerprint storage' item is selected when there are fingerprints registered in the mobile terminal 100, a screen 425 or 427 may be displayed. Alternatively, a screen for registering fingerprints from different fingers may be displayed. Thereafter, if a 'menu' item is selected, a menu including a plurality of menu items such as 'add fingerprint,' 'edit fingerprint,' 'set main fingerprint,' 'delete fingerprint,' and 'delete all fingerprints' may be displayed.

[0126] The whole surface of the display module 151 may be used as a fingerprint sensing area. Alternatively, for a more efficient fingerprint registration or identification, a certain part of the surface of the display module 151 may be set and used as a valid fingerprint sensing area.

[0127] FIG. 15 illustrates a haptic effect setting screen 450 for registering a haptic effect to be generated in connection with a fingerprint. Referring to FIG. 15, different haptic effects may be registered for different individuals, for different fingerprints or for different fingerprint patterns. Then, if a fingerprint-touch input is received, a haptic effect corresponding to fingerprint information of the received fingerprint-touch input may be generated. The intensity and pattern of the haptic effect may be altered in response to a touch input or a key input generated by the user.

[0128] FIG. 16 illustrates how to lock the mobile terminal 100. Referring to FIG. 16(a), the mobile terminal 100 may be locked by fingerprint-touching a 'Lock' screen 500. More specifically, if a 'Lock All' item 505 is selected, a 'Lock All' screen 510 allowing the user to choose when to lock the mobile terminal 100 and how to lock or unlock the mobile terminal 100 may be displayed, as shown in FIG. 16(b).

[0129] Referring to FIG. 16(b), a drop-down list 513 may display a list of values, from which the user may select one, i.e., 'Lock When Turned On,' 'Lock When USIM Changes,' 'Lock Immediately,' 'Unlock,' and may

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000212

thus allow the user whether and when to lock or unlock the mobile terminal 100. If the user selects the value 'Lock Immediately,' the mobile terminal 100 may be readily locked, and an idle screen may be displayed on the display module 151, alerting the user to the locking of the mobile terminal 100. If the user selects the value 'Lock When Turned On,' the mobile terminal 100 may be locked when turned on. If the user selects the value 'Lock When USIM Changes,' the mobile terminal 100 may be locked when a current USIM card is replaced with another USIM card. A drop-down list 515 may allow the user to choose whether the mobile terminal 100 should be locked and unlocked in response to a single fingerprint-touch input or a complex fingerprint-touch input. More specifically, if a '#' key of the user input unit 130 is pressed for a long time, the mobile terminal 100 may be readily locked. On the other hand, if the '#' key is pressed shortly, the mobile terminal 100 may be unlocked.

[0130] FIGS. 17(a) through 17(c) illustrate diagrams of screens 520, 530 and 540, respectively, for registering a function to be performed in connection with a fingerprint. Referring to FIGS. 17(a) through 17(c), various 'lock' functions may be associated with different fingerprint information. More specifically, different operating menus or functions may be associated with different fingerprints. Alternatively, in case that a fingerprint registered as main fingerprint information is damaged, more than one other fingerprint acquired from the same user may be registered as auxiliary fingerprint information, and the main fingerprint information and the auxiliary fingerprint information may both be associated with the same operating menu or function.

[0131] FIGS. 18 through 21 illustrate how to lock or unlock the mobile terminal 100 in response to a fingerprint-touch input. The mobile terminal 100 may be locked or unlocked by fingerprint-touching a certain part of the display module 151. For example, referring to FIG. 16, if a fingerprint-touch input 603 is detected from a lower left part of an operation screen 600, the mobile terminal 100 may be locked. On other hand, if a fingerprint-touch input 605 is detected from a lower right part of the operation screen 600, the mobile terminal 100 may be unlocked.

[0132] Alternatively, the mobile terminal 100 may be locked or unlocked according to with what finger the user touches the display module 151. Still alternatively, the mobile terminal 100 may be locked or unlocked according to whether a fingerprint-touch input is detected for more than a predefined amount of time. In this case, the controller 180 may generate vibration whose intensity increases or decreases in accordance with the duration in which a fingerprint-touch input is detected in order to alert the user.

[0133] Referring to FIG. 19(a), if the user fingerprint-touches an operation screen 610 with a finger and then drags the finger in a first direction, for example, in a leftward direction, as indicated by reference numeral 613, the mobile terminal 100 may be locked. On the other hand, referring to FIG. 19(b), if the user fingerprint-touches the operation screen 610 with a finger and then drags the finger in a second direction, which is opposite to the first direction, for example, in a rightward direction, as indicated by reference numeral 623, the mobile terminal 100 may be unlocked. In this manner, the mobile terminal 100 can be locked or unlocked for all operating menus or functions.

[0134] Referring to FIGS. 20(a) and 20(b), if the user fingerprint-touches a certain item 635 or 645 with a finger and then drags the finger in a certain direction, the mobile terminal 100 may be locked or unlocked only for an operating menu or function corresponding to the item 635 or 645.

[0135] Referring to FIGS. 21 (a) and 21 (b), if the user fingerprint-touches the display module 151 with two or more fingers and then moves the fingers apart, the mobile terminal 100 may be locked. On the other hand, if the user fingerprint-touches the display module 151 with two or more fingers and then pinches the fingers apart, the mobile terminal 100 may be unlocked.

[0136] The locking and unlocking of the mobile terminal 100 may be performed in response to other types of gestures, other than pinching or stretching. For example, if the user fingerprint-touches the display module 151 with one or more fingers and then drag the fingers to draw an L, the mobile terminal 100 may be locked. Then, if the user fingerprint-touches the display module 151 with one or more fingers and then drag the fingers to draw a U, the mobile terminal 100 may be unlocked. The mobile terminal 100 may be locked if the user fingerprint-touches the display module 151 with a finger and then drag the finger to draw a symbol such as '→,' '←,' '↑,' '↓,' or '☆ '. Alternatively, a lock icon may be provided on the display module 151. Then, if the user fingerprint-touches the lock icon with a finger and then drags the finger to a certain position on the display module 151, the mobile terminal 100 may be locked or unlocked.

[0137] FIGS. 22 through 30 illustrate how to perform screen control in accordance with a fingerprint-touch input.

[0138] Referring to FIGS. 22 and 23, different fingerprints acquired from different users, different fingerprints acquired from different fingers of the same user, or different fingerprints having different patterns may be associated with different control values. For example, a thumbprint may be associated with a lowest scroll speed, the fingerprint of an index finger may be associated with a second lowest scroll speed, the fingerprint of a middle finger may be associated with a normal scroll speed, the fingerprint of a ring finger may be associated with a second highest scroll speed, and the fingerprint of a little finger may be associated with a highest scroll speed. Alternatively, different fingerprints may be associated with different scroll amounts of, for example, one line, two lines, three lines, four lines, and five lines.

[0139] Referring to FIGS. 24(a) and 24(b), the user may fingerprint-touch an operation screen 700 with a fin-

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000213

ger, as indicated by reference numeral 705, and then drag the finger downward, as indicated by reference numeral 707. In this case, more than one fingerprint information (i.e., a plurality of pieces of fingerprint information 710, 720 and 730) may be acquired from where the user begins to drag the operation screen 700, from where the user drops the operation screen 700 and from anywhere in between. The plurality of pieces of fingerprint information 710, 720 and 730 may be used all together, or in various combinations depending upon need.

[0140] FIG. 25 illustrates various types of fingerprint-touch inputs for use in screen control. Referring to FIGS. 25(a) through 25(d), the user may control the display of a screen by fingerprint-touching the display module 151 with a finger and then dragging the finger to draw an arrow such as '→,' '←,' '↑,' or '↓' a reversed 'L' or a circle, or a symbol such as '☆'.

[0141] Referring to FIG. 26, if the user fingerprint-touches a scroll bar 791 on a phonebook menu screen 790 with an index finger, the phonebook menu screen 790 may be scrolled at low speed. On the other hand, if the user fingerprint-touches the scroll bar 791 with a ring finger, the phonebook menu screen 790 may be scrolled at high speed.

[0142] Similarly, if the user fingerprint-touches one of a plurality of navigation key with an index finger, the user may move to a next page slowly. On the other hand, if the user fingerprint-touches one of the navigation keys with a ring finger, the user may move to the next group quickly. If the user fingerprint-touches a side hot key with an index finger, scrolling may also be performed, and the speed of scrolling may vary according to fingerprint information.

[0143] Referring to FIG. 27, if the user touches a progressive bar on a multimedia file playback screen 800 with a finger and then drags the finger across the multimedia file playback screen 800, a search of a moving image, an MP3 file or an audio file may be performed, and the speed of the search may vary according to with what finger the user touches the progressive bar. For example, if the user touches the progressive bar with an index finger, a normal search may be performed. On the other hand, if the user touches the progressive bar with a middle finger, a quick search may be performed. Similarly, the speed of search of multimedia data may be controlled in various manners if a 'Fast Forward' key, a 'Rewind' key or another key for controlling the playback of multimedia data is selected in response to a fingerprint-touch input.

[0144] Referring to FIG. 28, if the user fingerprint-touches a mini-map 811 on an image viewer screen 810 with an index finger, the mini-map 810 may be moved slowly. On the other hand, if the user fingerprint-touches the mini-map 811 with a ring finger, the mini-map 811 may be moved quickly. Similarly, a mini-map on a web browser screen can be moved at different speeds in response to different fingerprint information.

[0145] Referring to FIG. 29, if the user fingerprint-touches a thumbnail viewer screen 820 with a finger and then drags the finger across the thumbnail viewer screen 820, as indicated by reference numeral 821, the thumbnail viewer screen 820 may be scrolled, and the speed at which, or the amount by which the thumbnail viewer screen 820 is scrolled may vary according to fingerprint information. For example, if the user fingerprint-touches the thumbnail viewer screen 820 with an index finger and then drags the index finger down, the thumbnail viewer screen 820 may be scrolled down slowly. On the other hand, if the user fingerprint-touches the thumbnail viewer screen 820 with a ring finger and then drags the ring finger down, the thumbnail viewer screen 820 may be scrolled down quickly.

[0146] The speed at which a thumbnail viewer screen or a list screen is flickered may vary according to fingerprint information. In addition, the amount by which a thumbnail viewer screen or a list screen is scrolled may vary according to fingerprint information. For example, if the user fingerprint-touches a thumbnail image screen or a list screen with an index finger, the thumbnail image screen or the list screen may be scrolled down by an amount corresponding to 1/2 of a page. On the other hand, if the user fingerprint-touches the thumbnail image screen or the list screen with a middle finger, the thumbnail image screen or the list screen may be scrolled down by an amount corresponding to 1/4 of a page.

[0147] Referring to FIG. 30, if a fingerprint-touch input 831 is detected from a document viewer screen 830, the document viewer screen 830 may be scrolled in response to the fingerprint-touch input 831, and the speed of scrolling the document viewer screen 830 may vary according to fingerprint information. More specifically, if the user fingerprint-touches a lower half of a current page on the document viewer screen 830 with an index finger, the document viewer screen 830 may be scrolled slowly on a page-by-page basis. On the other hand, if the user fingerprint-touches the lower half of the current page on the document viewer screen 830 with a ring finger, the document viewer screen 830 may be scrolled quickly on a page-by-page basis.

[0148] The document viewer screen 830 may be scrolled by a fingerprint-touch-based flickering gesture, and the scroll speed of the document viewer screen 830 may vary according to with what finger the document viewer screen 830 is flickered. For example, if the document viewer screen 830 is flickered with an index finger, the document viewer screen 830 may be scrolled slowly. On the other hand, if the document viewer screen 830 is flickered with a middle finger, the document viewer screen 830 may be scrolled quickly.

[0149] The document viewer screen 830 may be moved in response to a fingerprint-touch input, and the distance by which the document viewer screen 830 is moved may vary according to fingerprint information of the fingerprint-touch input.

[0150] FIG. 31 illustrates how to unlock the mobile ter-

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000214

minal 100 and then enter a predefined operating mode in response to a fingerprint-touch input. Referring to FIG. 31 (a), when the mobile terminal 100 is locked, a lock screen 830 may be displayed on the display module 151. The lock screen 830 may include a touch area 845 for unlocking the mobile terminal 100. If the user fingerprint-touches the touch area 845 with a finger, the mobile terminal 100 may be unlocked, and a guide message 847 indicating an operating mode to be entered may be displayed. Referring to FIG. 31(b), if the user fingerprint-touches the touch area 845 with an index finger, as indicated by reference numeral 855, the mobile terminal 100 may be unlocked, and may readily enter a music player mode. Then, referring to FIG. 31 (c), a music player screen 860 may be displayed on the display module 151.

[0151] In this manner, it is possible to unlock the mobile terminal 100 in accordance with a fingerprint-touch input and readily enter a predefined operating mode corresponding to fingerprint information of the fingerprint-touch input, such as a mode for sending/receiving messages, checking a list of calls or setting the alarm.

[0152] FIGS. 32 and 33 illustrate how to display different groups of menu icons in response to different fingerprint information. Referring to FIGS. 32(a) and 32(b), if a fingerprint-touch input 875 is detected from a screen 870 showing a group of menu icons, a screen 880 showing a predefined group of menu icons corresponding to fingerprint information of the fingerprint-touch input 875 may be displayed.

[0153] For example, if the user fingerprint-touches the screen 870 with an index finger, a group of menu icons representing operating system native applications may be displayed. On the other hand, if the user fingerprint-touches the screen 870 with a middle finger, a group of menu icons representing applications downloaded from a web store may be displayed. On the other hand, if the user fingerprint-touches the screen 870 with a ring finger, a group of menu icons representing applications preferred or selected by the user may be displayed.

[0154] When the screen 880 showing a different group of menu icons from the screen 870 is displayed, a screen effect, a sound effect or a haptic effect may be generated in order to alert the user.

[0155] Alternatively, referring to FIG. 33, if a fingerprint touch-and-drag 895 is detected from a screen 890 showing a group of menu icons, a screen showing another group of menu icons may be displayed. The group of menu icons displayed in response to the fingerprint touch-and-drag 895 may vary according to with what finger the fingerprint touch-and-drag 895 is generated.

[0156] The mobile terminal according to the present invention and the method of controlling the mobile terminal according to the present invention are not restricted to the exemplary embodiments set forth herein. Therefore, variations and combinations of the exemplary embodiments set forth herein may fall within the scope of the present invention.

[0157] The present invention can be realized as code that can be read by a processor (such as a mobile station modem (MSM)) included in a mobile terminal and that can be written on a computer-readable recording medium. The computer-readable recording medium may be any type of recording device in which data is stored in a computer-readable manner. Examples of the computer-readable recording medium include a ROM, a RAM, a CD-ROM, a magnetic tape, a floppy disc, an optical data storage, and a carrier wave (e.g., data transmission through the internet). The computer-readable recording medium can be distributed over a plurality of computer systems connected to a network so that computer-readable code is written thereto and executed therefrom in a decentralized manner. Functional programs, code, and code segments needed for realizing the present invention can be easily construed by one of ordinary skill in the art.

[0158] As described above, according to the present invention, it is possible to store a plurality of pieces of fingerprint information in a mobile terminal on a finger-by-finger, user-by-user or pattern-by-pattern basis and to lock or unlock the mobile terminal for various operating menus in response to a fingerprint-touch input. In addition, it is possible to perform various screen control operations (such as scrolling or controlling scroll speed) in response to a fingerprint-touch input. Moreover, it is possible to unlock a mobile terminal and then readily enter a predefined operating mode in response to a fingerprint-touch input. Furthermore, it is possible to display various groups of menu icons one after another in response to a fingerprint-touch input and to control various operations performed by a mobile terminal with convenience by using not only a fingerprint-touch input but also a key input or an ordinary touch input.

[0159] While the present invention has been particularly shown and described with reference to exemplary embodiments thereof, it will be understood by those of ordinary skill in the art that various changes in form and details may be made therein without departing from the scope of the present invention as defined by the following claims.

Claims

1. A method of controlling a mobile terminal, the method comprising:

   locking a predefined operating mode;
   receiving a fingerprint-touch input through a display module capable of performing fingerprint identification; and
   if fingerprint information of the received fingerprint-touch input matches with one of a plurality of pieces of previously-stored fingerprint information for unlocking the predefined operating mode, unlocking the predefined operating mode and entering an operating mode corresponding to the fingerprint information that matches with

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000215

the fingerprint information of the received fingerprint-touch input.

2. The method of claim 1, further comprising:

receiving a further fingerprint-touch input through the display module; and
if fingerprint information of the further received fingerprint-touch input matches with one of the plurality of pieces of fingerprint information for locking a predefined operating menu after the unlocking, locking the predefined operating menu.

3. The method of claim 2, further comprising outputting an alarm sound indicating the locking or unlocking of the predefined operating menu.

4. The method of claim 1, further comprising storing the plurality of pieces of fingerprint information on at least one of a finger-by-finger basis, a user-by-user basis, and a pattern-by-pattern basis.

5. The method of claim 1, further comprising displaying an operation screen corresponding to the entered operating mode on the display module.

6. The method of claim 5, further comprising:

receiving a further fingerprint-touch input through the display module; and
if fingerprint information of the further received fingerprint-touch input matches with one of the plurality of pieces of fingerprint information for controlling the display of a screen, controlling the display of the operation screen in accordance with a control value corresponding to the fingerprint information that matches with the fingerprint information of the further received fingerprint-touch input.

7. The method of claim 1, wherein the received fingerprint-touch input includes any one of a fingerprint-touch input generated by touching the display module with a finger and dragging the finger in a predetermined direction, a fingerprint-touch input generated by touching the display module with a finger and dragging the finger in a predetermined pattern, and a fingerprint-touch input generated by touching a first position on the display module with a finger and dragging the finger from the first position to a second position on the display module.

8. The method of claim 1, wherein the received fingerprint-touch input includes any one of a fingerprint-touch input generated by touching the display module with pressure and a fingerprint-touch input generated by touching the display module for more than a predefined amount of time.

9. The method of claim 1, further comprising:

displaying a first screen showing a number of menu icons on the display module;
receiving a further fingerprint-touch input through the display module; and
if fingerprint information of the further received fingerprint-touch input matches with one of the plurality of pieces of fingerprint information, displaying a second screen showing a predefined group of menu icons corresponding to the fingerprint information that matches with the fingerprint information of the further received fingerprint-touch input.

10. The method of claim 9, further comprising, if the fingerprint information of the further received fingerprint-touch input does not match with any one of the plurality of pieces of fingerprint information, performing an operation corresponding to a point of detection of the further received fingerprint-touch input.

11. The method of claim 9, further comprising generating at least one of a screen effect, a sound effect and a haptic effect indicating the displaying of the second screen.

12. The method of claim 9, wherein the predefined menu icon group includes menu icons representing operating system native applications, menu icons representing downloaded applications, and menu icons representing user-preferred applications.

13. A mobile terminal comprising:

a display module configured to be capable of performing fingerprint identification;
a memory configured to store a plurality of pieces of fingerprint information; and
a controller configured to receive a fingerprint-touch input through the display module, wherein, if fingerprint information of the received fingerprint-touch input matches with one of a plurality of pieces of previously-stored fingerprint information for unlocking the predefined operating mode, the controller unlocks the predefined operating mode and enters an operating mode corresponding to the fingerprint information that matches with the fingerprint information of the received fingerprint-touch input.

14. The mobile terminal of claim 13, wherein the memory stores the plurality of pieces of fingerprint information on at least one of a finger-by-finger basis, a user-by-user basis, and a pattern-by-pattern basis.

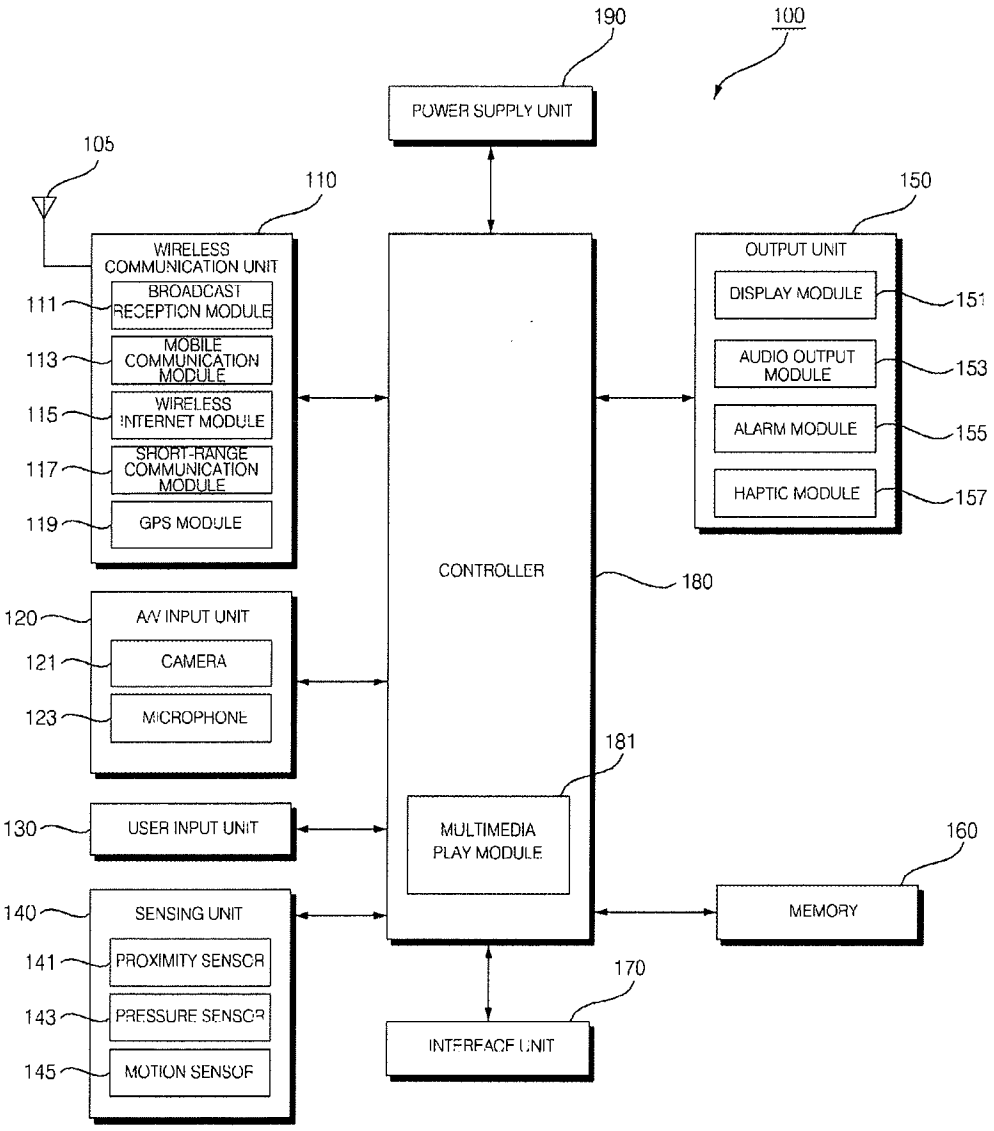
Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000216

15. The mobile terminal of claim 13, the controller being further configured to:

display a first screen showing a number of menu icons on the display module; and
receive a further fingerprint-touch input through the display module, wherein, if fingerprint information of the further received fingerprint-touch input matches with one of the plurality of pieces of fingerprint information, the controller displays a second screen showing a predefined group of menu icons corresponding to the fingerprint information that matches with the fingerprint information of the further received fingerprint-touch input.

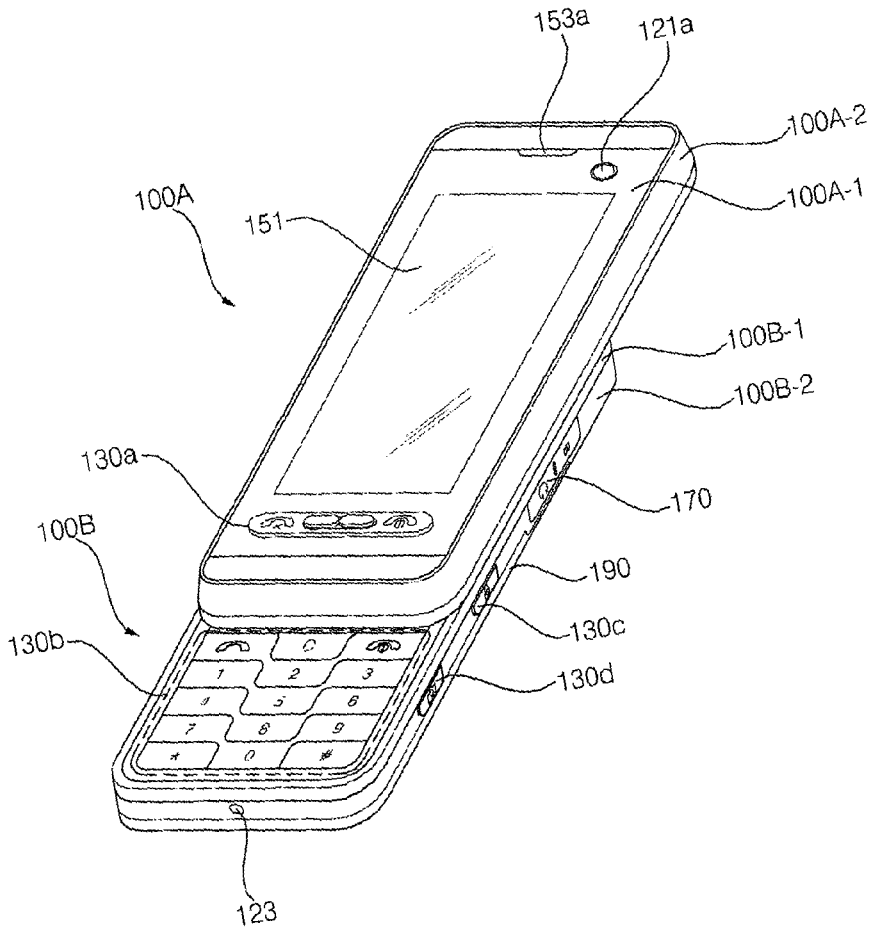
Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000217

FIG. 1



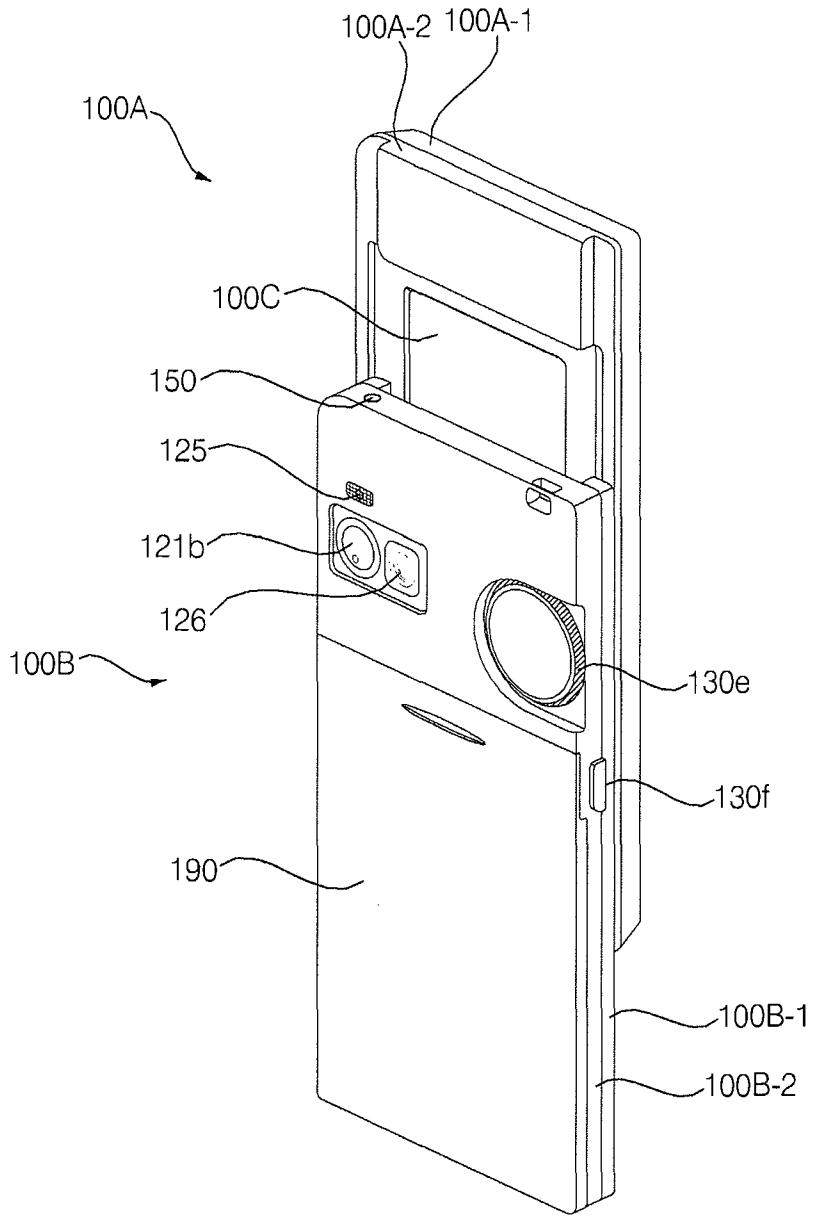
Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000218

FIG. 2



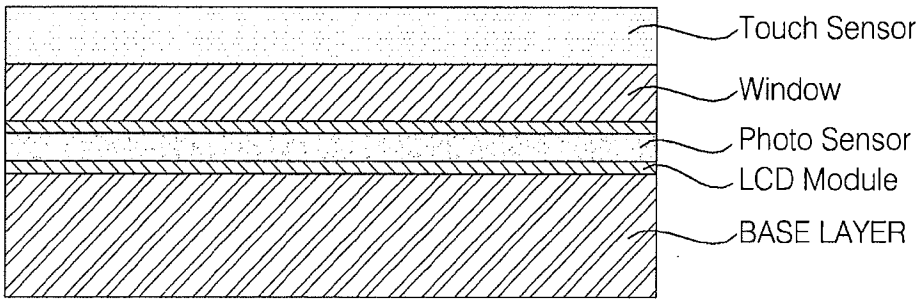
Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000219

FIG. 3

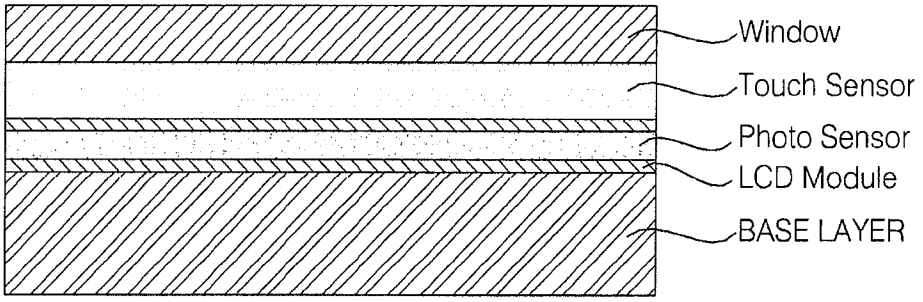


Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000220

FIG. 4



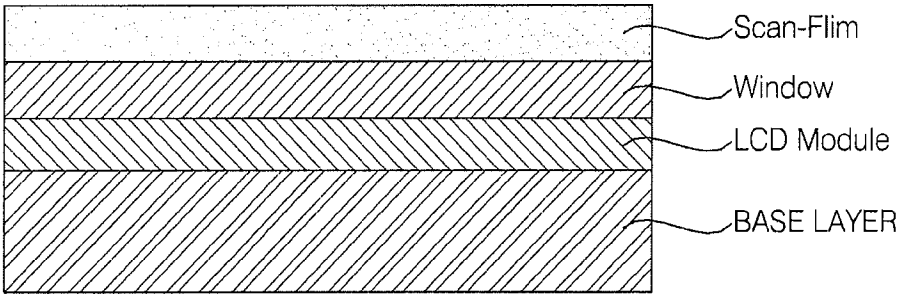
(a)



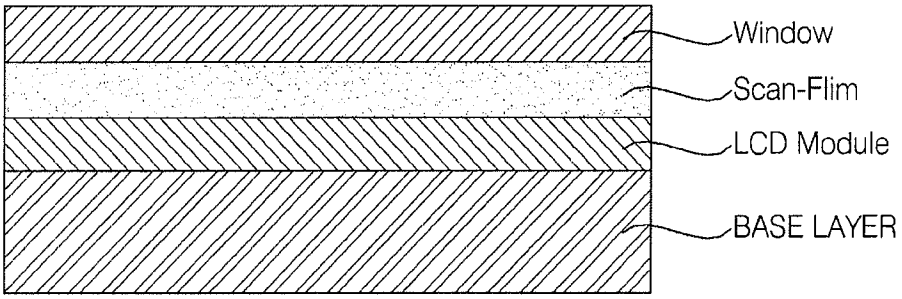
(b)

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000221

FIG. 5



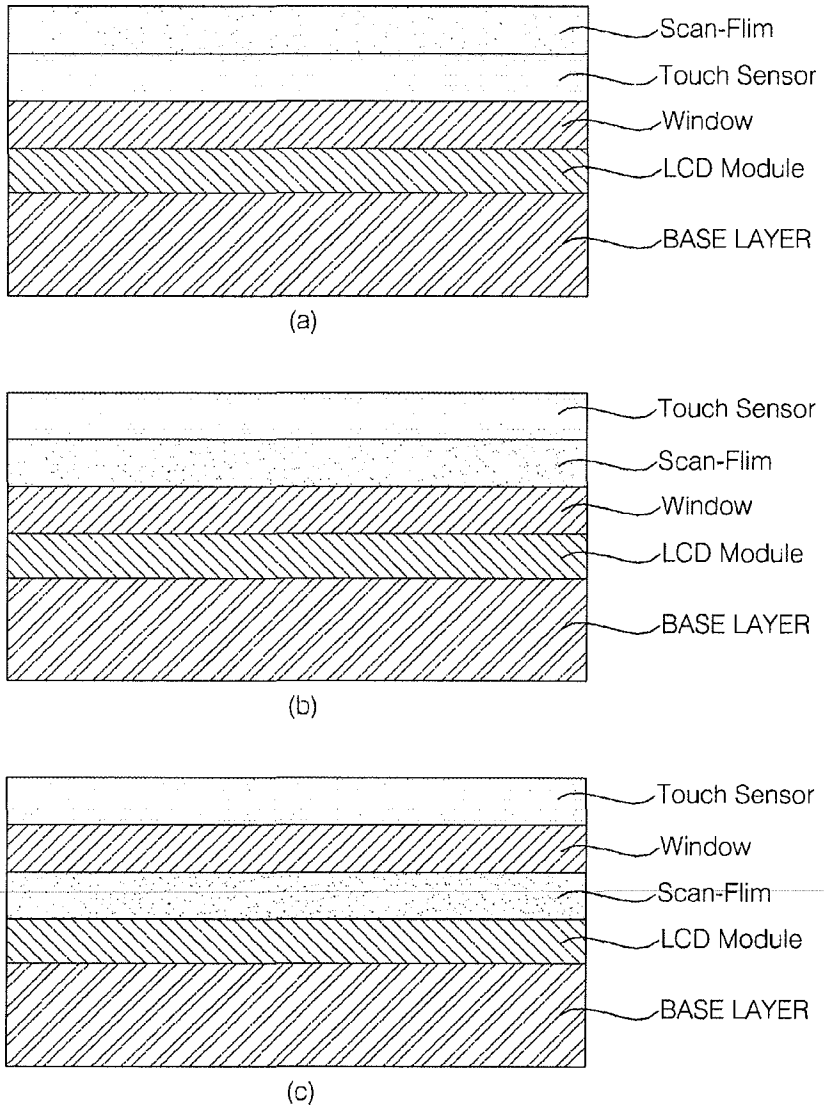
(a)



(b)

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FIG. 6



Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000223

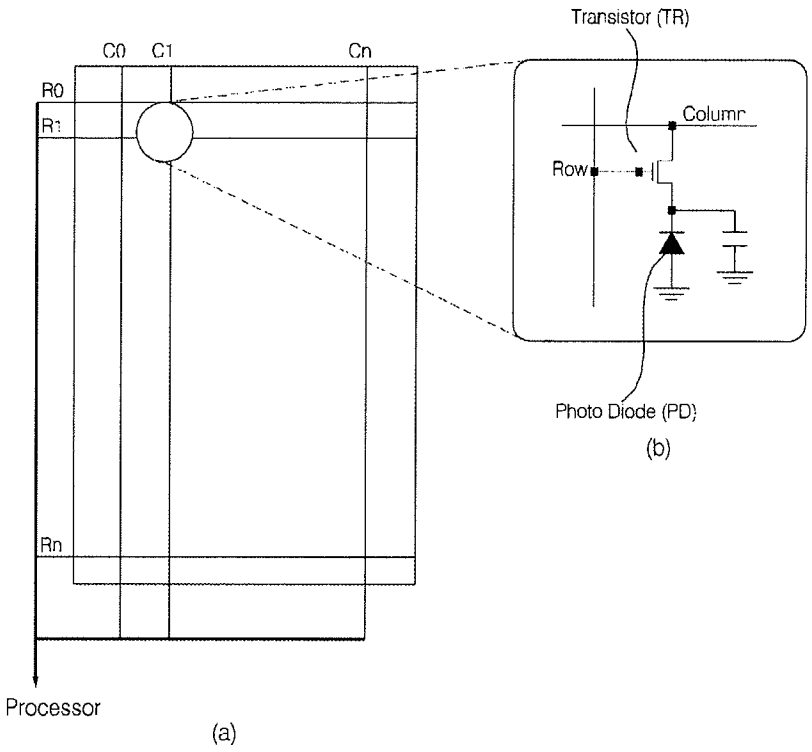


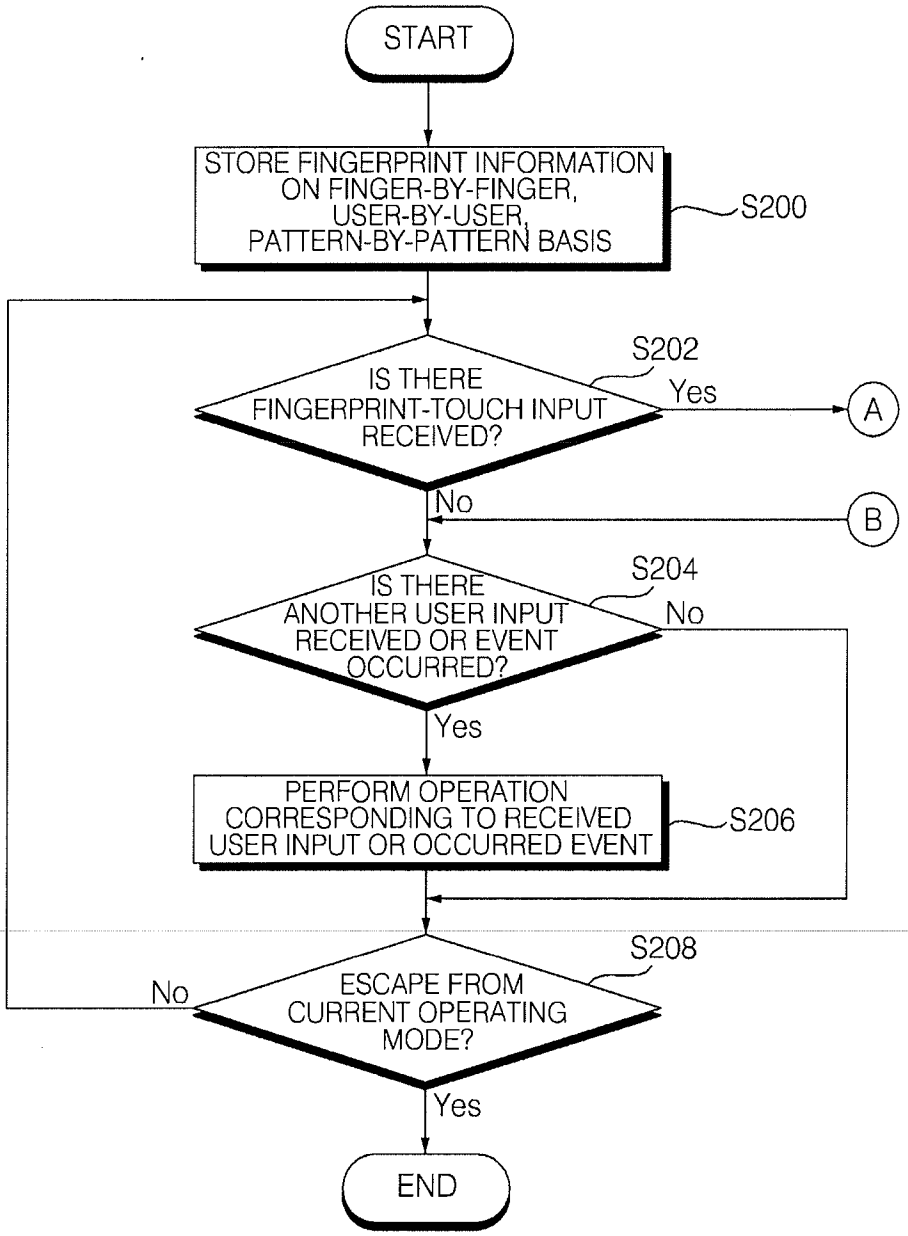
FIG. 7

Cm	R1	R2	R3	•••	Rn
C2					
C1	R1	R2	R3	•••	Rn
Red	100%	50%	20%	•	•
Green	50%	20%	•	•	•
Blue	0%	10%	0%	•	••

FIG. 8

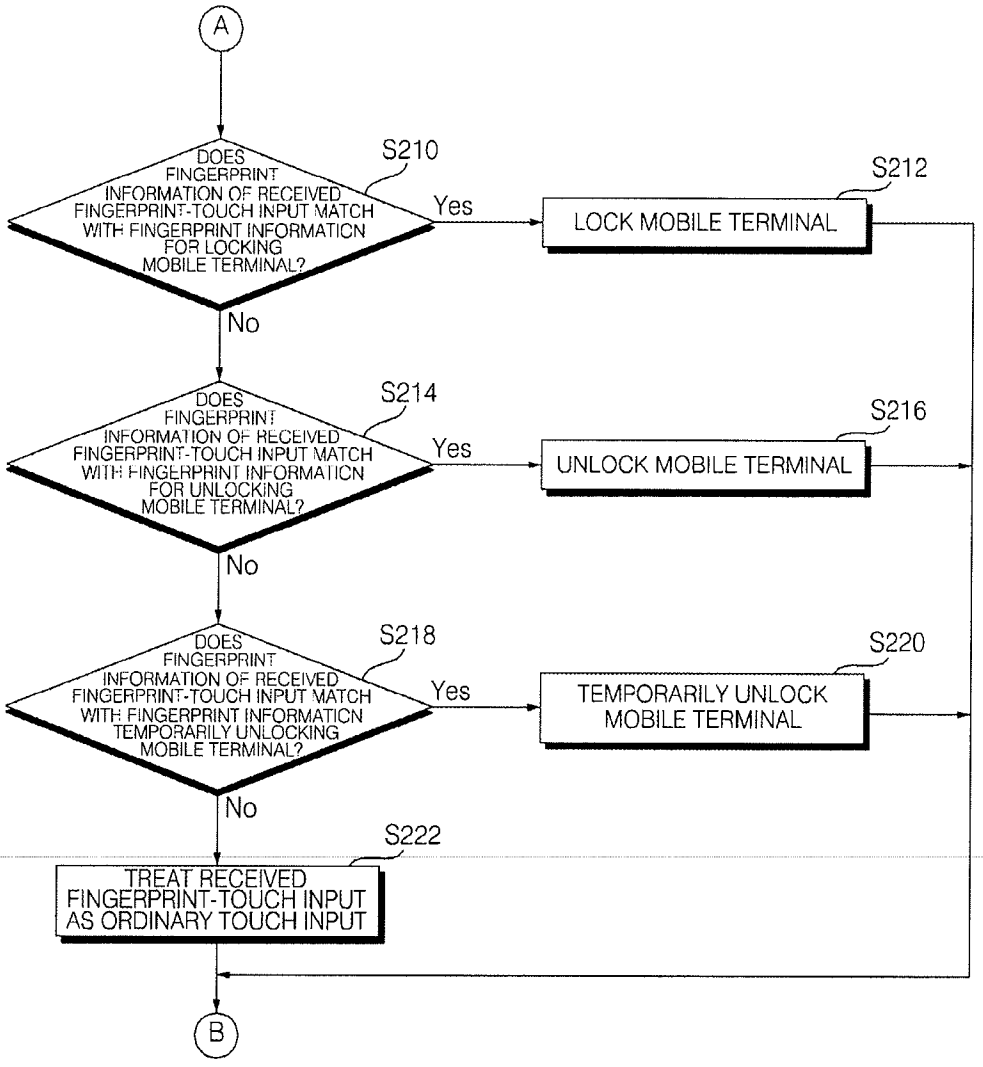
Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000224

FIG. 9A



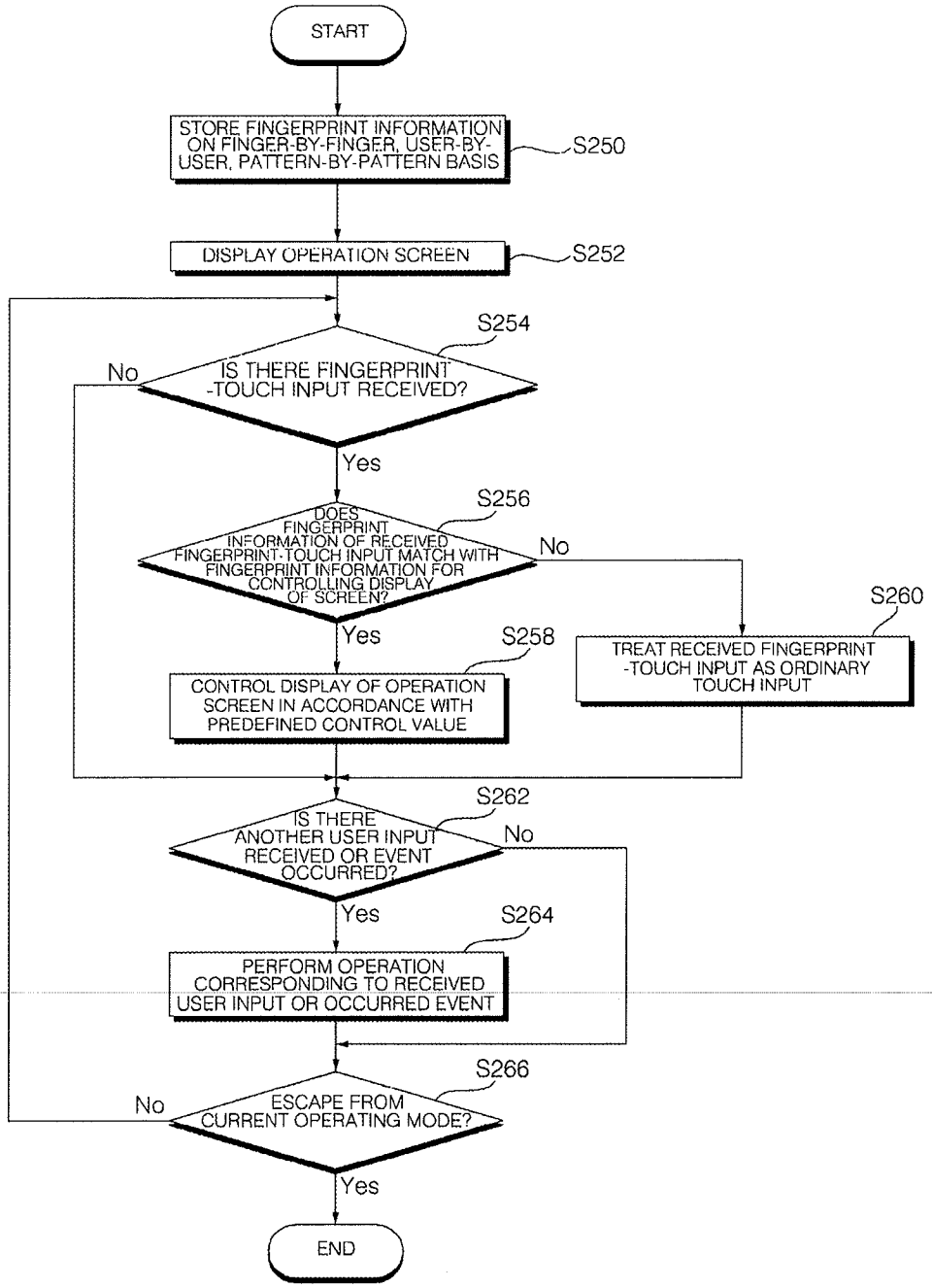
Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000225

FIG. 9B



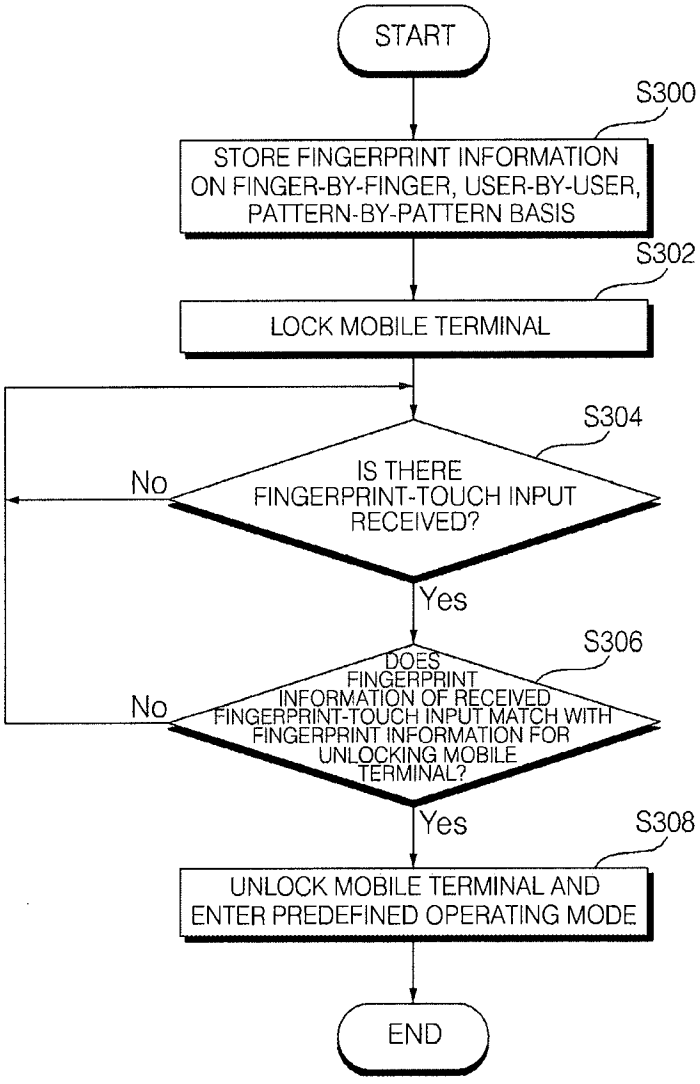
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FIG. 10



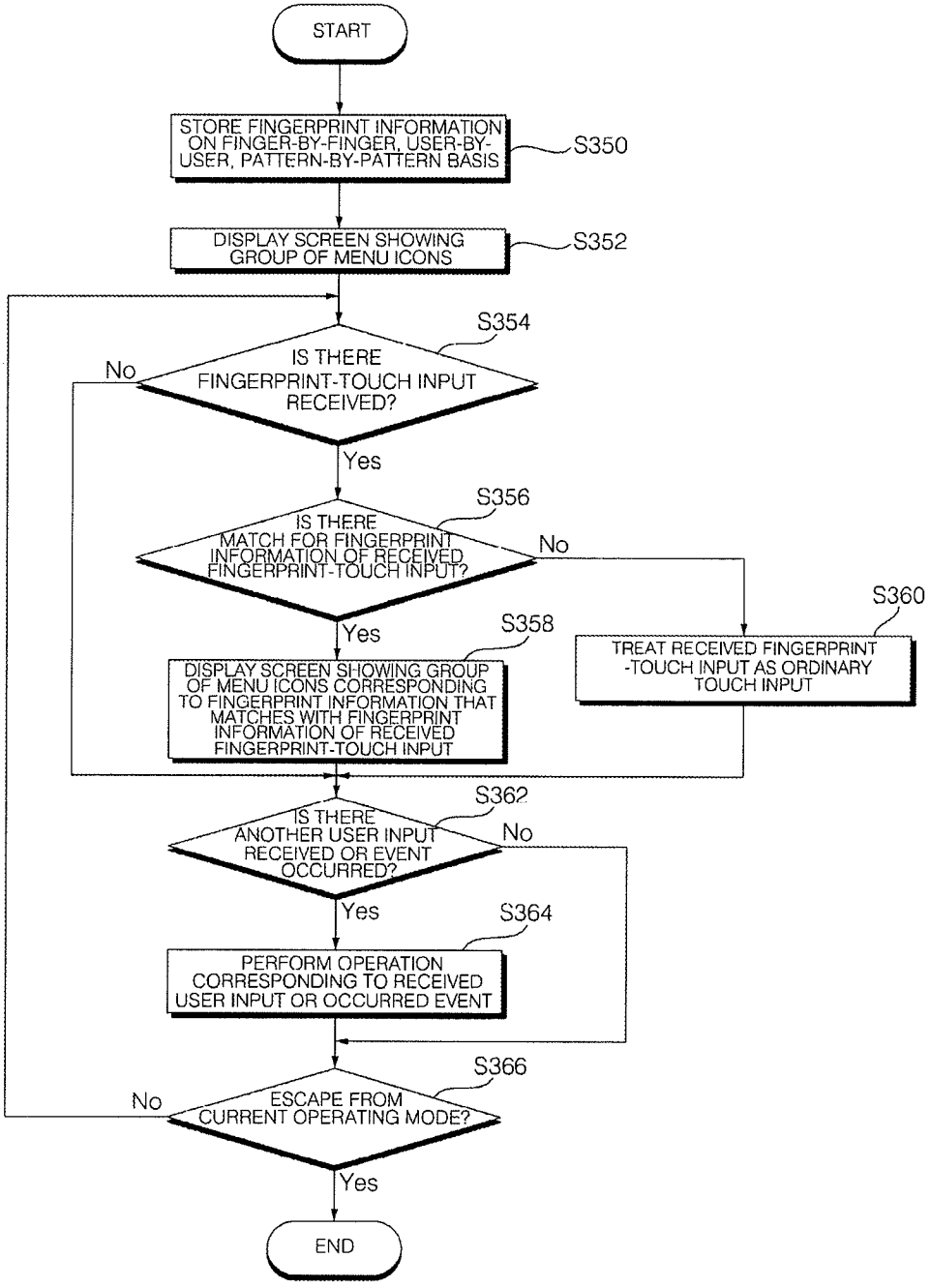
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FIG. 11



Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000228

FIG. 12



Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000229

FIG. 13

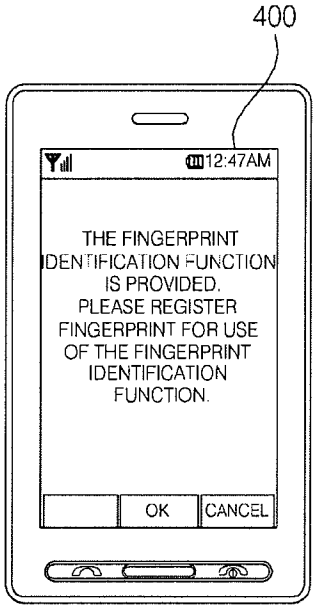
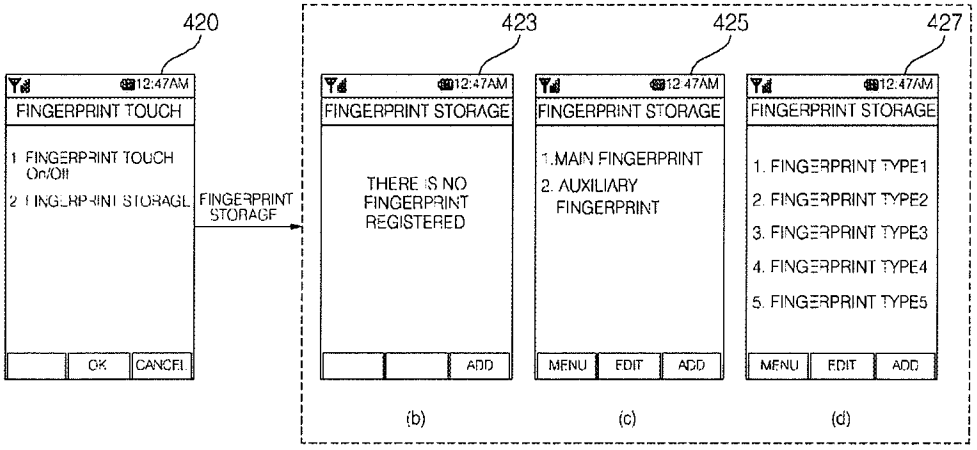


FIG. 14



Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000230

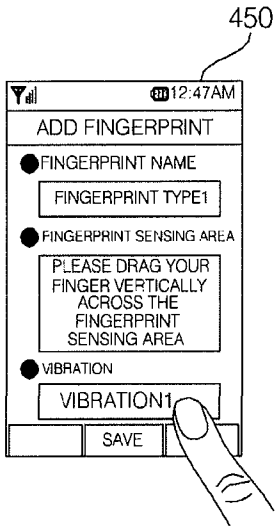
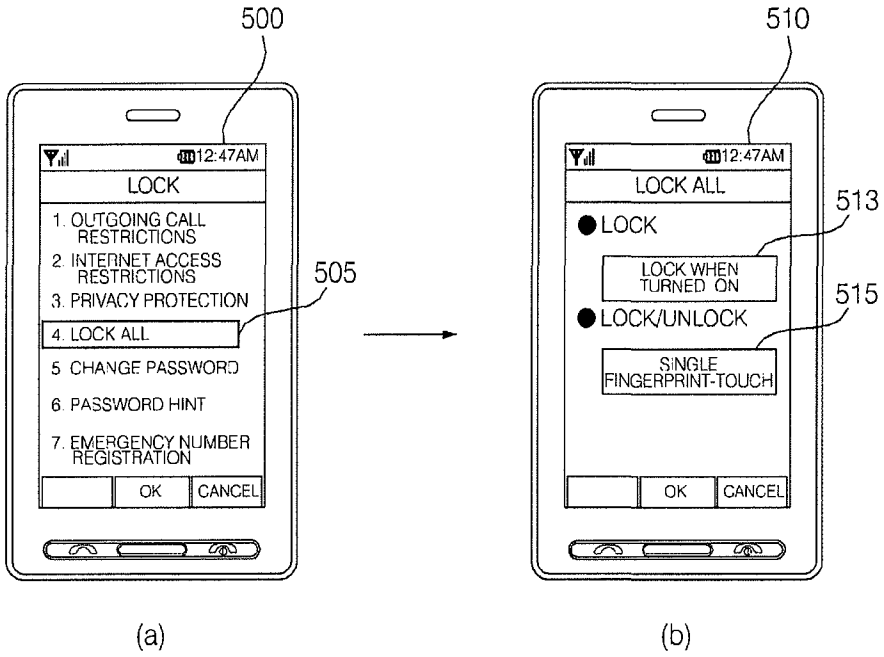


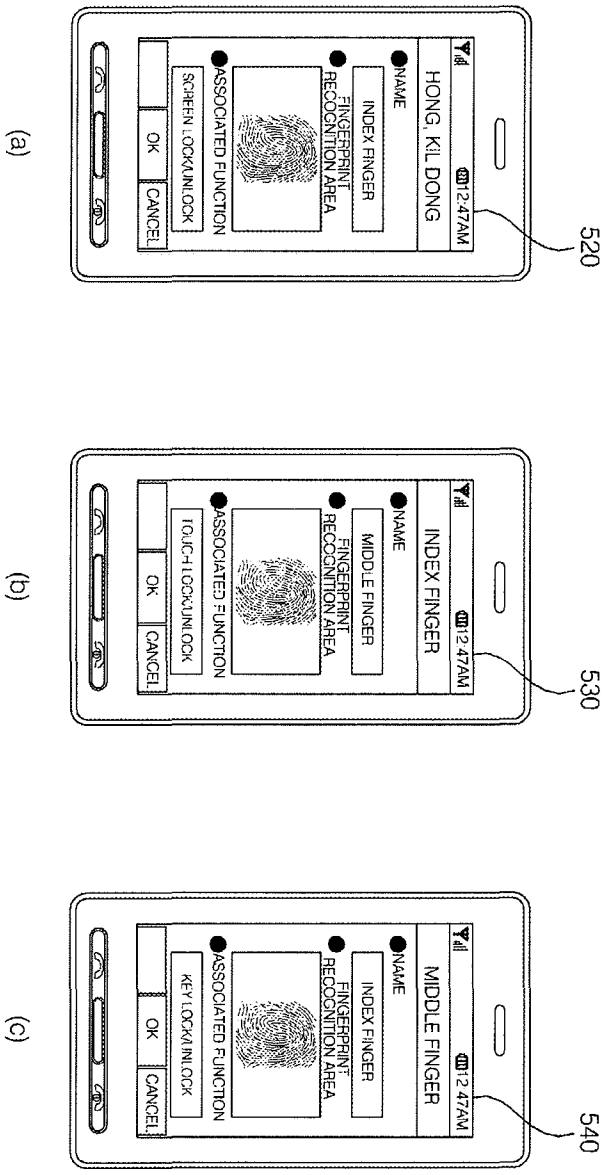
FIG. 15

FIG. 16



Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000231

FIG. 17



Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000232

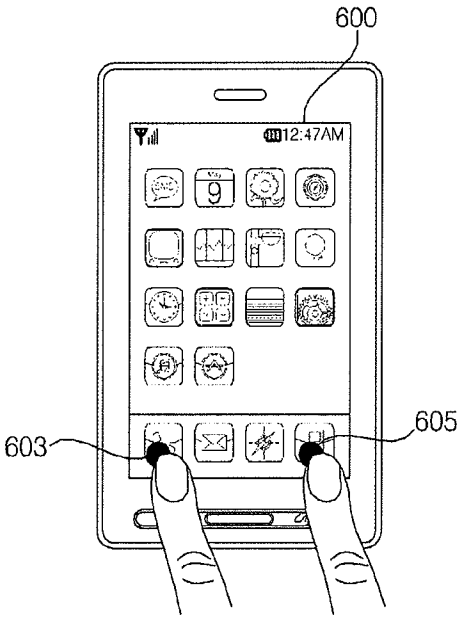
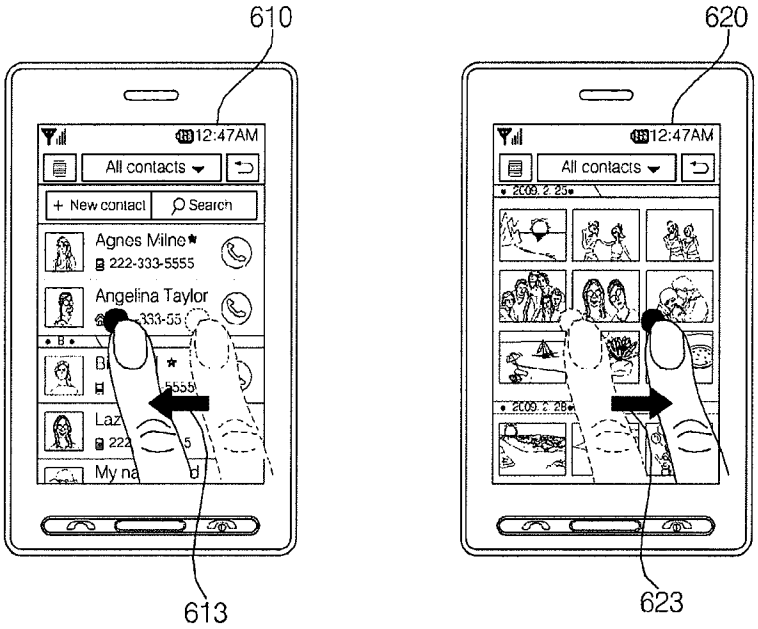


FIG. 18

FIG. 19



Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000233

FIG. 20

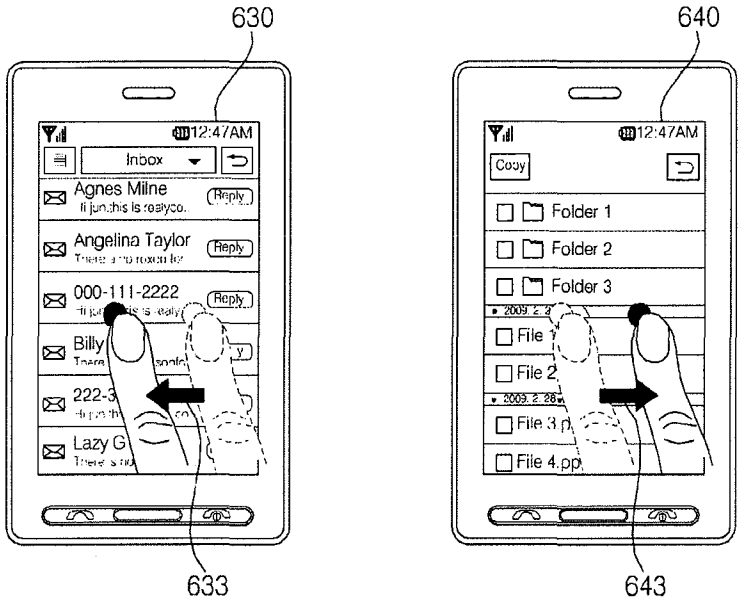
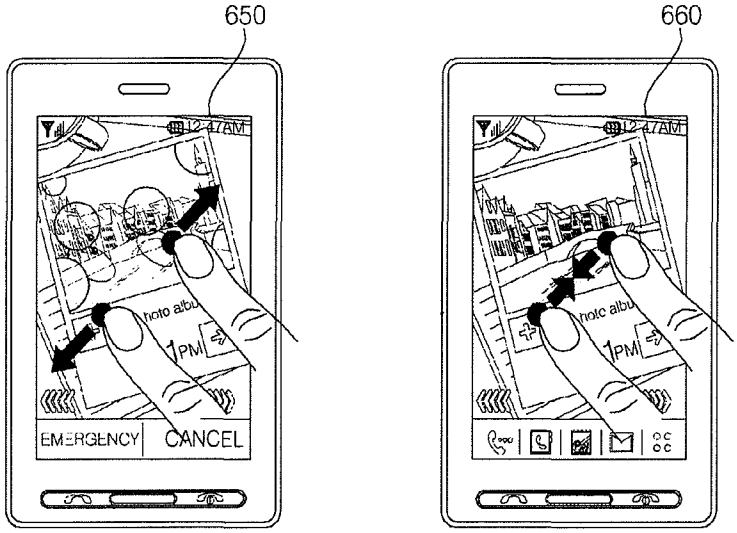


FIG. 21



Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000234

FIG. 22

(a)

FINGERPRINT TOUCH	SCROLL SPEED/ACCELERATION
USER1	VERY LOW
USER2	LOW
USER3	NORMAL
USER4	HIGH
USER5	VERY HIGH

(b)

FINGERPRINT TOUCH	SCROLL SPEED/ACCELERATION
THUMB	VERY LOW
INDEX FINGER	LOW
MIDDLE FINGER	NORMAL
RING FINGER	HIGH
LITTLE FINGER	VERY HIGH

(c)

FINGERPRINT TOUCH	SCROLL SPEED/ACCELERATION
PATTERN1	VERY LOW
PATTERN2	LOW
PATTERN3	NORMAL
PATTERN4	HIGH
PATTERN5	VERY HIGH

FIG. 23

(a)

FINGERPRINT TOUCH	SCROLL SPEED/ACCELERATION
USER1	1 SCREEN BASIS
USER2	2 SCREEN BASIS
USER3	3 SCREEN BASIS
USER4	4 SCREEN BASIS
USER5	5 SCREEN BASIS

(b)

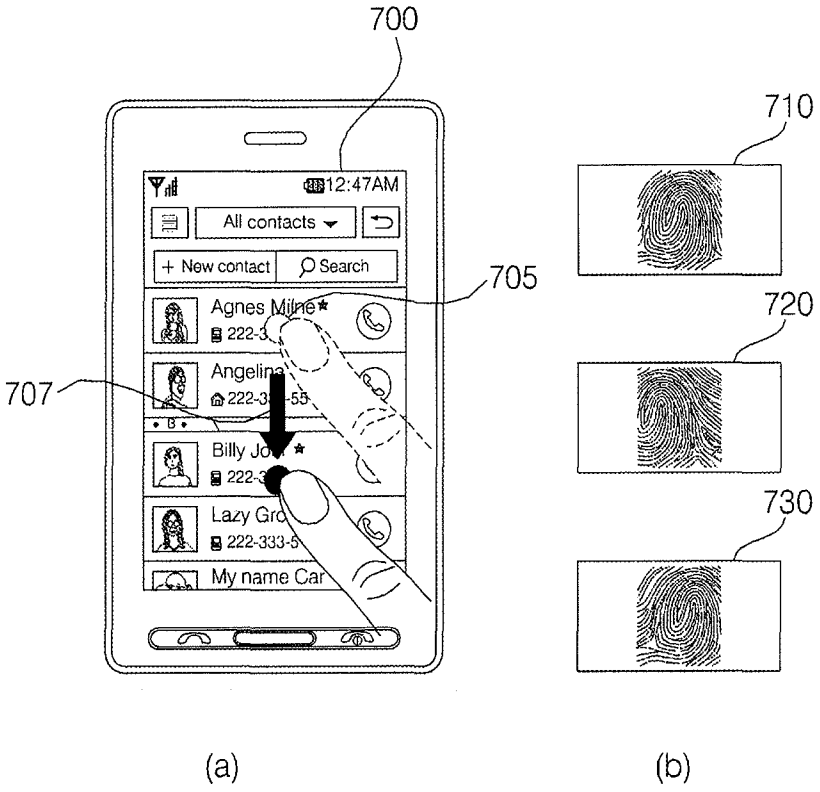
FINGERPRINT TOUCH	SCROLL SPEED/ACCELERATION
THUMB	1 LINE BASIS
INDEX FINGER	2 LINE BASIS
MIDDLE FINGER	3 LINE BASIS
RING FINGER	4 LINE BASIS
LITTLE FINGER	5 LINE BASIS

(c)

FINGERPRINT TOUCH	SCROLL SPEED/ACCELERATION
PATTERN1	1 PAGE BASIS
PATTERN2	2 PAGE BASIS
PATTERN3	3 PAGE BASIS
PATTERN4	4 PAGE BASIS
PATTERN5	5 PAGE BASIS

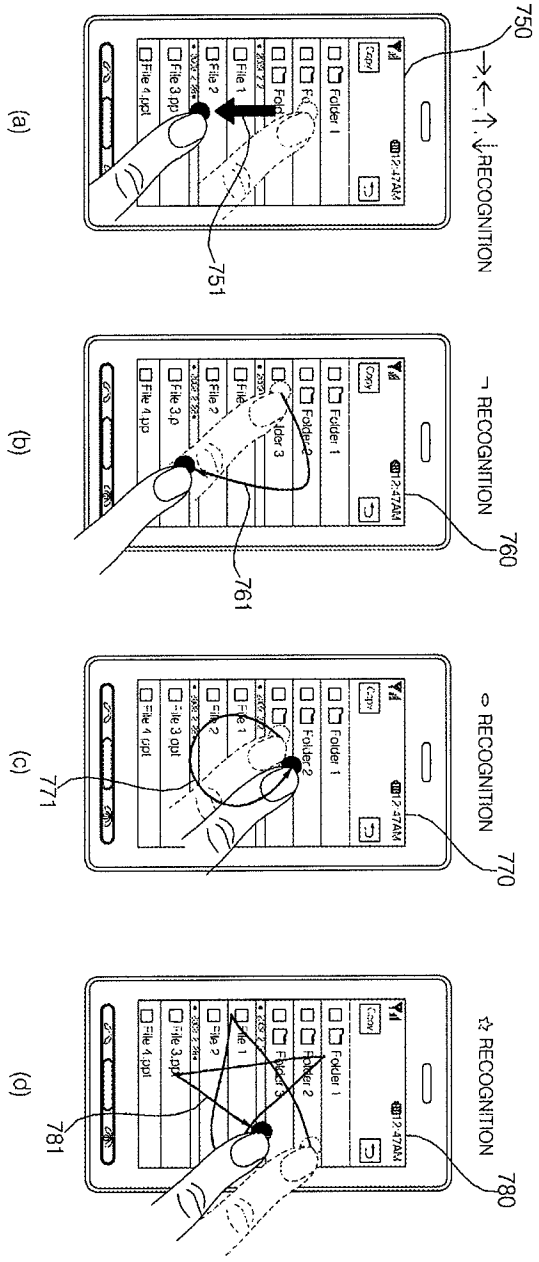
Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000235

FIG. 24



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FIG. 25



Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000237

FIG. 26

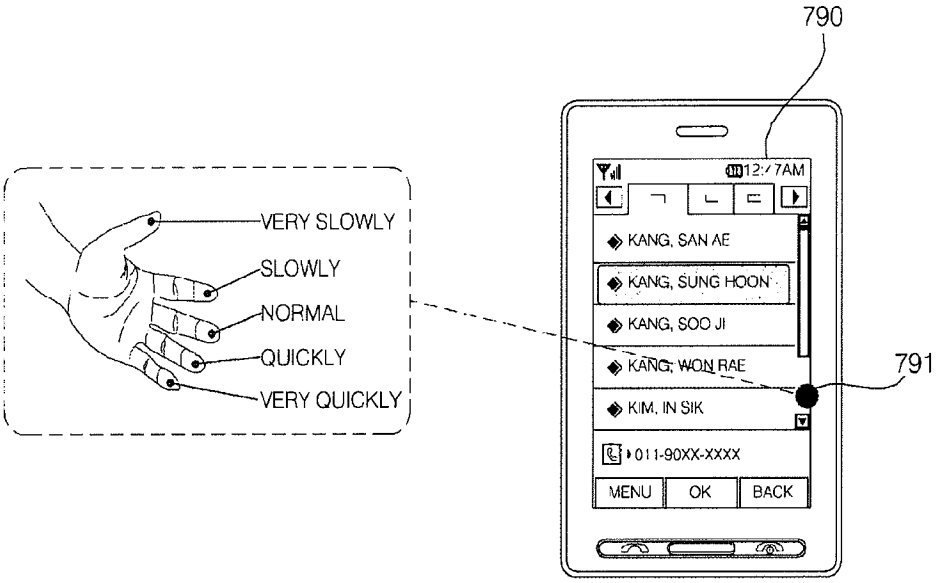
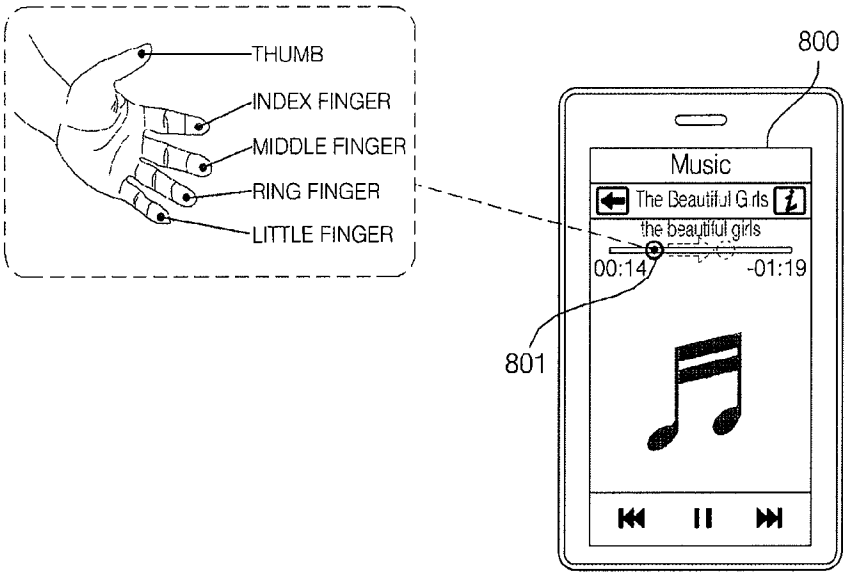


FIG. 27



Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000238

FIG. 28

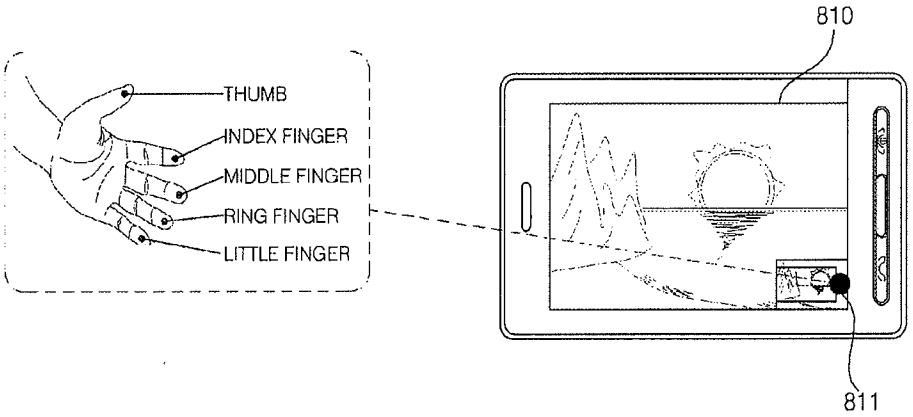
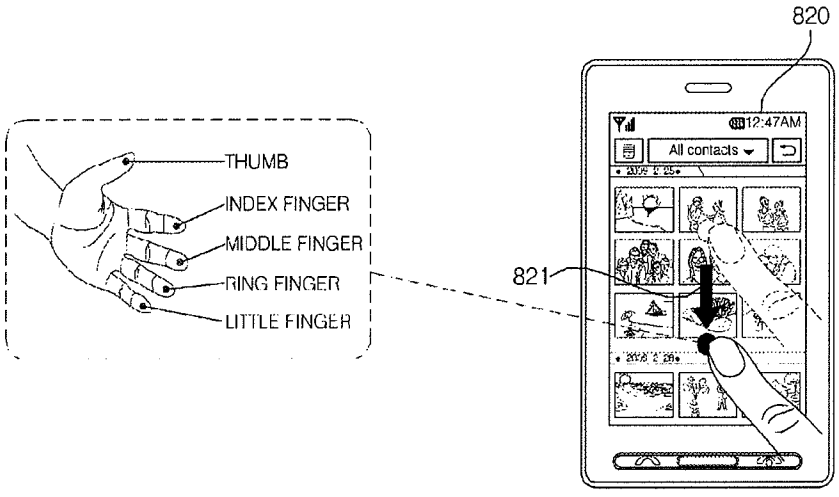


FIG. 29



Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000239

FIG. 30

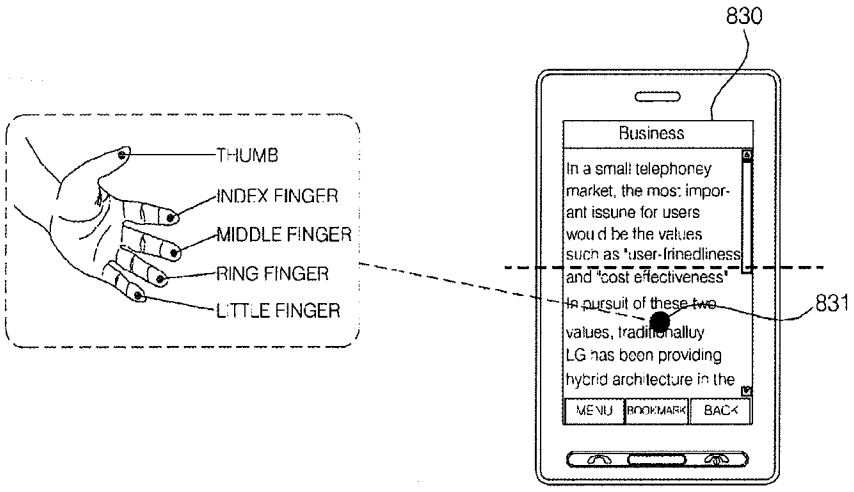
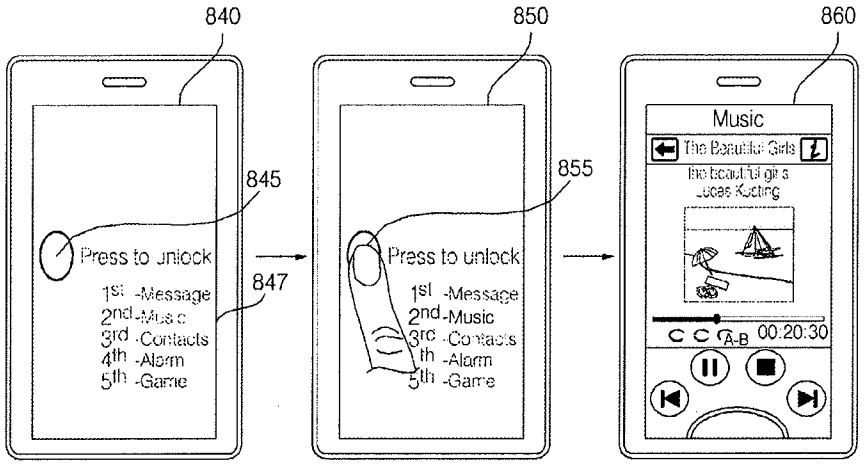


FIG. 31



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FIG. 32

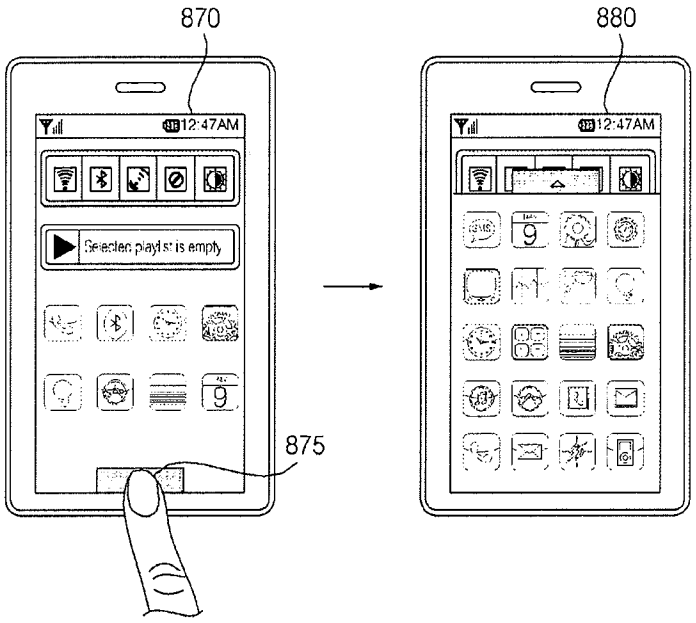
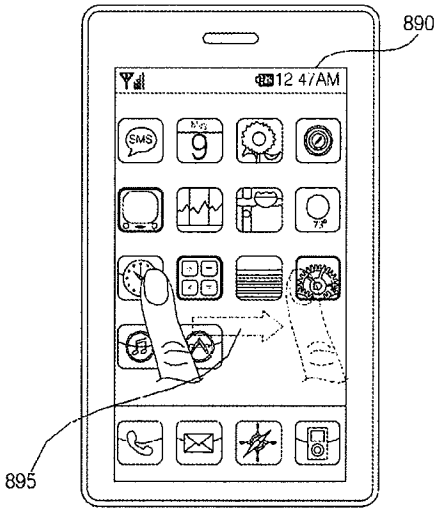


FIG. 33



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Europäisches Patentamt
European Patent Office
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EUROPEAN SEARCH REPORT

Application Number
EP 10 15 6753

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2007/140806 A1 (NOKIA CORP [FI]; NURMI JUHA H [FI]; SAARINEN KAJ [JP]; RAUTANEN TERO [) 13 December 2007 (2007-12-13) * page 2, line 19 - page 17, line 6 *	1-15	INV. G06F21/20
X	US 2006/284853 A1 (SHAPIRO STEVEN C [US]) 21 December 2006 (2006-12-21) * the whole document *	1-15	
A	US 2007/150842 A1 (CHAUDHRI IMRAN [US] ET AL CHAUDHRI IMRAN [US] ET AL) 28 June 2007 (2007-06-28) * abstract * * paragraph [0052] - paragraph [0063] *	1-15	
A	JP 2007 304646 A (SHARP KK) 22 November 2007 (2007-11-22) * abstract *	1-15	

TECHNICAL FIELDS SEARCHED (IPC)
G06F
H04L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	11 August 2010	Segura, Gustavo

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 10 15 6753

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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11-08-2010

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		US 2009241072 A1	24-09-2009
		WO 2007076210 A1	05-07-2007
JP 2007304646 A	22-11-2007	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 256 610 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
01.12.2010 Bulletin 2010/48

(51) Int Cl.:
G06F 3/048 (2006.01)

(21) Application number: **09011680.7**

(22) Date of filing: **11.09.2009**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK SM TR
Designated Extension States:
AL BA RS

(30) Priority: **27.05.2009 TW 98117942**

(71) Applicant: **HTC Corporation**
Taoyuan County 330 (TW)

(72) Inventor: **Brinda, David**
Taoyuan City
Taoyuan County 330 (TW)

(74) Representative: **Emde, Eric**
Wagner & Geyer
Gewürzmühlstrasse 5
80538 München (DE)

(54) Method for unlocking screen-locked state of touch screen, electronic device and recording medium using the same

(57) A method for unlocking a screen-locked state of a touch screen, and an electronic device and a recording medium using the same are disclosed. In the present method, during a screen-locked state, an unlocking area of a touch screen of the mobile device is divided into a first touch area and a second touch area by a separate line. Next, the touch screen is used to detect a touch operation of a user. If it is determined that the touch operation is started from the first touch area and ended in the second touch area, the screen of the mobile device is to be unlocked.

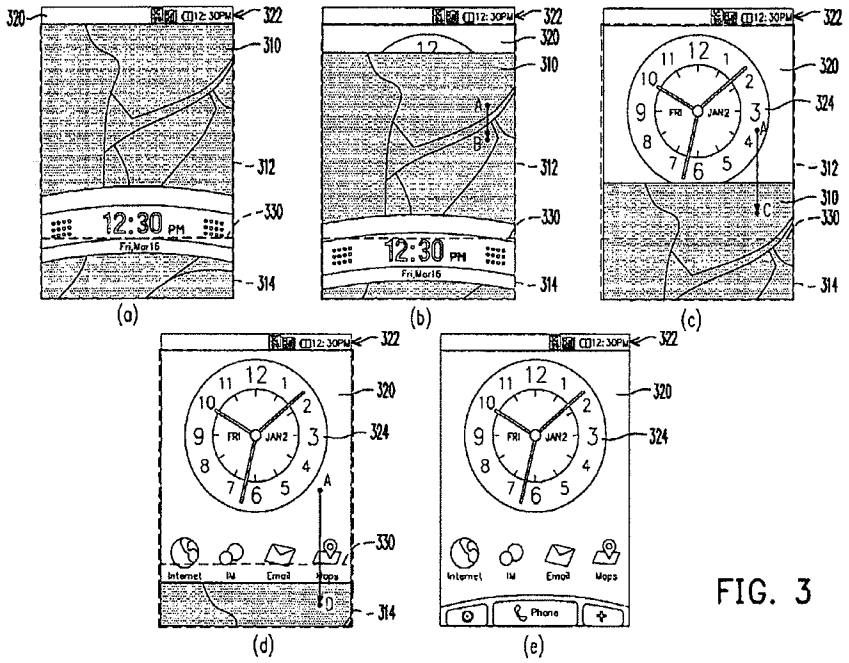


FIG. 3

EP 2 256 610 A1

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Description

BACKGROUND OF THE APPLICATION

1. Field of the Application

[0001] The present application relates to a method for operating a touch screen. More particularly, the present application relates to a method for unlocking a screen-locked state of a touch screen.

2. Description of Related Art

[0002] To get larger screen size, more and more electronic devices, such as mobile phones, are equipped with touch screen recently. However, the touch screen is quite sensitive to an external touch operation. When the user carelessly touches an on-screen key displayed on the touch screen, the electronic device is forced to execute a function corresponding to the on-screen key. Therefore, the electronic device has a screen-locked state to prevent the user from miss-touching the touch screen.

SUMMARY OF THE APPLICATION

[0003] The present application is directed to a method for unlocking a screen-locked state of a touch screen, an electronic device and a recording medium using the same, by which whether the screen of the electronic device is unlocked is determined according to whether a user's touch operation on a touch screen crosses a separate line.

[0004] The present application provides a method for unlocking a screen-locked state of a touch screen, wherein the touch screen in the screen-locked state has an unlocking area. In the method, the unlocking area of the touch screen is divided into a first touch area and a second touch area by a separate line. While a touch operation is detected by the touch screen, the screen-locked state of the touch screen is to be unlocked when the touch operation is started from the first touch area and ended in the second touch area.

[0005] The present application provides an electronic device including a touch screen and a processing module. The touch screen is used for detecting a touch operation, wherein touch screen in a screen-locked state has an unlocking area, and the unlocking area is divided into a first touch area and a second touch area by a separate line. The processing module is coupled to the touch screen, and is used for unlocking the screen-locked state of the touch screen when determining that the touch operation is started from the first touch area and ended in the second touch area.

[0006] The present application further provides a recording medium for storing a computer program, which is used to execute the aforementioned method. Basically, the computer program is assembled by a plurality of program sections (i.e. an organization diagram building program section, a list approving program section, a setting program section, and a deploying program section). Moreover, after the plurality of program sections are loaded to the electronic device and executed, the steps of the method for unlocking the screen-locked state of the touch screen can be accomplished.

[0007] The present application provides an electronic device including a dividing means, a detecting means and an unlocking means. The dividing means is for dividing an unlocking area of a touch screen of the electronic device into a first touch area and a second touch area by a separate line. The detecting means is for detecting a touch operation with the touch screen. And the unlocking means is for unlocking a screen-locked state of the touch screen when determining that the touch operation is started from the first touch area and ended in the second touch area.

[0008] According to the examples of the present application, when the touch screen enters the screen-locked state, the original layer originally displayed on the touch screen is covered by the protection layer, and the touch operation of the user will be detected. If the detected touch operation crosses the separate line, the protection layer is removed, so as to unlock the screen-locked state of the touch screen.

[0009] In order to make the aforementioned and other features and advantages of the present application comprehensible, several exemplary examples accompanied with figures are described in detail below.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. 1 is a flowchart illustrating a method for unlocking a screen-locked state of a touch screen according to an example of the present application.

[0011] FIG. 2 is a flowchart illustrating a method for unlocking a screen-locked state of a touch screen according to another example of the present application.

[0012] FIG. 3(a) to FIG. 3(e) are diagrams illustrating a method for unlocking a screen-locked state of a touch screen according to a first example of the present application.

[0013] FIG. 4(a) and FIG. 4(b) are diagrams illustrating a method for unlocking a screen-locked state of a touch screen according to a second example of the present application.

[0014] FIG. 5(a) to FIG. 5(c) are diagrams illustrating a method for unlocking a screen-locked state of a touch screen according to a third example of the present application.

[0015] FIG. 6(a) to FIG. 6(c) are diagrams illustrating a method for unlocking a screen-locked state of a touch screen according to a forth example of the present application.

[0016] FIG. 7 is a diagram illustrating an example of a protection layer according to an example of the present application.

[0017] FIG. 8 is a block diagram of an electronic device

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000245

according to an example of the present application.

DESCRIPTION

[0018] In the present application, a touch screen in a screen-locked state has an unlocking area, and the unlocking area is divided into two independent areas by a separate line. Then, whether the screen-locked state is unlocked is determined according to a touch operation detected with the touch screen from a user in the two areas. The present application applies a dual-layer display concept to implement the screen locking. According to such concept, in a normal state, an original layer is displayed for being operated by the user; and in the screen-locked state, a protection layer is displayed to cover the original layer preventing the user from miss-touching function icons or keys displayed on the original layer.

[0019] Moreover, the protection layer is correspondingly moved or removed according to the touch operation on the protection layer. When detecting a touch operation moved on the touch screen, the electronic device moves the protection layer according to a direction and a displacement of the touch operation, so that the original layer located under the protection layer can be viewed by the user. When detecting the touch operation ended, the electronic device determines whether to remove the protection layer and unlock the screen-locked state according to the start and end positions of the touch operation on the touch screen, so that the function icons or keys displayed on the original layer can be operated by the user. Examples are provided below to describe the above circumstances in detail.

[0020] FIG. 1 is a flowchart illustrating a method for unlocking a screen-locked state of a touch screen according to an example of the present application. The method of the present example is adapted to an electronic device with a touch screen, for example, a mobile phone, a personal digital assistant (PDA), a PDA mobile phone, a lap top computer, a car computer, a digital camera, a music player, a game device or any other electronic device with a touch screen. The method in FIG. 1 is described as follows.

[0021] When the touch screen is in the screen-locked state, whether the screen-locked state is unlocked is determined according to the touch operation of the user. Wherein, the touch screen enters the screen-locked state when the user's operation is not detected for a period of time, or directly enters the screen-locked state when receiving an input from a user to loch the touch screen, which is not limited by the present application.

[0022] After the touch screen enters the screen-locked state, the touch screen has an unlocking area and the unlocking area is divided into a first touch area and a second touch area by a separate line (S102). The unlocking area may include the whole touch area of the touch screen, or may include a part of touch area of the touch screen. The separate line may be a straight line or a curve line, and the separate line may be displayed or not displayed on the touch screen. All above modifications fall within the scope of the present application.

[0023] It should be noticed that even if the touch screen has entered the screen-locked state, the touch screen of the electronic device is still capable of detecting a touch operation from the user (S104).

[0024] When the touch screen detects a touch operation, the electronic device determines whether the touch operation is started from the first touch area and ended in the second touch area (S105). If the touch operation is started from the first touch area and ended in the second touch area (i.e., crosses the separate line), the screen-locked state of the touch screen is to be unlocked (S108). Otherwise, the touch screen maintains the screen-locked state (S110). In brief, when the user first touches the first touch area, drags across the separate line, and leaves in the second touch area finally, the electronic device determines the above touch operation is effective to unlock the screen-locked state of the touch screen for allowing the user to operate the function icons or keys displayed on the touch screen the electronic device.

[0025] In another example, the above operation method may be further combined with the dual-layer display concept to increase an operation flexibility of the electronic device. Another example is provided below for further description.

[0026] FIG. 2 is a flowchart illustrating a method for unlocking the screen-locked state of the touch screen according to another example of the present application. The method of the present example is also adapted to an electronic device with a touch screen, for example, a mobile phone, a PDA, a PDA mobile phone, a lap top computer, a car computer, a digital camera, a music player, a game device or any other electronic device with a touch screen. The method in FIG. 2 is described as follows.

[0027] When the touch screen is in the screen-locked state, a protection layer is displayed on the touch screen to cover an original layer originally displayed on the touch screen in a normal state (S202), so as to avoid the user from miss-touching the function icons an keys displayed on the original layer. The original layer may be a main menu user interface, an address book user interface, a network-browsing user interface, a message editing user interface, a multimedia-playing user interface or any types of user interface of the electronic device. The protection layer may cover the whole original layer, or may cover only a part of the original layer depending on design requirements. In addition, on the protection layer the information such as time, date, a service provider, an incoming or untreated event (e.g., an incoming call, message, email, a missed call, an unread voicemail, an unread message and/or an unread E-mail) may be displayed, so that the user can know a current state of the electronic device.

[0028] Besides displaying the protection layer, when

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000246

the touch screen is in the screen-locked state, the touch screen has an unlocking area and the unlocking area of is divided into a first touch area and a second touch area by a separate line (S204). Since the step S204 of the present example is similar to the step S102 of the aforementioned example, the detailed descriptions thereof are not repeated.

[0029] Next, the touch screen is used to detect the touch operation performed on the protection layer by the user (S206). During a process of detecting the touch operation, the protection layer may be moved according to a moving direction and a displacement of the touch operation, so as to reveal the original layer covered by the protection layer (S208) for allowing the user to view the content displayed on the original layer.

[0030] In one example, whether the protection layer is moved is determined according to the displacement of the touch operation along a specific direction. If the displacement along the specific direction is greater than a predetermined value, the protection layer is moved along the specific direction. Moreover, a moving distance of the protection layer may be determined according to the displacement of the touch operation along the specific direction.

[0031] For example, the specific direction is set to be a downward direction, and the predetermined value is set to be zero. When the touch screen detects a touch operation with a downward displacement, the protection layer is correspondingly moved downwards, and the moving distance of the protection layer increases as the displacement of the downward touch operation increases. In practice, the moving distance of the protection layer may be or not proportional to the downward displacement of the touch operation. It should be noticed that during an actual operation, a direction of the touch operation performed by the user may be slightly deviated from the specific direction. However, whether the protection layer is moved and the moving distance thereof may still be determined by calculating the displacement along the specific direction of the touch operation (for example, the downward direction), so that an effect of moving the protection layer is also achieved.

[0032] While the protection layer is being moved, the electronic device further determines whether the touch operation is started from the first touch area and ended in the second touch area (S210). When the touch operation is started from the first touch area and ended in the second touch area, the protection layer is moved to reveal the original layer originally covered by the protection layer (S212), and the screen-locked state of the touch screen is to be unlocked (S214). For example, the protection layer is moved downwards into a lower edge of the touch screen to remove the protection layer.

[0033] Otherwise, when the touch operation is determined not started from the first touch area or not ended in the second touch area, the current moved protection layer is bounced back to its original position to re-cover the original layer again (S216).

[0034] According to the above method for unlocking the screen-locked state of the touch screen, the user can move the protection layer to view a content displayed on the original layer by touching and dragging the protection layer. In addition, the user can remove the protection layer to operate the electronic device by touching the touch screen from the first touch area to the second touch area to cross the separate line with finger or stylus.

[0035] For example, FIG. 3(a) to FIG. 3(e) are diagrams illustrating a method for unlocking a screen-locked state of a touch screen according to a first example of the present application. FIG. 3(a) illustrates a screen image of the electronic device while the touch screen is in the screen-locked state, wherein a protection layer 310 covers an original layer 320, and leaves a status bar 322 on the original layer 320 uncovered. Now, the user can see information such as time and date, etc. displayed on the status bar 322, but cannot see the content on the original layer 320 covered by the protection layer 310 to operate the electronic device.

[0036] It should be noticed that in the present example, a separate line 330 is used to divide the touch screen into a first touch area 312 and a second touch area 314 as a reference for determining whether to unlock the screen-locked state of the touch screen. Namely, when the user touches the touch screen moving from the first touch area 312 to the second touch area 314 across the separate line 330, the electronic device then removes the protection layer 310 to unlock the screen-locked state of the touch screen.

[0037] Referring to FIG. 3(b), when the user touches the touch screen moving from a point A to a point B, the electronic device correspondingly moves the protection layer 310 along a direction from point A to point B to reveal a part of the original layer 320 originally covered by the protection layer 310.

[0038] Referring to FIG. 3(c), when the user continually moves on the touch screen to a point C, the protection layer 310 is moved downwards accordingly and a clock 324 on the original layer 320 is to be shown to the user. If the user stops touching the touch screen at the point C, since the start point A and the end point C of the touch operation are all located within the first touch area 312 and the touch operation is not across the separate line 330, the protection layer 310 is bounced back to its original position as shown in FIG. 3(a) to re-cover the original layer 320, and the screen-locked state of the touch screen is not to be unlocked.

[0039] Referring to FIG. 3(d), if the user continually moves on the touch screen to a point D, the protection layer 310 is further moved downwards accordingly. If the user stops touching the touch screen at the point D, since the start point A of the touch operation is located in the first touch area 312 and the end point D of the touch operation is located in the second touch area 314, and the touch operation is across the separate line 330, the protection layer 310 is moved downwards into a lower edge of the touch screen, and the screen-locked state of

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000247

the touch screen is to be unlocked. After that, the original layer 320 is totally displayed on the touch screen (shown as FIG. 3(e)) for allowing the user to perform general operations of the electronic device, for example, making a phone call, sending an E-mail or any other general operations of the mobile phone in this example.

[0040] As described above, if the touch operation is not started from the first touch area or not ended in the second touch area (i.e. not across the separate line), the screen-locked state of the touch screen is not to be unlocked.

[0041] For another example, FIG. 4(a) and FIG. 4(b) are diagrams illustrating a method for unlocking the screen-locked state of the touch screen according to a second example of the present application. FIG. 4(a) illustrates a screen image of the electronic device while the touch screen is in the screen-locked state, which is the same as FIG. 3(a).

[0042] Referring to FIG. 4(b), when the user touches the touch screen moving from a point A to a point B, the electronic device correspondingly moves the protection layer 310 along a direction from the point A to the point B to reveal a part of the original layer 320 originally covered by the protection layer 310. If the user stops touching the touch screen at the point B, since the start point A and the end point B of the touch operation are all located within the second touch area 314, and the touch operation is not across the separate line 330, the protection layer 310 is bounced back to its original position as that shown in FIG. 4(a) to re-cover the original layer 320, and the screen-locked state of the touch screen is not to be unlocked.

[0043] It should be noticed that in another example, when the displacement of the touch operation along the specific direction on the touch screen does not exceed a predetermined value, the protection layer 310 is not correspondingly moved.

[0044] For another example, FIG. 5(a) to FIG. 5(c) are diagrams illustrating a method for unlocking the screen-locked state of the touch screen according to a third example of the present application. FIG. 5(a) illustrates a screen image of the electronic device while the touch screen is in the screen-locked state, which is the same as FIG. 3(a).

[0045] Referring to FIG. 5(b), in the present example, the specific direction is set to be a downward direction, and the predetermined value is set to be zero. When the user touches the touch screen moving from a point A to a point B, since the touch operation does not have a downward displacement, the protection layer 310 is not moved. If the user stops touching the touch screen at the point B, since the start point A and the end point B of the touch operation are all located within the second touch area 314, and the touch operation is not across the separate line 330, the screen-locked state of the touch screen is not to be unlocked.

[0046] Referring to FIG. 5(c), if the user continually moving upwards on the touch screen to a point C, since the touch operation still does not have the downward displacement, the protection layer 310 is still not moved accordingly. If the user stops moving on the touch screen at the point C, though the touch operation crosses the separate line 330, since the start point A of the touch operation is not located in the first touch area 312, and the end point C is not located in the second touch area 314, the screen-locked state of the touch screen is not to be unlocked.

[0047] It should be noticed that in other examples, the electronic device can further define a specific area on the touch screen as a reference for determining whether to move the protection layer 310. In detail, even if the touch screen detects the touch operation, the protection layer is not moved when the touch operation is not moved in the specific area. However, once the touch operation is moved in the specific area, the electronic device then moves the protection layer according to the touch operation.

[0048] For example, FIG. 6(a) to FIG. 6(c) are diagrams illustrating a method for unlocking the screen according to a fourth example of the present application. FIG. 6(a) illustrates a screen image of the electronic device while the touch screen is in the screen-locked state, wherein a protection layer 610 covers an original layer 620, and leaves a status bar 622 above the original layer 620 uncovered.

[0049] In the present example, a separate line 630 is used to divide the protection layer 610 into a first touch area 612 and a second touch area 614 as a reference for determining whether to unlock the screen-locked state of the touch screen. The difference to the aforementioned example is a specific area 640 is further defined in the present example to serve as a reference for determining whether to move the protection layer 610.

[0050] Referring to FIG. 6(a), when the user touches the touch screen moving from a point A to a point B, the protection layer 610 is not to be moved because the touch operation is not moved in the specific area 640.

[0051] Referring to FIG. 6(b), when the user continually moves on the touch screen to a point C, the protection layer 610 is correspondingly moved downwards according to a movement of the touch operation in the specific area 640 because the touch operation is moved in the specific area 640, and then a part of the original layer 620 located under the protection layer 610 is to be revealed. If the user stops touching the touch screen at the point C, as described above, since the start point A and the end point C of the touch operation are all located within the first touch area 612 and the touch operation in not across the separate line 630, the protection layer 610 is bounced back to its original position as shown in FIG. 6(a) to re-cover the original layer 620, and the screen-locked state of the touch screen is not to be unlocked.

[0052] Referring to FIG. 6(c), if the user continually moves on the touch screen to a point D, the protection layer 610 is further moved downwards accordingly because the displacement of the touch operation within the

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000248

specific area 640 is increased. If the user stops touching the touch screen at the point D, as described above, since the start point A is located in the first touch area 612 and the end point D is located in the second touch area 614, and the touch operation is across the separate line 630, the protection layer 610 is moved downwards into a lower edge of the touch screen and the screen-locked state of the touch screen is to be unlocked.

[0053] It should be noticed that in another example, the electronic device further displays a prompt message on the protection layer to prompt a latest untreated event to user. The untreated event may be a missed call, an unread voicemail, an unread message and/or an unread E-mail, which is not limited by the present application.

[0054] For example, FIG. 7 is a diagram illustrating an example of a protection layer according to an example of the present application. Referring to FIG. 7, besides displaying a current time and date, the protection layer 710 further displays a prompt message 720 of a missed call at a lower area of the protection layer 710 to prompt the user he/she missed a call.

[0055] In allusion to the aforementioned method for unlocking the screen-locked state of the touch screen, the present application also provides a corresponding hardware apparatus to apply the method to mobile phones, PDAs, PDA mobile phones, lap top computers, car computers, digital cameras, music players, game devices or any other electronic device with a touch screen etc. Another example is provided below for further description.

[0056] FIG. 8 is a block diagram of an electronic device according to an example of the present application. Referring to FIG. 8, the electronic device 800 comprises a touch screen 810 and a processing module 820.

[0057] The touch screen 810 is used for detecting a touch operation to the electronic device 800 performed by the user. When the touch screen 810 is in the screen-locked state, the touch screen 810 defines an unlocking area, wherein the unlocking area is divided into a first touch area and a second touch area by a separate line.

[0058] The processing module 820 is coupled to the touch screen 810, which is used for determining whether to unlock the screen-locked state of the touch screen 810 according to the detected touch operation when the touch screen 810 is in the screen-locked state. If the processing module 820 determines that the touch operation is started from the first touch area and ended in the second touch area, the processing module 820 unlocks the screen-locked state of the touch screen 810, for allowing the user to operate the electronic device 800 with the touch screen 810.

[0059] It should be noticed that during a process that the touch screen detects the user's touch operation, the processing module 820 can show the original layer under the protection layer by moving or removing the protection layer and unlock the screen-locked state of the touch screen according to the touch operation detected by the touch screen 810. Since the related technique features have been described in the aforementioned examples, details thereof are omitted for brevity.

[0060] The present application further provides a recording medium for storing a computer program, which is used to execute the method for unlocking a screen-locked state of a touch screen. Basically, the computer program is assembled by a plurality of program sections (i.e. an organization diagram building program section, a list approving program section, a setting program section, and a deploying program section). Moreover, after the plurality of program sections are loaded to the electronic device and executed, the steps of the screen unlocking method can be accomplished.

[0061] In summary, according to the examples of the present application, when the touch screen of the electronic device enters the screen-locked state, an additional protection layer is to cover the original layer originally displayed on the touch screen for avoiding the user miss-touching the function icons or keys displayed on the original layer. Moreover, the user can move the protection layer by touching and moving on the touch screen to view the content displayed on the original layer. If the user wants to recover to a normal operation mode, the user can remove the protection layer by touching and sliding across the separate line to unlock the screen-locked stat of the touch screen.

[0062] It will be apparent to those skilled in the art that various modifications and variations can be made to the structure of the present application without departing from the scope or spirit of the application. In view of the foregoing, it is intended that the present application cover modifications and variations of this application provided they fall within the scope of the following claims and their equivalents.

Claims

1. A method for unlocking a screen-locked state of a touch screen, wherein the touch screen in the screen-locked state has an unlocking area, the method comprising:

   dividing the unlocking area of the touch screen into a first touch area and a second touch area by a separate line;
   detecting a touch operation with the touch screen; and
   unlocking the screen-locked state of the touch screen when determining that the touch operation is started from the first touch area and ended in the second touch area.

2. The method as claimed in claim 1, wherein the touch screen in the screen-locked state displays a protection layer to cover an original layer, and the method further comprises:

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000249

moving the protection layer according to the touch operation to reveal a part of the original layer originally covered by the protection layer.

3. The method as claimed in claim 2, wherein the step of moving the protection layer according to the touch operation further comprises:

moving the protection layer along a specific direction when a displacement of the touch operation along the specific direction is greater than a predetermined value.

4. The method as claimed in claim 2, wherein the step of moving the protection layer according to the touch operation further comprises:

moving the protection layer according to the touch operation only when the touch operation is moved within a specific area on the touch screen.

5. The method as claimed in claim 2, wherein the step of unlocking the screen-locked state of the touch screen further comprises:

removing the protection layer to reveal the original layer originally covered by the protection layer.

6. The method as claimed in claim 2, further comprising:

bouncing back the protection layer to its original position to re-cover the original layer when the touch operation is determined not started from the first touch area or not ended in the second touch area.

7. The method as claimed in claim 2, further comprising:

displaying a prompt message on the protection layer to prompt a latest untreated event, wherein the untreated event comprises one of a missed call, an unread voicemail, an unread message and an unread E-mail.

8. An electronic device, comprising:

a touch screen, for detecting a touch operation, wherein touch screen in a screen-locked state has an unlocking area, and the unlocking area is divided into a first touch area and a second touch area by a separate line; and
a processing module, coupled to the touch screen, for unlocking the screen-locked state of the touch screen when determining that the touch operation is started from the first touch area and ended in the second touch area.

9. The electronic device as claimed in claim 8, wherein the touch screen in the screen-locked state displays a protection layer to cover an original layer; and
the processing module moves the protection layer according to the touch operation to reveal a part of the original layer originally covered by the protection layer.

10. The electronic device as claimed in claim 9, wherein the touch screen further has a specific area, and the processing module further moves the protection layer according to the touch operation only when the touch operation is moved within the specific area on the touch screen.

11. The electronic device as claimed in claim 9, wherein the processing module further removes the protection layer to reveal the original layer originally covered by the protection layer when determining that the touch operation is started from the first touch area and ended in the second touch area.

12. The electronic device as claimed in claim 9, wherein the processing module further bounces back the protection layer to its original position to re-cover the original layer when determining that the touch operation is not started from the first touch area or not ended in the second touch area.

13. The electronic device as claimed in claim 9, wherein the touch screen displays a prompt message on the protection layer to prompt a latest untreated event, wherein the untreated event comprises one of a missed call, an unread voicemail, an unread message and an unread E-mail.

14. A recording medium used for storing a computer program, said computer program comprising a plurality of codes used for being loaded into an electronic device and enabling the electronic device to execute the method of claim 1.

15. An electronic device, comprising:

a dividing means for dividing an unlocking area of a touch screen of the electronic device into a first touch area and a second touch area by a separate line;
a detecting means for detecting a touch operation with the touch screen; and
an unlocking means for unlocking a screen-locked state of the touch screen when determining that the touch operation is started from the first touch area and ended in the second touch area.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000250

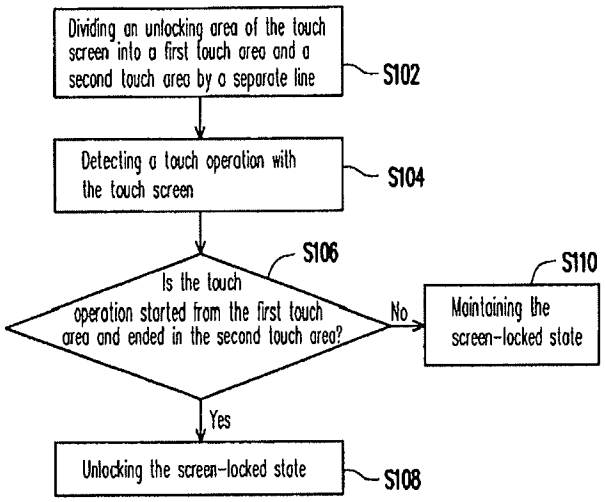


FIG. 1

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000251

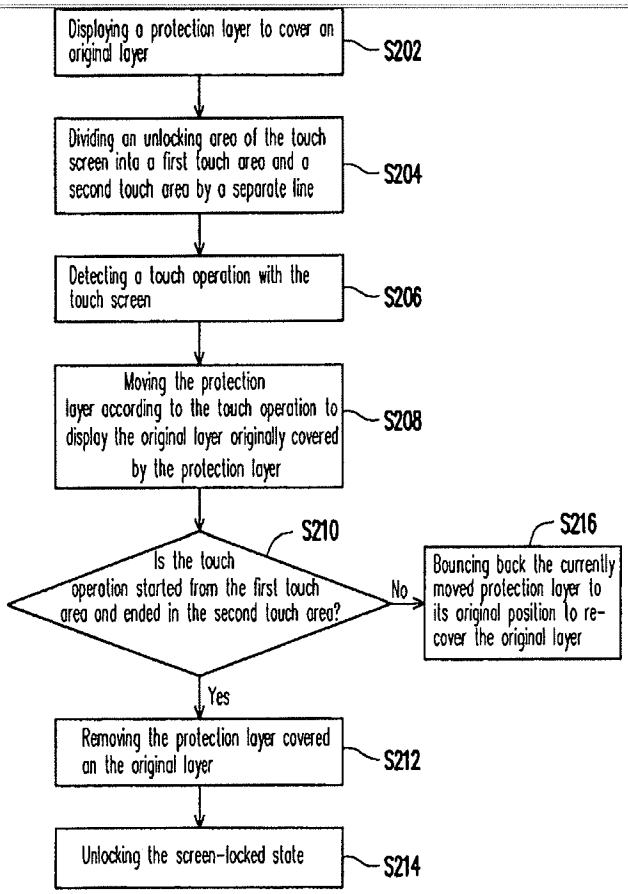


FIG. 2

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000252

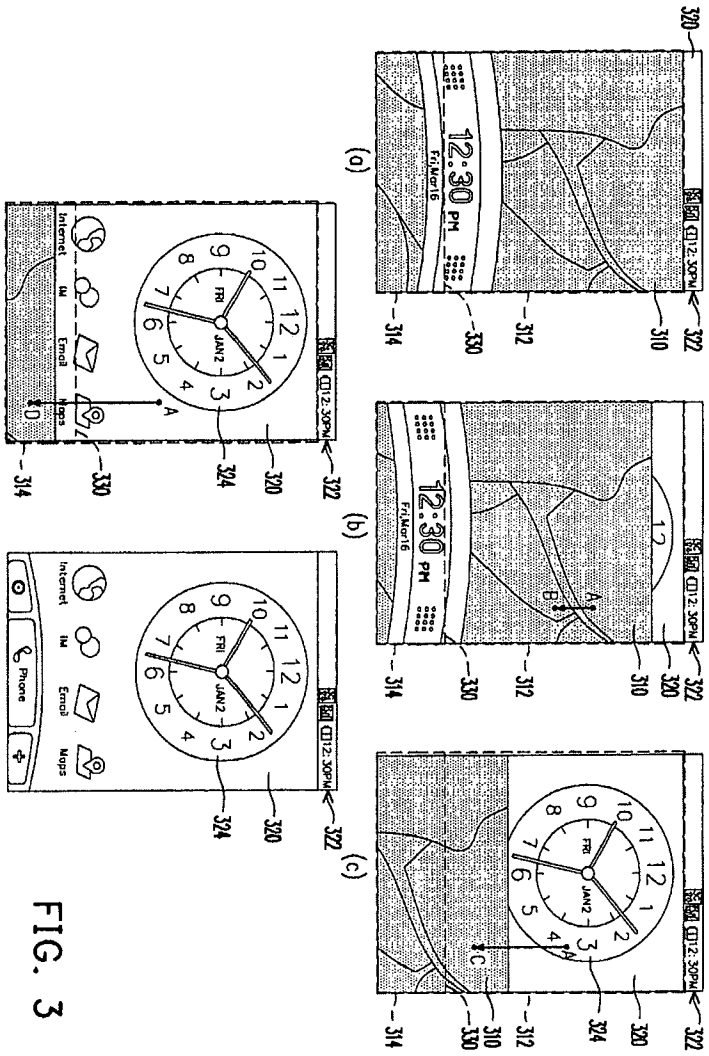


FIG. 3

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000253

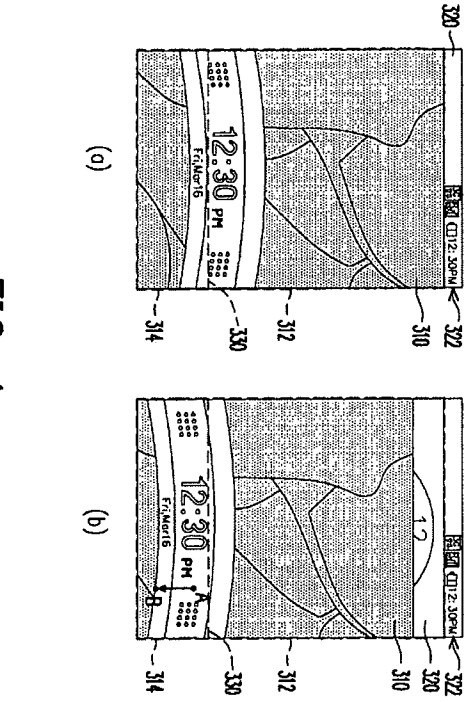


FIG. 4

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000254

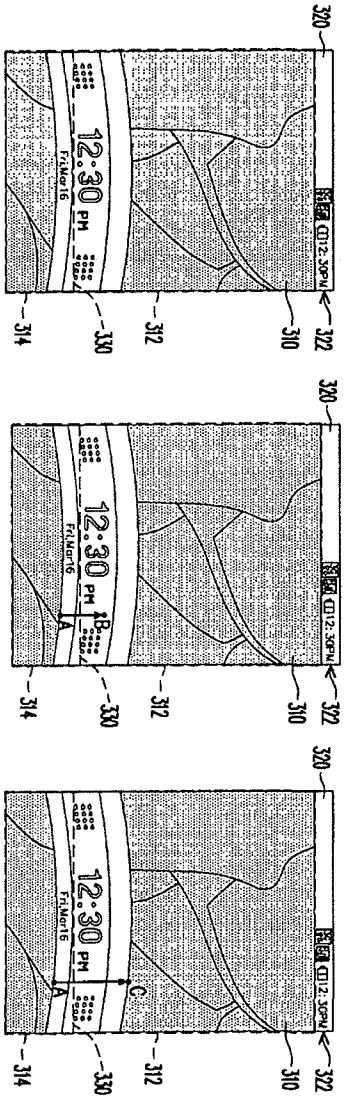


FIG. 5

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000255

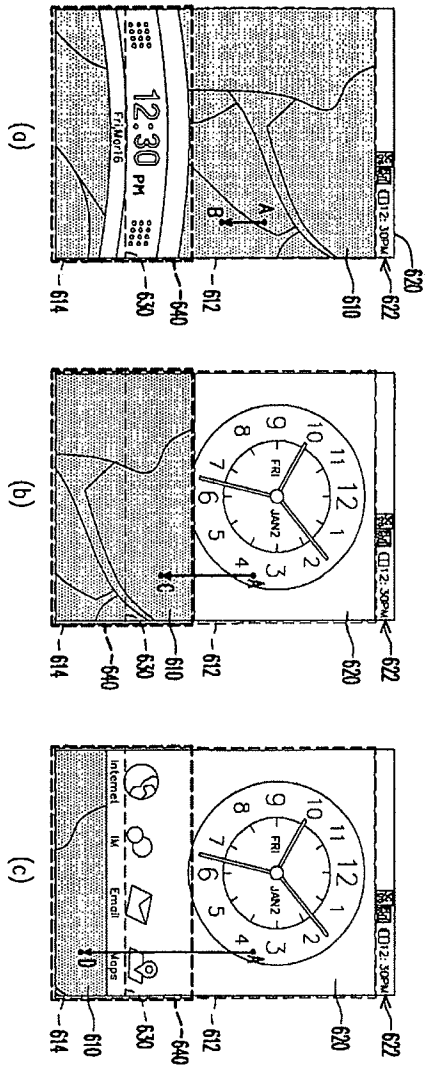


FIG. 6

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000256

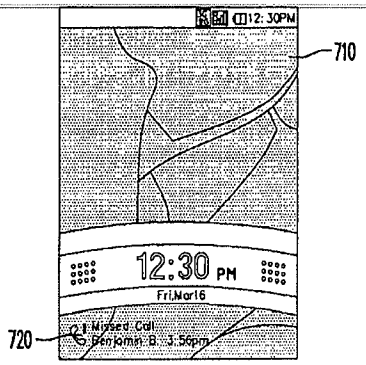


FIG. 7

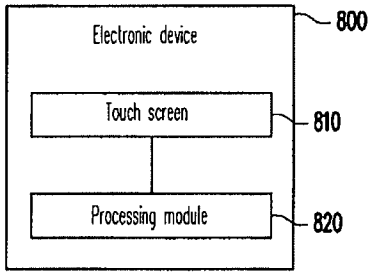


FIG. 8

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000257

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EUROPEAN SEARCH REPORT

Application Number
EP 09 01 1680

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2009/006991 A1 (LINDBERG PHILLIP JOHN [FI] ET AL) 1 January 2009 (2009-01-01) * paragraph [0016] * * paragraph [0024]; figure 2a *	1-15	INV. G06F3/048
X	US 2007/150842 A1 (CHAUDHRI IMRAN [US] ET AL) 28 June 2007 (2007-06-28) * paragraphs [0064] - [0070]; figure 3 *	1-15	
A	EP 1 022 650 A (IBM [US]) 26 July 2000 (2000-07-26) * paragraphs [0014], [0015]; figures 1,2 *	2-7,9-13	

TECHNICAL FIELDS SEARCHED (IPC)

G06F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Berlin	20 November 2009	Mouton, Benjamin

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
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Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000258

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 09 01 1680

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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20-11-2009

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000259

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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[Continued on next page]

(54) Title: SECURITY CAPABILITY WITH AN INPUT DEVICE

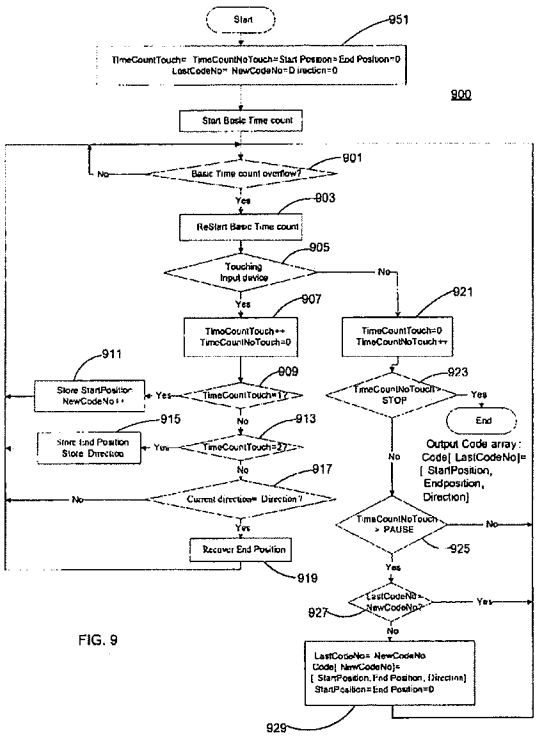


FIG. 9

(57) Abstract: Apparatuses and methods for providing security for a secured unit with a security code are provided. The secured unit may be locked to prevent an unauthorized user from accessing the secured unit. In order to unlock the secured unit, a user enters a sequence of strokes through an input device, e.g., a circular input device. A security module extracts stroke information from the entered strokes and unlocks the secured unit when the extracted stroke information matches the security code. Stroke information may be indicative of the locations of the start and end points and the direction of each stroke. A security code is configured for a secured unit by a user entering a sequence of strokes through an input device. The security code is determined from stroke information. The stroke information may be verified by the user re-entering the sequence of strokes.

WO 2008/116395 A1

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000260

NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

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SECURITY CAPABILITY WITH AN INPUT DEVICE

FIELD OF THE INVENTION

The present invention relates generally to entering strokes through an input device, e.g., a circular input device in order to configure a security code and to unlock an apparatus.

BACKGROUND OF THE INVENTION

Electronic equipment, e.g., MP3 players and wireless communication telephones, are becoming smaller with additional user capability. Electronic devices often have a circular input device for entering data into the electronic equipment but may not have a keypad because of size constraints. However, the user may wish to restrict use of the device to unauthorized users in order to protect important data, e.g., personal data.

Because of the need to reduce the size of an electronic device while increasing the capabilities of the electronic device, there is a real need in the marketplace to enable a user to ensure the security of the electronic device through a circular input device.

SUMMARY OF THE INVENTION

The present invention provides apparatuses and methods and for providing security for a secured unit with a security code. The secured unit may be locked to prevent an unauthorized user from accessing the secured unit. In order to unlock the secured unit, a user enters a sequence of strokes through an input device, e.g., a circular input device. A security module extracts stroke information from the entered strokes and unlocks the secured unit when the extracted stroke information matches the security code.

With one aspect of the invention, a security module obtains the locations of the start point and an end point of an entered stroke when extracting stroke information for unlocking a secured unit. If the entered start or end points is sufficiently close to valid points, the security module determines that the entered points are valid points. The security module allows an acceptance range to be specified when approximating the start and end points.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000262

With another aspect of the invention, direction information is obtained from an entered stroke when extracting stroke information. The locations of the start and end points may be used in conjunction with the direction data when comparing the stroke information with the security code.

With another aspect of the invention, one or more strokes may be entered when unlocking a secured unit. The number of strokes may be fixed or variable.

With another aspect of the invention, a security code is configured for a secured unit by a user entering a sequence of strokes through an input device. The security code is determined from stroke information. The stroke information may be verified by the user re-entering the sequence of strokes.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing summary of the invention, as well as the following detailed description of exemplary embodiments of the invention, is better understood when read in conjunction with the accompanying drawings, which are included by way of example, and not by way of limitation with regard to the claimed invention.

Figure 1 shows a security module that inputs a sequence of strokes through a circular input device to lock or unlock an apparatus in accordance with an embodiment of the invention.

Figure 2 shows a security module that inputs a sequence of strokes through a sliding input device to lock or unlock an apparatus in accordance with an embodiment of the invention.

Figure 3 shows exemplary user scenarios for entering strokes through a circular input device in accordance with an embodiment of the invention.

Figure 4 shows an approximation of a start point and an end point of an entered stroke through a circular input device in accordance with an embodiment of the invention.

Figure 5 shows different directions of different strokes near the start point in accordance with an embodiment of the invention.

Figure 6 shows different directions of different strokes near the end point in accordance with an embodiment of the invention.

Figure 7 shows a flow diagram for processing security strokes to configure a security code in accordance with an embodiment of the invention.

Figure 8 shows a flow diagram for processing unlocking strokes to unlock an apparatus in accordance with an embodiment of the invention.

Figure 9 shows a flow diagram for processing security strokes to configure a security code in accordance with an embodiment of the invention.

Figure 10 shows a circular input device in accordance with an embodiment of the invention.

Figure 11 shows a flow diagram for determining a direction of an entered stroke in accordance with an embodiment of the invention.

Figure 12 shows scenarios for extracting stroke information from entered strokes in accordance with an embodiment of the invention.

DETAILED DESCRIPTION OF INVENTION

The following is separated by subheadings for the benefit of the reader. The subheadings include: Terms, Architecture of Platform, Exemplary Scenarios of Entering Strokes Through an Input Device, and Processing of Entered Strokes to Configure a Security Code and to Unlock an Apparatus.

Terms

Stroke - a contiguous (uninterrupted) curve drawn on an input device, e.g., a circular input device. A *start point* is where the stroke begins and an *end point* is where the stroke ends. One or more *security strokes* are entered when a user is specifying a security code. One or more *unlocking strokes* are entered when a user is attempting to unlock an apparatus.

Stroke information – information that characterizes a stroke. Stroke information may include the locations of the start points and the end points and the direction of the stroke.

Security code – collection of information that stroke must match to unlock an apparatus. A *security code* may include information that is extracted from a sequence of *security strokes*.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000264

Architecture of Platform

Embodiments of the invention enable a user to enter strokes through an input device in order to configure a security code and to unlock an apparatus.

Figure 1 shows security module 100 that inputs a sequence of strokes through a circular input device 101 to lock or unlock apparatus 107 in accordance with an embodiment of the invention. Security module 100 may be contained in apparatus 107 (e.g., a MP3 player) or may external to apparatus 107 (e.g., a door latch). Security module 100 may be incorporated with different products. For example, a user may have data on a portable computer that must be protected while the user is not present. As another example, a parent wishes to prevent a child from opening a car door or a refrigerator door or turning on an electrical appliance by using a child proof lock for safety reasons.

Security module 100 includes circular input device 101 for a user to enter one or more strokes (a sequence of strokes) to configure a security code and to subsequently unlock apparatus 107 by entering a sequence of unlocking strokes. Processor 103 processes entered strokes to determine the security code and to determine whether information from entered strokes match the security code. Processor 103 may store the security code and stroke information in memory 105.

Figure 2 shows security module 200 that inputs a sequence of strokes through sliding input device 201 to lock or unlock an apparatus 207 in accordance with an embodiment of the invention. Security module 200 includes sliding input device 201 for a user to enter one or more strokes (a sequence of strokes) to configure a security code and to subsequently unlock apparatus 207 by entering a sequence of unlocking strokes. Processor 203 processes entered strokes to determine the security code and to determine whether information from the entered strokes match the security code. Processor 203 may store the security code and stroke information in memory 205.

Exemplary Scenarios of Entering Strokes Through an Input Device

Figure 3 shows exemplary user scenarios for entering strokes 301, 303, and 305 through circular input device 101 in accordance with an embodiment of the invention. Each stroke has start point 351, where a user starts to apply pressure (touch) to circular input device 101, and end point 353, where the user releases pressure to circular input device 101.

While different strokes typically have different start points and end points, Figure 3 illustrates a situation in which different strokes have the same start point (e.g., start point 351) and/or the same end point (e.g., end point 353). In such cases, embodiments of the invention may utilize additional stroke information (e.g., direction information) as will be discussed.

Strokes may be entered to configure a security code as will be discussed. In such cases, associated strokes are referred as *security strokes*. Also, strokes may be entered to unlock an apparatus, where associated information is matched to the security code. In such cases, associated strokes are referred as *unlocking strokes*.

Figure 4 shows an approximation of start point 451 and end point 453 of an entered stroke (e.g., 401 and 403) through circular input device 101 in accordance with an embodiment of the invention. Typically, a user cannot exactly enter the same stroke when repeating an operation. Consequently, start points and end points of different strokes (that are intended to be the same by the user) are not exactly the same.

In the example shown in Figure 4, the user attempts to enter strokes 401 and 403 so that both strokes have start point 451 and end point 453. However, strokes 401 and 403 do not have start points and end points that are exactly the same as start point 451 and end point 453. Consequently, embodiments of the invention may support an approximation of a start point and an end point, where the points are considered to be the same as the desired points if the entered points are sufficiently close to the desired points. For example, if the actual start point of an entered stroke is within circle 461 (having a center corresponding to start point 451), then the actual start point is considered to be the same as desired start point 451. Similarly, if the actual end point of an entered stroke is within circle 463 (having a center corresponding to end point 453), then the actual end point is considered to be the same as desired end point 453. As shown in the example in Figure 4, the start and end points of stroke 401 are approximated as being start points 451 and 453, respectively. However, the end point of stroke 403 is not considered as being end point 453 since the end point is outside the circle of tolerance.

Figure 5 shows different directions of different strokes 501-507 near start point 551 in accordance with an embodiment of the invention. With embodiments of the invention, stroke information that is extracted from an entered stroke may include direction information. For example, the directions of strokes 501, 503, 505, 507 are back, front, right, and left, respectively, near start point 551. Similarly, Figure 6 shows different directions of different strokes 601-607

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000266

near end point 661 in accordance with an embodiment of the invention. The directions of strokes 601, 603, 605, 607 are back, front, right, and left, respectively, near end point 651. Direction information for a stroke may include the directions of the stroke near the start point and the end point. However, embodiments of the invention may use other attributes to extract direction information for a stroke. For example, direction information may be indicative whether a stroke traverses in a clockwise or counterclockwise (anti-clockwise) direction about the center of circular device 101.

Stroke information that is extracted from a sequence of security strokes can be used as a security code for locking an apparatus as will be further discussed with Figures 6 and 8. Consequently, with embodiments of the invention, a security code is not a fixed sequence of key inputs but a sequence of use-entered input strokes. The start point, end point, and direction of the each stroke may be varied. The security module (e.g., module 100 or 200) can capture the approximate start and end points to form security code from a sequence of fixed number of strokes (e.g., three or four) or a variable number of strokes (e.g., from two to six strokes). As an example, if three strokes are used to configure the security code, the security code may be represented as a set of information comprising {start point i, end point i, direction i, start point 2, end point 2, direction 2, start point 3, end point 3, direction 3}.

Similarly, to unlock an apparatus, stroke information may be extracted from unlocking strokes as will be further discussed with Figure 8. If the extracted stroke information matches the security code, the security module instructs the apparatus to unlock.

Processing of Entered Strokes to Configure a Security Code and to Unlock an Apparatus

Figure 7 shows flow diagram 700 for processing security strokes to configure a security code in accordance with an embodiment of the invention. The setup of the security lock may be through a menu displayed on a user interface. Once the setup mode is entered in step 701, the security module waits for a user to input a sequence of security strokes. Once the user starts to touch the input device, the security module learns the approximate start location and end location together with the direction. In steps 703 and 705, the user enters the sequence of security strokes from which stroke information is extracted. The approximation of the locations of the start point and the end point can be determined by the programmer or end user. For example, entered points may be ± 1cm or ± 2cm from the learned location.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000267

In step 707, if pause time has not expired, process 700 will continue to scan for further entered strokes in order to configure the security code. However, if the pause time expires, process 700 will save the extracted stroke information as being potentially the security code in step 709.

In step 711, the user re-enters the sequence of entered strokes as was entered in steps 703-707. Re-entered code information is approximated within the specified tolerances. If the re-entered code matches the originally-entered code, as determined by step 713, the security code is set to the entered code. The security code is stored in memory (e.g., memory 105, for later retrieval when a user is attempting to unlock the apparatus. However, if the codes do not match, process 700 is reset so that the user needs to repeat process 700 in order to configure the security code.

Once the security code has been configured, the apparatus may enter the security lock mode in order to provide a security lock or a child-proof lock. Embodiments of the invention support different methods to activate the security lock mode. For example, a user may:

- setup a preset time through a menu, in which the security module activates the security lock mode when the timer expires because of user inactivity
- press a designated button to activate the security lock mode
- enter the security mode through a menu
- enter a predefined sequence of strokes through an input device to enter the security lock

Figure 8 shows flow diagram 800 for processing unlocking strokes to unlock an apparatus in accordance with an embodiment of the invention. In step 801, the security module enters a security lock mode, in which the apparatus is non-responsive until the user enters the security code. With embodiments of the invention, the user may unlock the apparatus by pressing a designated button (e.g., a child-proof lock). Alternatively, the user may enter a sequence of unlocking strokes through an input device. The security module processes the entered strokes as shown in flow diagram 800.

In steps 803-807, user enters strokes in an attempt to unlock the apparatus. The security module extracts stroke information in step 805 for each entered unlocking stroke. When all of the strokes have been entered, as determined by step 807, the security module determines if the extracted stroke information matches the security module. The security module may require an exact

match or may require a sufficient number of stroke attributes to match the security code. If the extracted stroke information matches the security code, as determined by step 809, the apparatus is unlocked in step 811. Otherwise, the process 800 resets in step 813, and the user must repeat the process in order to attempt unlocking the apparatus.

Figure 9 shows flow diagram 900 for processing security strokes to configure a security code in accordance with an embodiment of the invention. (Please note that flow diagram 700 provides a similar process for configuring a security code.) Initially, timers and location registers are reset in step 951. Process 900 periodically scans activity on a circular input device in accordance with basic time overflow in step 901. When the basic timer expires, the timer is reset in step 903, and the security module determines if the input device is being touched in step 905.

If the input device is being touched, steps 907-919 are executed to extract stroke information from the entered stroke. In step 917 direction information is extracted from the entered stroke as will be further discussed in Figure 11.

Once the user terminates touching the input device to specify the entered stroke, as determined by step 905, process 900 determines if additional strokes may occur to obtain additional stroke information from subsequent strokes in steps 921-925. If step 927 determines that a new security code has been configured, the new security code is entered into memory in step 929. The security code comprises an array, where each member of the array corresponds to the locations of the start point and end point and the direction of each stroke.

Figure 10 shows circular input device 1000 in accordance with an embodiment of the invention. The touch screen is divided into 128 equal radial sections, in which each region, (e.g. sections 1001a-1001d) is assigned a section number (1-128). If a point (either a start point or an end point of an entered stroke) is located anywhere in a region, the location of the point is associated with assigned section number of the region.

Figure 11 shows flow diagram 1100 for determining a direction of an entered stroke in accordance with an embodiment of the invention. The exemplary embodiment shown in process 1100 refers to the section number assignments that are shown in Figure 10. Steps 1101-1109 analyze the locations (positions) of the start point and end point of the entered stroke. (Please note that an entered stroke may refer to either a security stroke or an unlocking stroke.) The

direction of the stroke is determined in steps 1111-1115, where the direction may be either clockwise or anti-clockwise (counterclockwise).

Figure 12 shows scenarios 1251-1267 for extracting stroke information from entered strokes in accordance with an embodiment of the invention. Scenarios 1251-1255 (corresponding to strokes 1201-1205, respectively) correspond to a training process, in which a user enters security strokes during the setup mode. A security module extracts security stroke information when configuring a security code. In the exemplary example, the security code configured to be {10, 55, clockwise; 125, 28, clockwise; 39, 85, anti-clockwise}. When a user subsequently attempts to unlock the device, the unlocking stroke information must match the security code within predetermined precision limits (e.g., ±5 units). Thus, when the user sequentially executes scenarios 1257-1261, the device will be unlocked. However, when the user sequentially executes scenarios 1263-1267, the device will remain locked.

As can be appreciated by one skilled in the art, a computer system with an associated computer-readable medium containing instructions for controlling the computer system can be utilized to implement the exemplary embodiments that are disclosed herein. The computer system may include at least one computer such as a microprocessor, digital signal processor, and associated peripheral electronic circuitry.

Although the subject matter has been described in language specific to structural features and/or methodological acts, it is to be understood that the subject matter defined in the appended claims is not necessarily limited to the specific features or acts described above. Rather, the specific features and acts described above are disclosed as example forms of implementing the claims.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000270

CLAIMS

What is claimed is:

1. A method for providing security for an apparatus, comprising:

(a) locking the apparatus to prevent an unauthorized user from accessing the apparatus;

(b) detecting an unlocking stroke that is entered though an input device;

(c) extracting unlocking stroke information from the unlocking stroke;

(d) repeating (b)-(c) when another unlocking stroke is entered; and

(e) when the unlocking stroke information matches a security code, unlocking the apparatus to enable an authorized user to access the apparatus.

2. The method of claim 1, (c) comprising:

(c)(i) obtaining an entered start point location and an entered end point location of the unlocking stroke.

3. The method of claim 2, (c) further comprising:

(c)(ii) determining whether the entered start point location is sufficiently close to a valid start point location; and

(c)(iii) determining whether the entered end point location is sufficiently close to a valid end point location.

4. The method of claim 3, wherein

(c)(ii) comprises:

(c)(ii)(1) measuring a start distance between the entered start point location and the valid start point location; and

(c)(ii)(2) determining whether the start distance is within a predetermined start limit; and

(c)(iii) comprises:

(c)(iii)(1) measuring an end distance between the entered end point location and the valid end point location; and

(c)(iii)(2) determining whether the end distance is within a predetermined end limit.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000271

5. The method of claim 2, (c) further comprising:

(c)(ii) obtaining direction information associated with the unlocking stroke.

6. The method of claim 1, (e) comprising:

(e)(i) verifying that the unlocking stroke information is the same as the security code for all unlocking strokes.

7. The method of claim 1, further comprising:

(f) storing the unlocking information in memory for subsequent retrieval.

8. The method of claim 1, further comprising:

(f) retrieving the security code from memory.

9. The method of claim 1, further comprising:

(f) determining a number of expected unlocking strokes associated with unlocking the apparatus.

10. The method of claim 1, (a) comprising:

(a)(i) locking the apparatus when a predetermined time is exceeded.

11. The method of claim 1, (a) comprising:

(a)(i) locking the apparatus when a predetermined sequence of entered stroke is entered.

12. A method for providing security for an apparatus, comprising:

(a) detecting a setup mode that allows an authorized user to enter a security code;

(b) detecting a security stroke that is entered through an input device;

(c) extracting security stroke information from the security stroke;

(d) repeating (b)-(c) when another security stroke is entered;

(e) determining a security code from the security stroke information; and

(f) locking the apparatus to prevent an unauthorized user from accessing the apparatus based on the security code.

13. The method of claim 12, further comprising:

(g) verifying the security stroke information.

14. The method of claim 13, (g) comprising:

(g)(i) repeating (b)-(e); and

(g)(ii) comparing the security stroke information with re-entered security stroke information.

15. The method of claim 12, (c) comprising:

(c)(i) obtaining a start point location and an end point location of the security stroke.

16. The method of claim 15, (c) further comprising:

(c)(ii) obtaining direction information associated with the security stroke.

17. The method of claim 12, further comprising:

(g) unlocking the apparatus by processing a sequence of entered strokes.

18. The method of claim 12, further comprising:

(g) unlocking the apparatus by detecting a user pressing a designated button.

19. The method of claim 17, further comprising:

(h) obtaining a predetermined approximation limit for processing the sequence of entered strokes to determine whether to unlock the apparatus.

20. A security module for providing security for an apparatus, comprising:

an input device capturing input stroke information; and

a processing unit obtaining the input stroke information from the input device and configured to perform:

(a) locking the apparatus to prevent an unauthorized user from accessing the apparatus based on a security code;

(b) detecting an unlocking stroke that is entered though the input device;

(c) extracting unlocking stroke information from the unlocking stroke;

(d) repeating (b)-(c) when another unlocking stroke is entered; and

(e) when the unlocking stroke matches a security code, unlocking the apparatus to enable an authorized user to access the apparatus.

21. The security module of claim 20, the processing unit being further configured to perform:

(f) detecting a setup mode that allows an authorized user to enter a security code;

(g) detecting a security stroke that is entered through the input device;

(h) extracting security stroke information from the security stroke;

(i) repeating (g)-(h) when another security stroke is entered; and

(j) determining the security code from the security stroke information.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000274

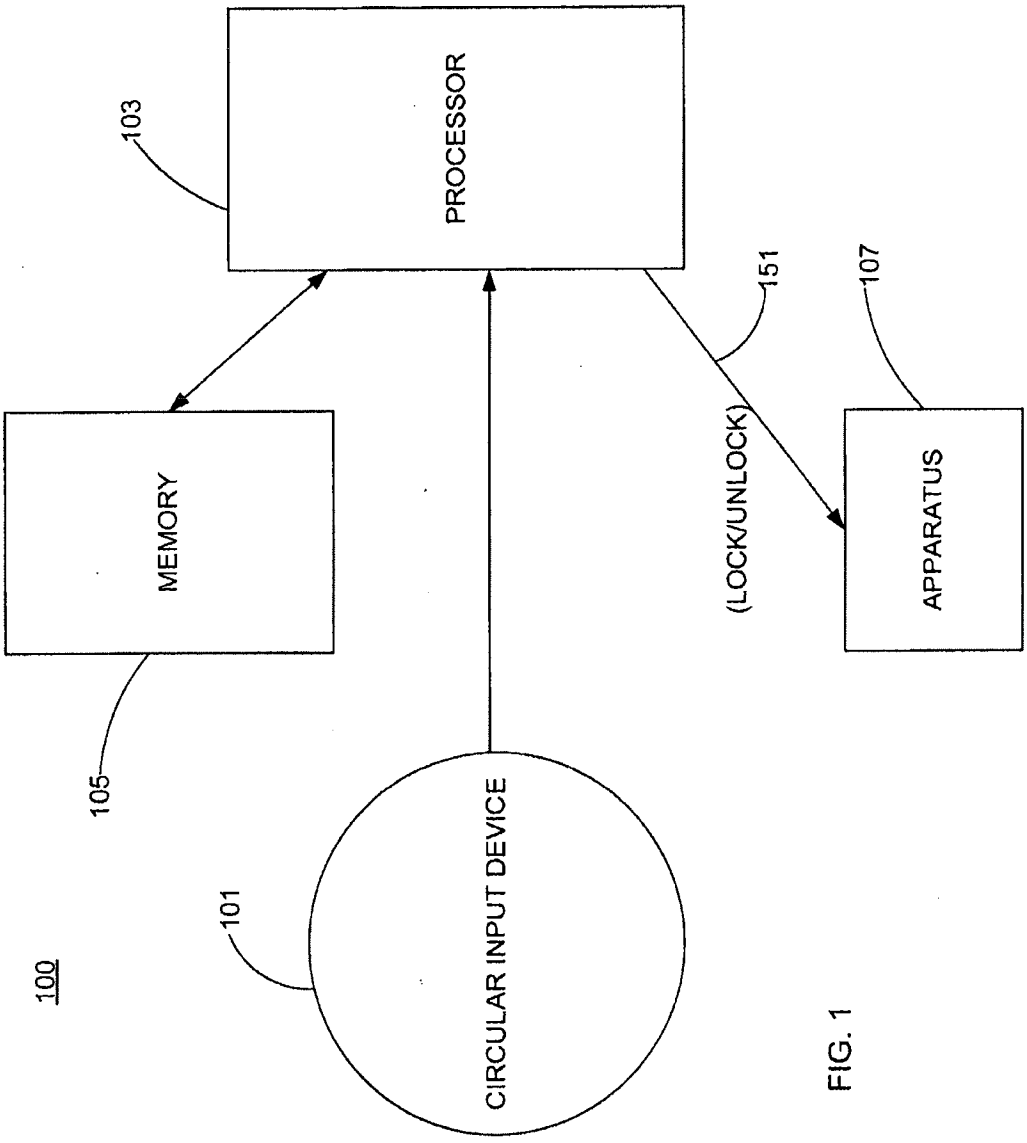


FIG. 1

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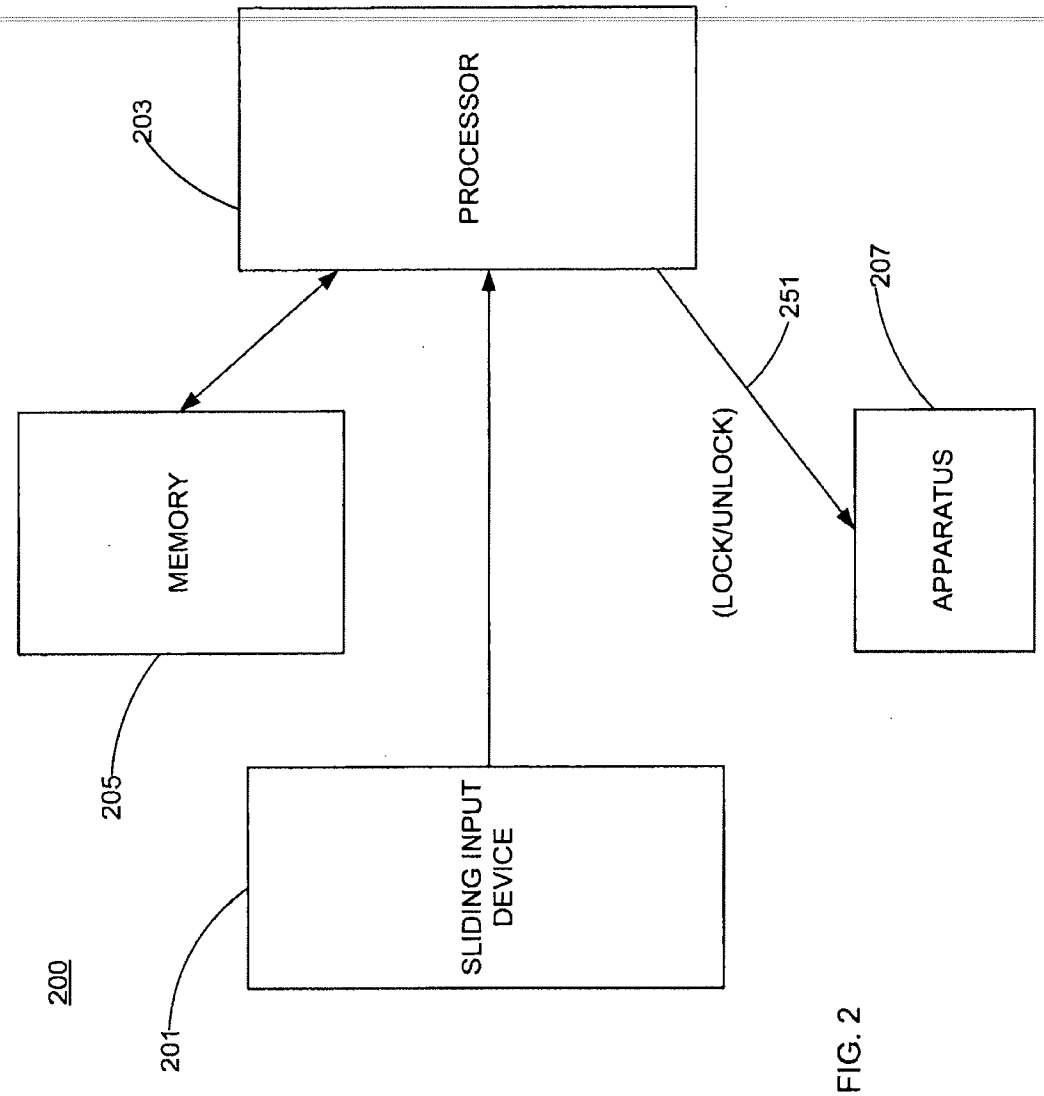


FIG. 2

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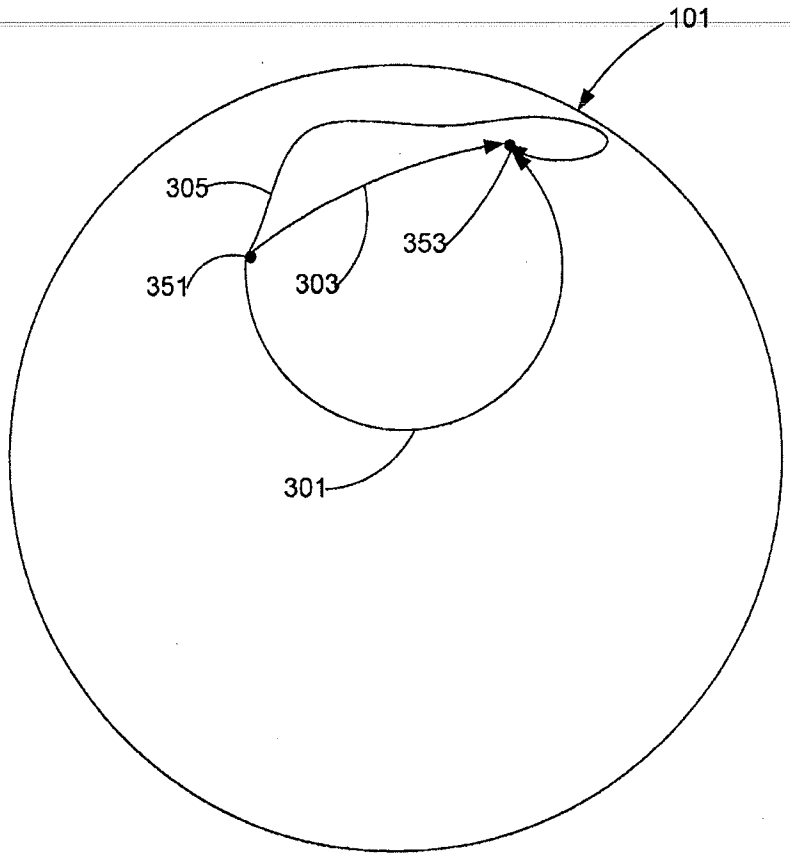


FIG. 3

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000277

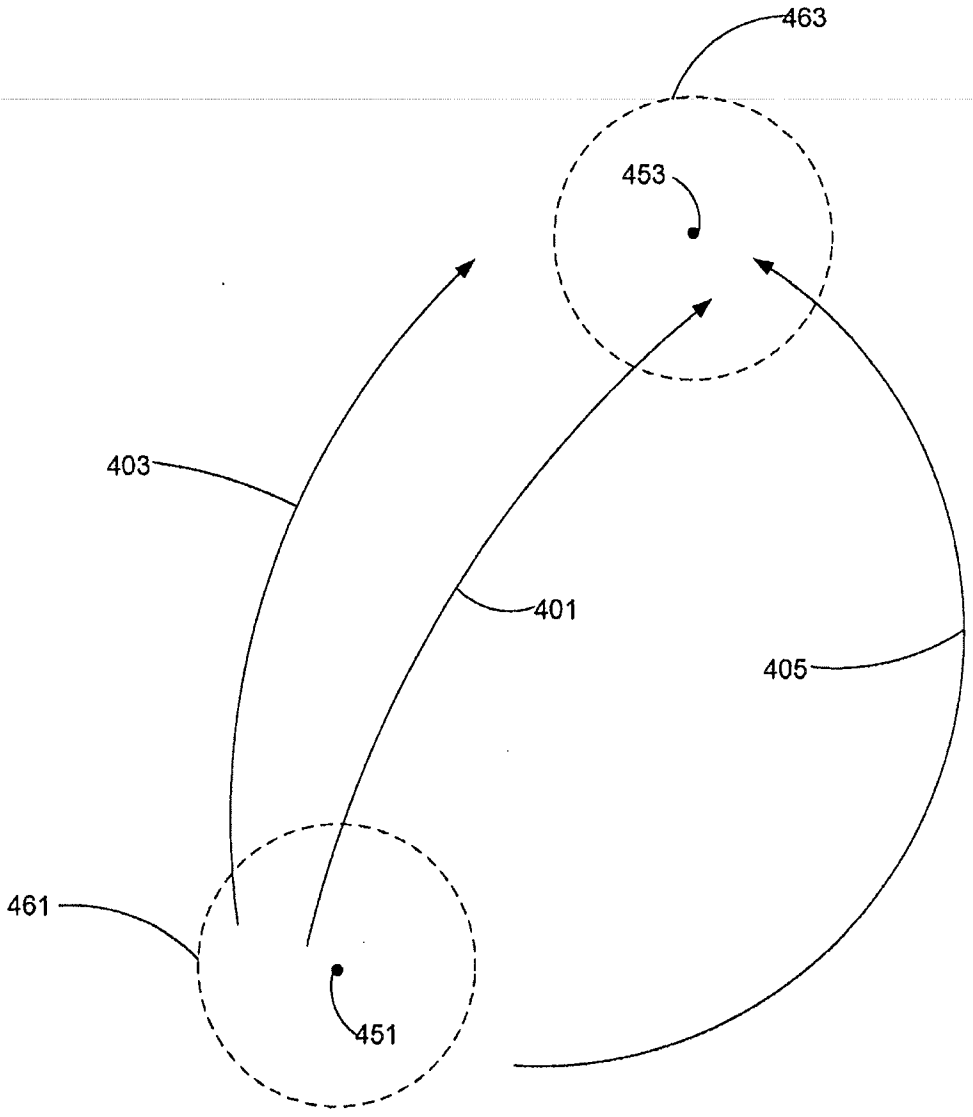


FIG. 4

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000278

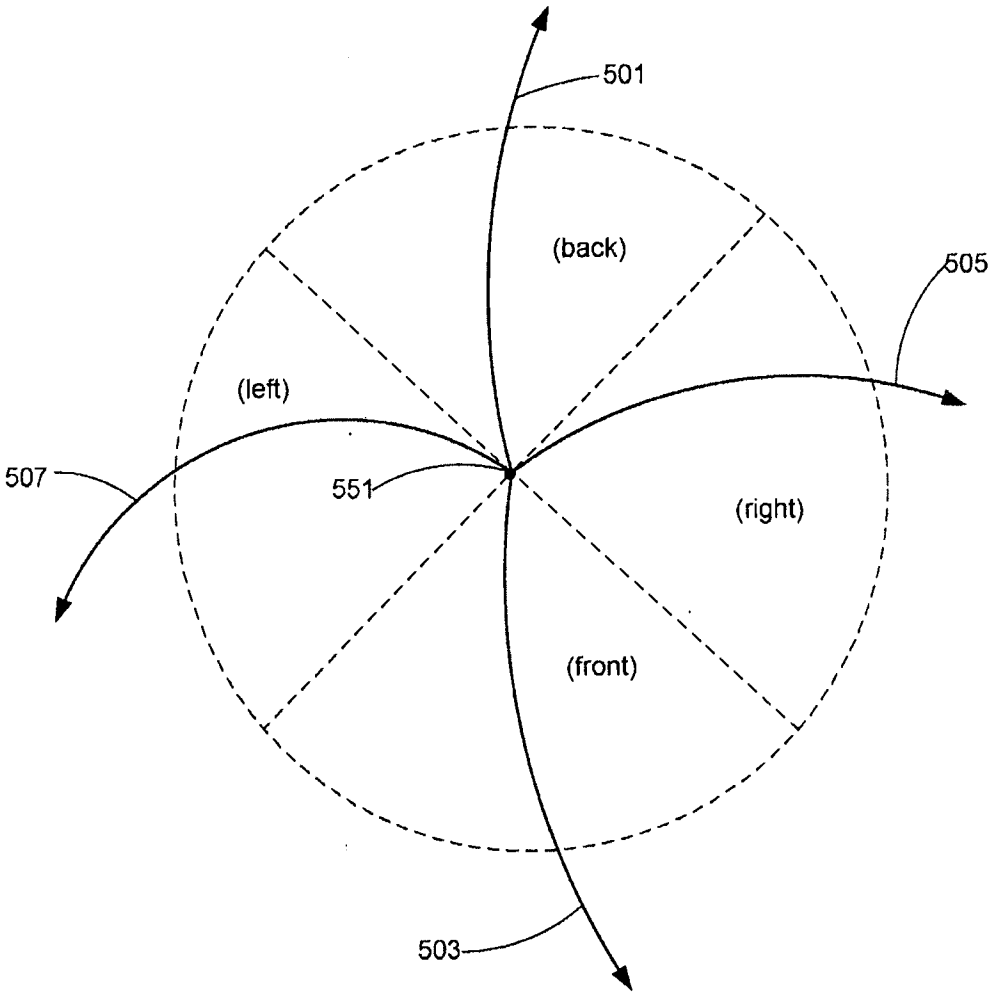


FIG. 5

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000279

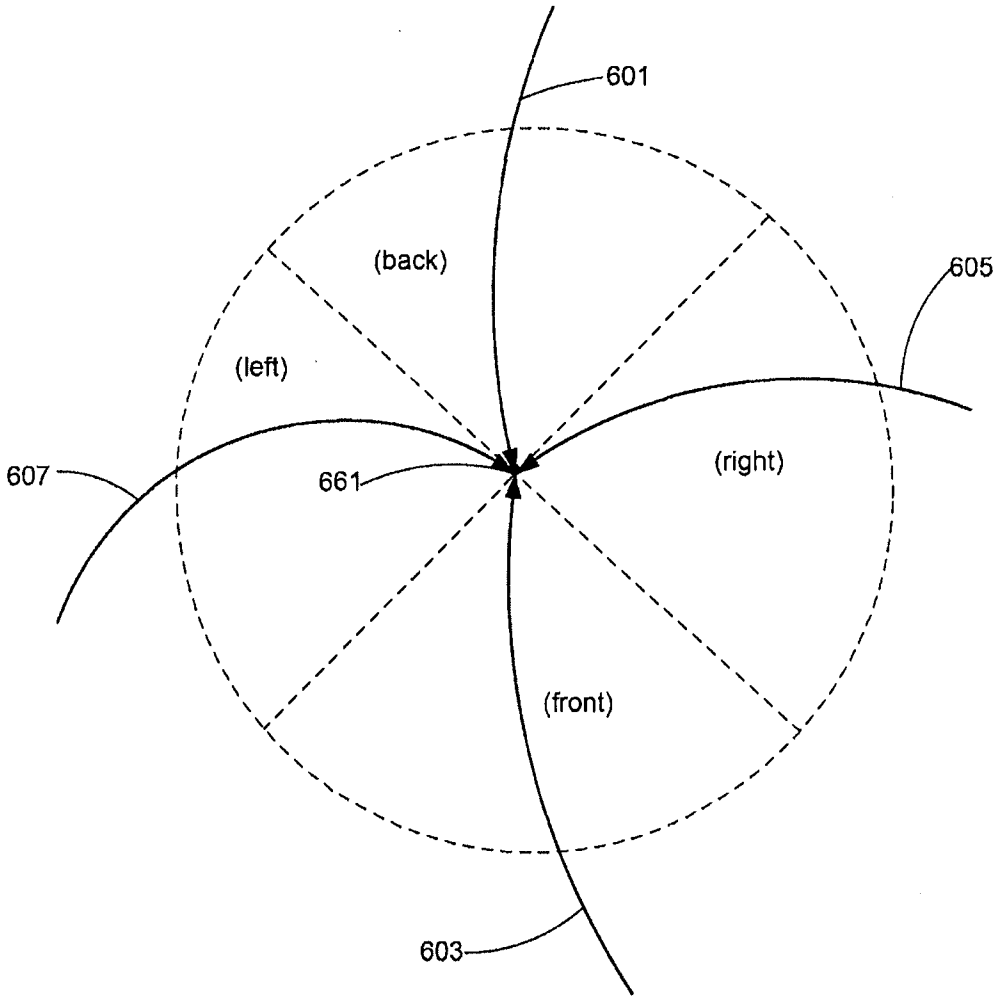


FIG. 6

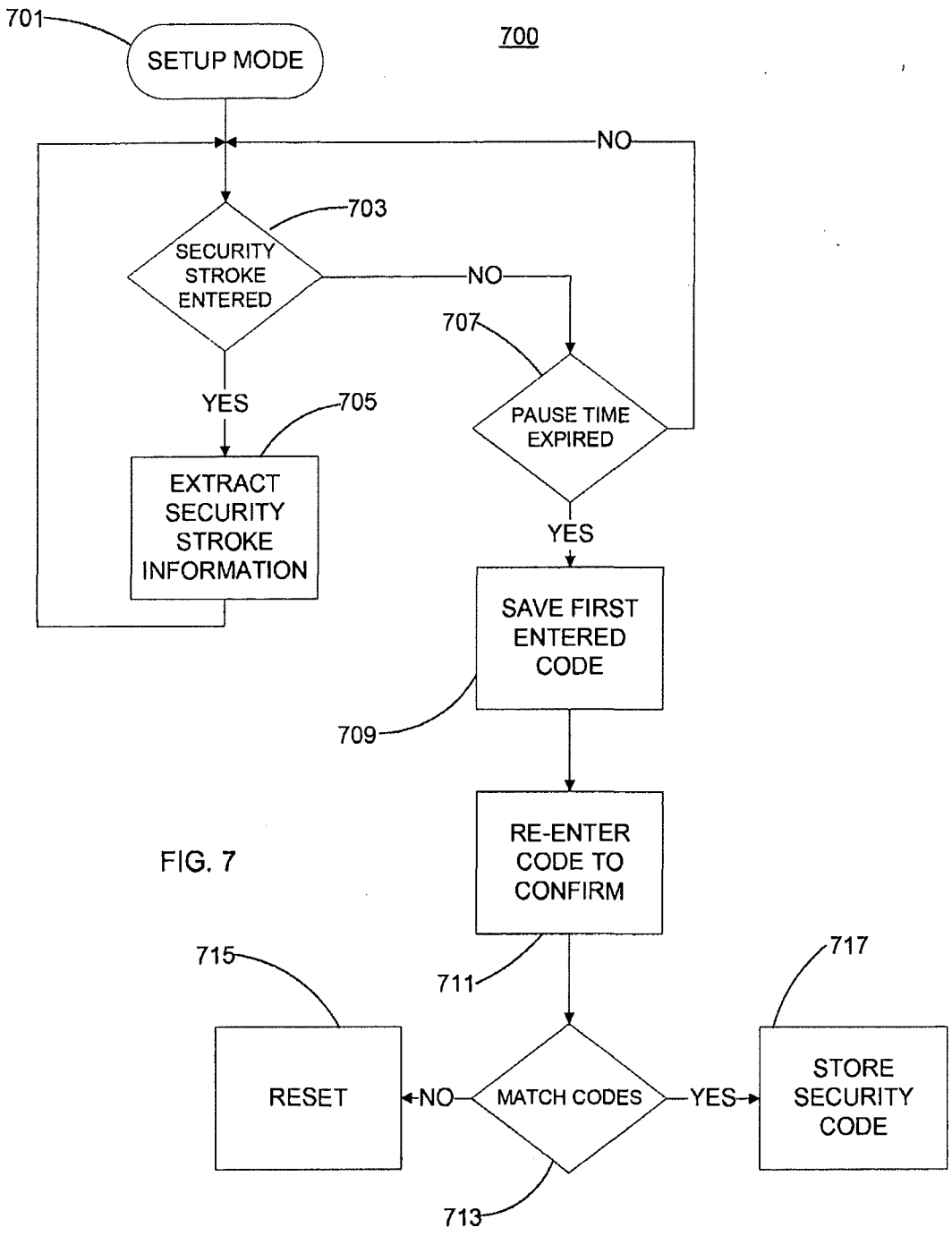

701
SETUP MODE
700
NO
703
SECURITY STROKE ENTERED
NO
707
YES
705
PAUSE TIME EXPIRED
EXTRACT SECURITY STROKE INFORMATION
YES
SAVE FIRST ENTERED CODE
709
RE-ENTER CODE TO CONFIRM
715
711
717
RESET
NO
MATCH CODES
YES
STORE SECURITY CODE
713

FIG. 7

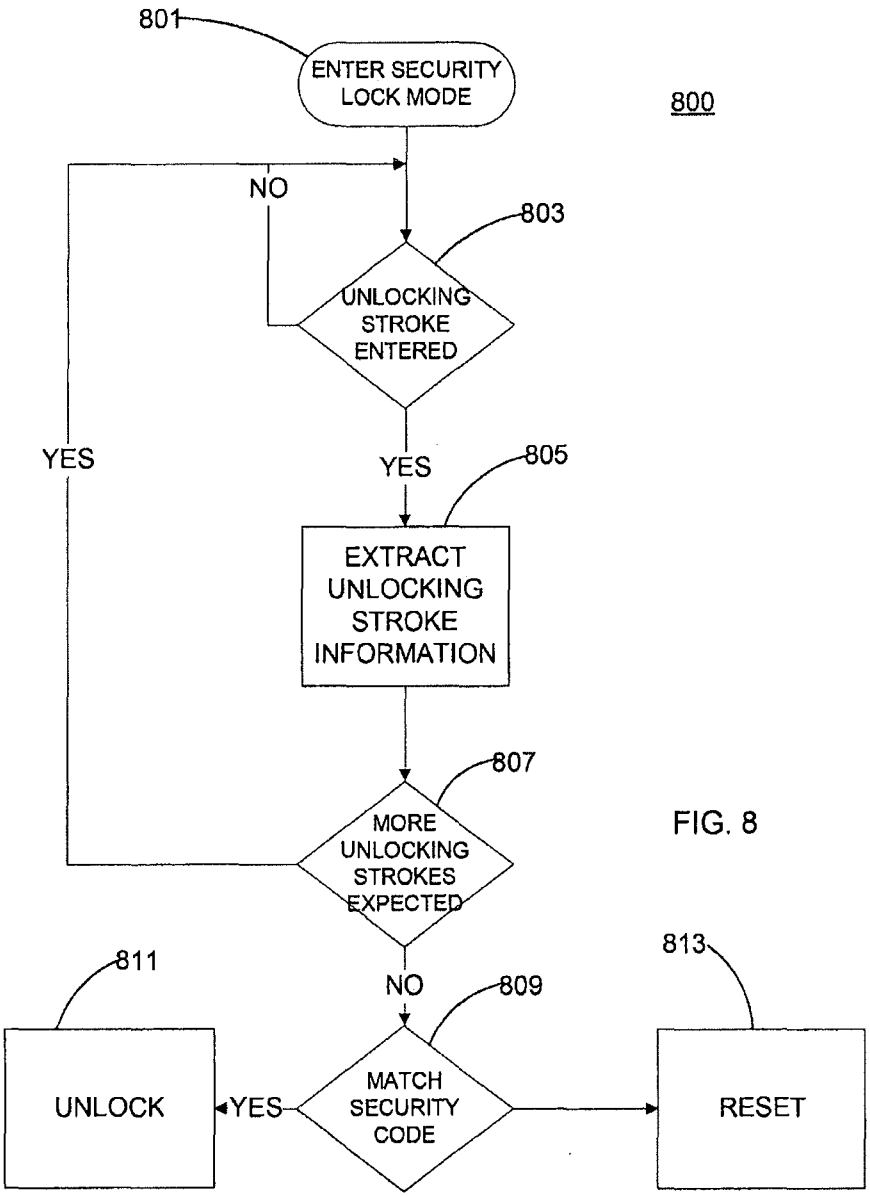

801
ENTER SECURITY LOCK MODE
800
NO
803
UNLOCKING STROKE ENTERED
YES
YES
805
EXTRACT UNLOCKING STROKE INFORMATION
807
MORE UNLOCKING STROKES EXPECTED
NO
809
811
813
UNLOCK
YES
MATCH SECURITY CODE
RESET

FIG. 8

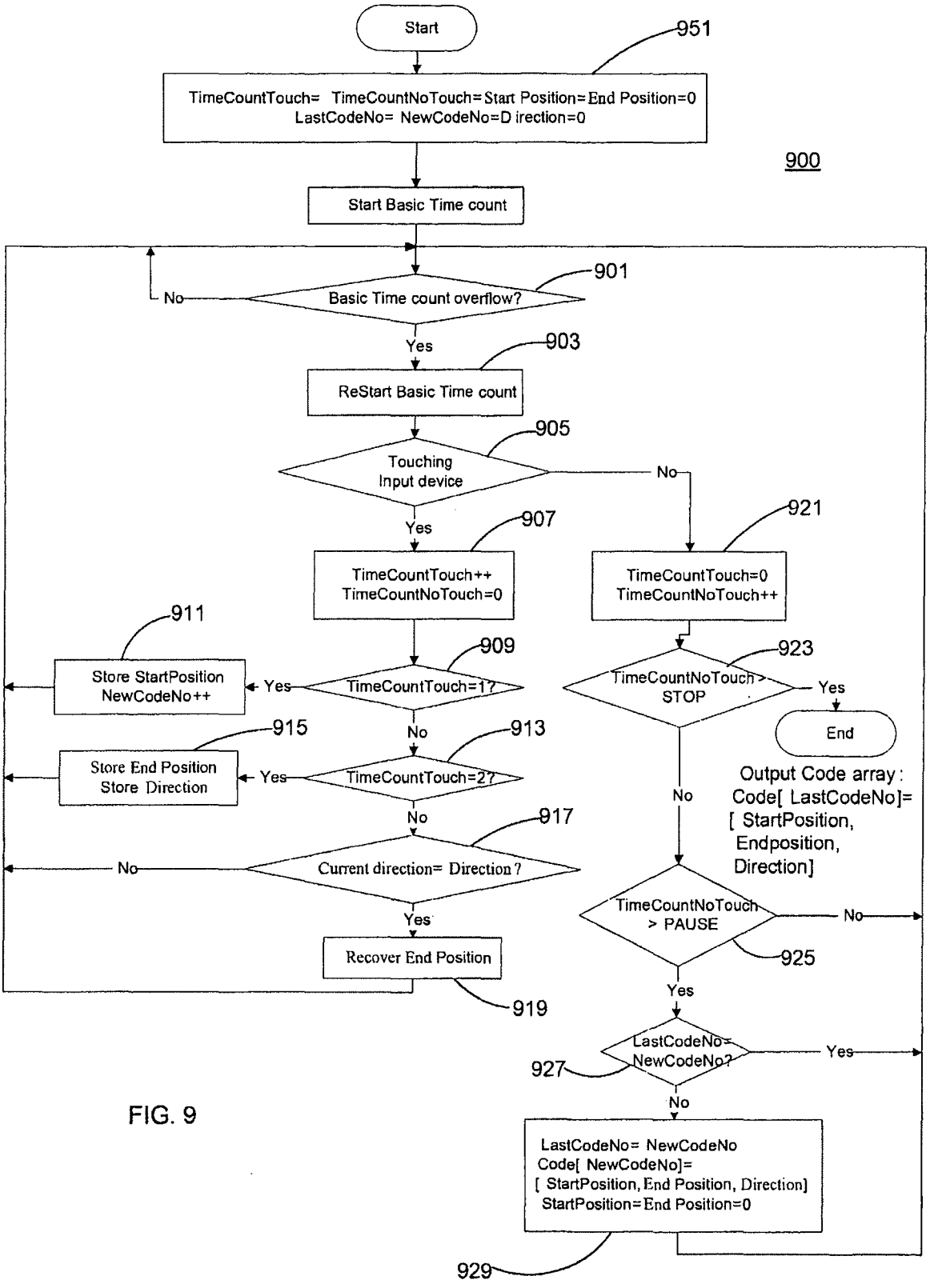


FIG. 9

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000283

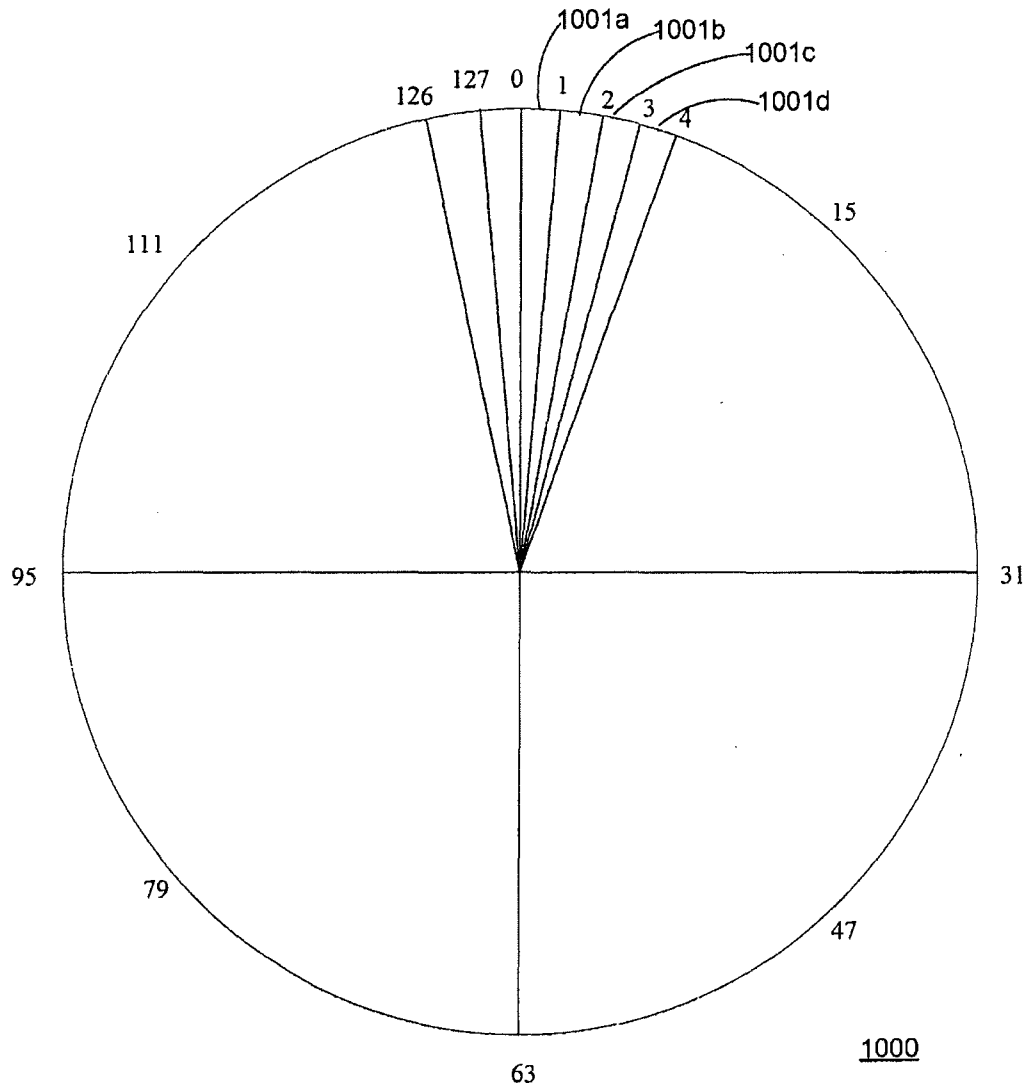


FIG. 10

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000284

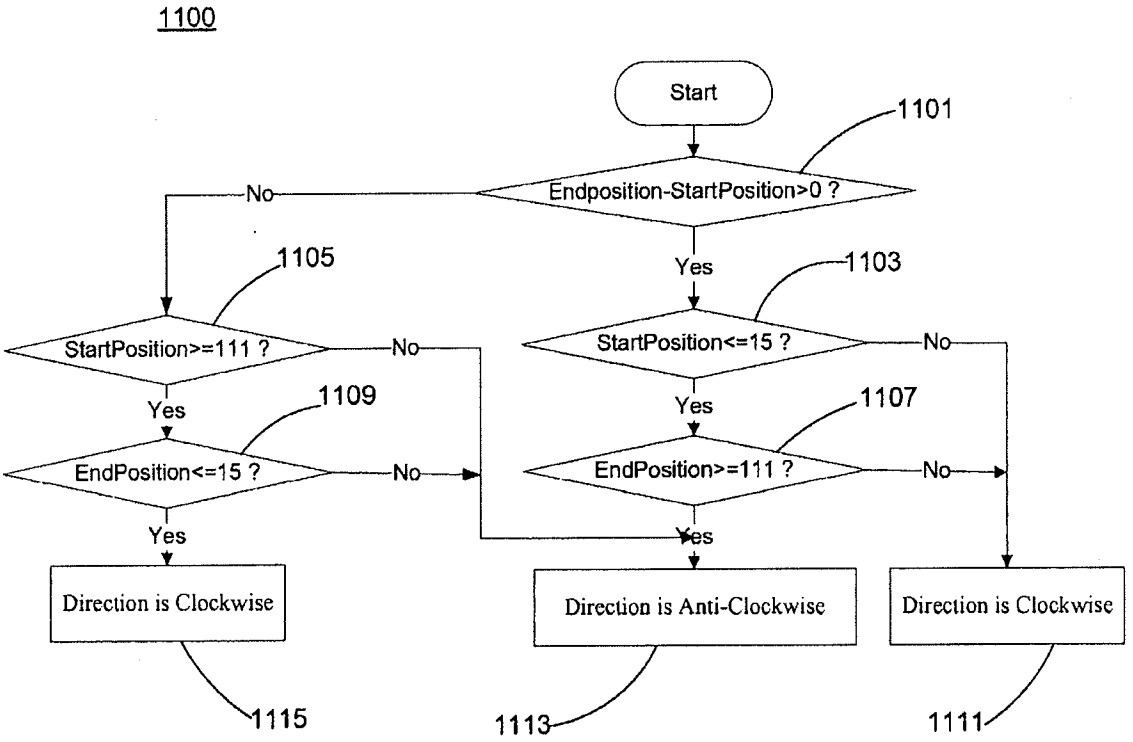

1100
Start
1101
Endposition-StartPosition>0 ?
No
Yes
1105
1103
StartPosition>=111 ?
No
StartPosition<=15 ?
No
Yes
1109
Yes
1107
EndPosition<=15 ?
No
EndPosition>=111 ?
No
Yes
Yes
Direction is Clockwise
Direction is Anti-Clockwise
Direction is Clockwise
1115
1113
1111

FIG. 11

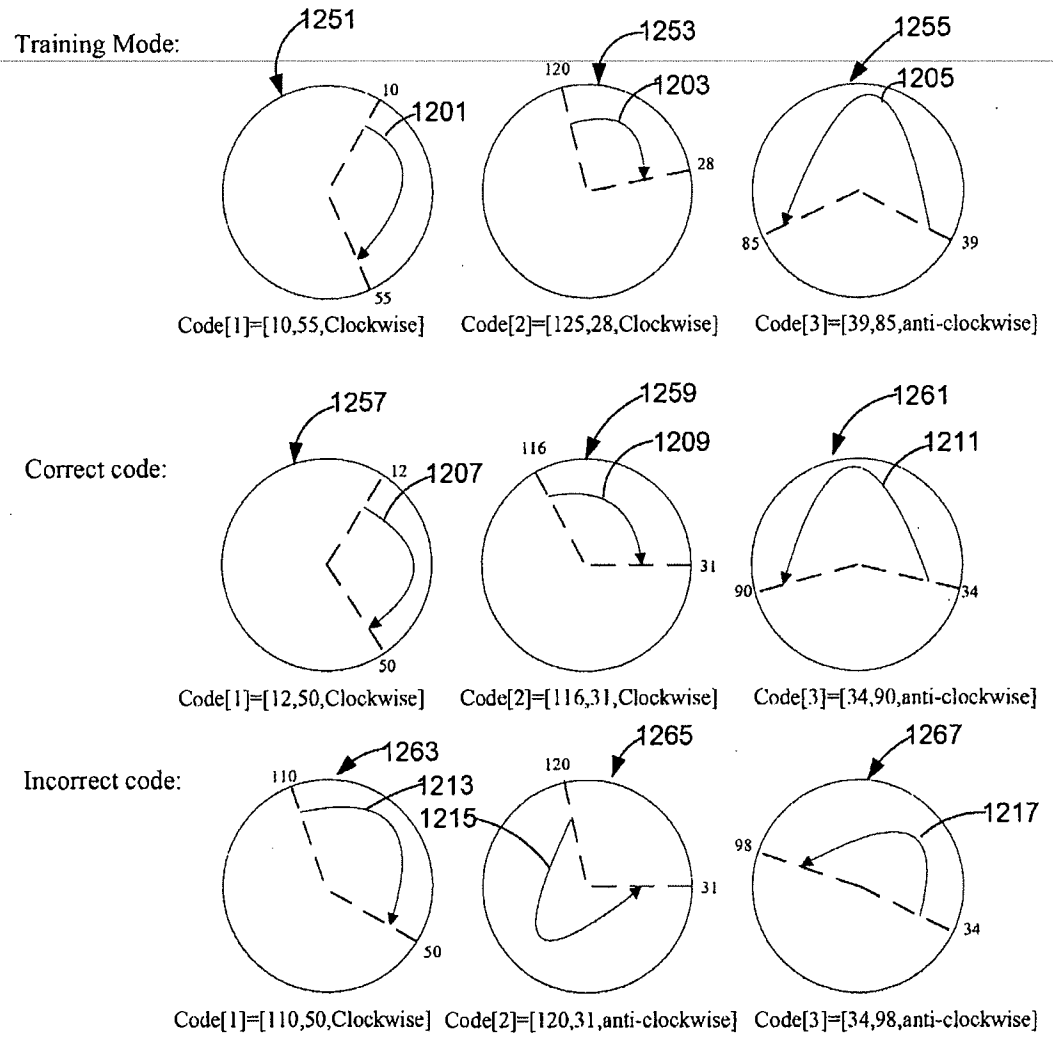

Training Mode:
1251
10
1201
55
Code[1]=[10,55,Clockwise]
1253
120
1203
28
Code[2]=[125,28,Clockwise]
1255
1205
85
39
Code[3]=[39,85,anti-clockwise]
Correct code:
1257
12
1207
50
Code[1]=[12,50,Clockwise]
1259
116
1209
31
Code[2]=[116,31,Clockwise]
1261
1211
90
34
Code[3]=[34,90,anti-clockwise]
Incorrect code:
1263
110
1213
1215
50
Code[1]=[110,50,Clockwise]
1265
120
31
Code[2]=[120,31,anti-clockwise]
1267
1217
98
34
Code[3]=[34,98,anti-clockwise]

FIG. 12

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2008/000622

A. CLASSIFICATION OF SUBJECT MATTER

G06F 21/00 (2006.01) i

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)

IPC: G06F 21/-

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)

CNPAT; CNKI; WPI; EPODOC; PAJ

secur+, safe+, lock+, unlock+, stroke?, hand w writ+, pen?, input, compar+, match+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US2003182585A1 (FUJITSU LIMITED) 25 September 2003(25.09.2003) see description paragraphs 41-63, claims 12&14&16	1-21
A	JP2001134535A (SHARP KK) 18 May 2001(18.05.2001) see the whole document	1-21
A	JP11184816A (CASIO COMPUTER CO LTD) 09 July 1999(09.07.1999) see the whole document	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 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
23 June 2008(23.06.2008)	**17 Jul. 2008 (17.07.2008)**
Name and mailing address of the ISA/CN The State Intellectual Property Office, the P.R.China 6 Xitucheng Rd., Jimen Bridge, Haidian District, Beijing, China 100088 Facsimile No. 86-10-62019451	Authorized officer JIA, Yong Telephone No. (86-10)62411850

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

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000287

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2008/000622

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
US2003182585A1	25.09.2003	JP2003271966A	26.09.2003
		CN1445654A	01.10.2003
		TW222032BI	11.10.2004
		CN1221890C	05.10.2005
JP2001134535A	18.05.2001	None	
JP11184816A	09.07.1999	None	

Form PCT/ISA/210 (patent family annex) (April 2007)

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000288

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference NC73993WO	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/FI2011/050776	International filing date *(day/month/year)* 09 September 2011 (09.09.2011)	(Earliest) Priority Date *(day/month/year)* 26 October 2010 (26.10.2010)
Applicant NOKIA CORPORATION et al.		

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 5 sheets.

☒ 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:

   ☒ 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**,

   ☒ 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**,

   ☒ 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. 4C

   ☐ 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.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000289

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI2011/050776

A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet

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)

IPC: G05B, G06F, G06K, G09G, H04B, H04W, H04M

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

FI, SE, NO, DK

Electronic data base consulted during the international search (name of data base and, where practicable, 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.
A	EP 2230623 A1 (LG ELECTRONICS INC) 22 September 2010 (22.09.2010) paragraphs [0006]-[0014], [0093], [0135], [0150], claims 1-15, figures 21, 31	1-24
A	US 2009/0264159 A1 (HSIEH C et al.) 22 October 2009 (22.10.2009) paragraphs [0008]-[0029], [0043], [0046]-[0050], claims 1-22, figure 3	1-24
A	WO 2008/116395 A1 (COMPUTIME LTD et al.) 02 October 2008 (02.10.2008) page 1: line 17-page 2: line 10, page 5: line 7-page 6: line 20, claims 1-20, figures 5, 6	1-24
A	US 2010/0162182 A1 (OH MA et al.) 24 June 2010 (24.06.2010) paragraphs [0009]-[0024], [0055]-[0058], [0074]-[0078], claims 1-26, figure 4	1-24

☒ 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 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
22 December 2011 (22.12.2011)	27 December 2011 (27.12.2011)

Name and mailing address of the ISA/FI	Authorized officer
National Board of Patents and Registration of Finland P.O. Box 1160, FI-00101 HELSINKI, Finland	L Eronen
Facsimile No. +358 9 6939 5328	Telephone No. +358 9 6939 500

Form PCT/ISA/210 (second sheet) (July 2009)

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000290

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI2011/050776

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2010/0095206 A1 (KIM HJ) 15 April 2010 (15.04.2010) paragraphs [0011]-[0015], [0090]-[0093], [0116]-[0117], claims 1-20, figures 8, 9, 20, 21	1-24
P, A	EP 2256610 A1 (HTC CORP) 01 December 2010 (01.12.2010) paragraphs [0003]-[0009], claims 1-15	1-24

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000291

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/FI2011/050776

Patent document cited in search report	Publication date	Patent family members(s)	Publication date
EP 2230623 A1	22/09/2010	KR 20110101683 A	16/09/2011
		US 2010240415 A1	23/09/2010
		CN 101853379 A	06/10/2010
		KR 20100104648 A	29/09/2010
US 2009/0264159 A1	22/10/2009	TW 200945128 A	01/11/2009
WO 2008/116395 A1	02/10/2008	EP 2130154 A1	09/12/2009
		US 2008244730 A1	02/10/2008
US 2010/0162182 A1	24/06/2010	EP 2368326 A2	28/09/2011
		WO 2010074468 A2	01/07/2010
		KR 20100073743 A	01/07/2010
US 2010/0095206 A1	15/04/2010	US 2011296357 A1	01/12/2011
		EP 2350802 A2	03/08/2011
		WO 2010044579 A2	22/04/2010
		KR 20100041006 A	22/04/2010
EP 2256610 A1	01/12/2010	TW 201042530 A	01/12/2010
		US 2010306693 A1	02/12/2010

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000292

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI2011/050776

CLASSIFICATION OF SUBJECT MATTER

Int.Cl.
G06F 3/033 (2006.01)
G06F 3/048 (2006.01)
G06F 21/00 (2006.01)
G06F 3/01 (2006.01)

Form PCT/ISA/210 (extra sheet)

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000293

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
NOKIA CORPORATION
IPR Department Ari Aarnio
Keilalahdentie 4
FI-02150 Espoo
FINLAND

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

	Date of mailing *(day/month/year)* 27 December 2011 (27.12.2011)
Applicant's or agent's file reference NC73993WO	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/FI2011/050776	09 September 2011 (09.09.2011)	26 October 2010 (26.10.2010)

International Patent Classification (IPC) or both national classification and IPC
See supplemental box

Applicant
NOKIA CORPORATION et al.

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

- [x] Box No. I Basis of the opinion
- [x] 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
- [x] 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
- [x] Box No. VI Certain documents cited
- [x] 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 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/FI	Date of completion of this opinion	Authorized officer
National Board of Patents and Registration of Finland P.O. Box 1160, FI-00101 HELSINKI, Finland	22 December 2011 (22.12.2011)	L Eronen
Facsimile No. +358 9 6939 5328		Telephone No. +358 9 6939 500

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/FI2011/050776

Box No. I Basis of this 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 43*bis*.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:

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000295

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/FI2011/050776

Box No. II Priority

1. ☒ The validity of the priority claim has not been considered because the International Searching Authority does not have in its possession a copy of the earlier application whose priority has been claimed or, where required, a translation of that earlier application. This opinion has nevertheless been established on the assumption that the relevant date (Rules 43*bis*.1 and 64.1) is the claimed priority date.

2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43*bis*.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.

3. Additional observations, if necessary:

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000296

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)	Claims	1-24	YES
	Claims		NO
Inventive step (IS)	Claims	1-24	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-24	YES
	Claims		NO

2. Citations and explanations:

2.1 Documents cited in the International Search Report

D1: EP 2230623 A1
D2: US 2009/0264159 A1
D3: WO 2008/116395 A1
D4: US 2010/0162182 A1
D5: US 2010/0095206 A1

Document D1 (paragraphs [0006]-[0014], [0093], [0135], [0150], claims 1-15, figures 21, 31) discloses a mobile terminal and a control method of mobile terminal. The method involves locking a predefined operating mode and receiving a fingerprint-touch input through a display module capable of performing fingerprint identification. If fingerprint information of the received fingerprint-touch input matches with one of multiple pieces of previously-stored fingerprint information, the predefined operating mode is unlocked. An operating mode is entered corresponding to the fingerprint information that matches with the fingerprint information of the received fingerprint-touch input. Multiple fingerprint information can be stored in mobile terminal on finger-by-finger, user-by-user or pattern-by-pattern basis. In response to fingerprint-touch input various screen control operations, such as scrolling or controlling scroll speed can be performed, various groups of menu icons can be displayed one after another, the mobile terminal can be locked or unlocked for various operating menus, and then readily enter predefined operating mode.

Document D2 (paragraphs [0008]-[0029], [0043], [0046]-[0050], claims 1-22, figure 3) discloses a method for unlocking screen, a mobile electronic device using the same, and a storage medium thereof. The method involves defining two signal input areas on a touch screen of a mobile electronic device e.g. smartphone. An input signal is detected within the signal input areas. A moving range of a trajectory produced by the input signal is calculated when the input signal is detected within one of the signal input areas. The touch screen of the mobile electronic device is unlocked when the moving range reaches a predetermined value. The method executes unlocking screen function according to a touching and sliding manipulation on a screen provided by a user.

Document D3 (page 1: line 17-page 2: line 10, page 5: line 7-page 6: line 20, claims 1-20, figures 5, 6) discloses security providing method for apparatus e.g. wireless communication telephone. The security providing method involves unlocking the apparatus to enable an authorized user to access the apparatus when the unlocking stroke information matches a security code. An unlocking stroke entered though an input device is detected to extract the unlocking stroke information from the unlocking stroke. The apparatus is locked to prevent the unauthorized user from accessing the apparatus. The method enables user to ensure security of electronic device through circular input device. Allows acceptance range to be specified when approximating start and end points.

Document D4 (paragraphs [0009]-[0024], [0055]-[0058], [0074]-[0078], claims 1-26, figure 4) discloses an unlocking method and apparatus for an electronic appliance e.g. mobile communication terminal. The

Continued to next page

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000297

Supplemental Box

Continuation of: Box V (1 / 3)

method involves detecting an input gesture applied by a gesture input unit, which is locked. The input unit is unlocked in response to the input gesture. An application mapped to the input gesture is invoked. The input gesture is identified in response to detection of the input gesture. A determination is made whether the input gesture is a mapped gesture. The input gesture is compared with a registered gesture if a condition is satisfied. A display section is activated in response to the detection of the input gesture. The method enables a user to unlock the electronic appliance in a convenient and advanced way by applying a gesture through a touch screen or touch pad, thus enhancing usability of the electronic appliance.

Document D5 (paragraphs [0011]-[0015], [0090]-[0093], [0116]-[0117], claims 1-20, figures 8, 9, 20, 21) discloses a three-dimensional user interface controlling method for e.g. mobile terminal. The method involves displaying multiple widgets to have predetermined depths on a display i.e. touch screen, of a display e.g. thin film transistor LCD, where the widgets represent menus. A user's gesture on one of the widgets is detected using a three-dimensional multi-sensor, where the user's gesture changes a distance between a user input unit e.g. stylus pen, and the display device in a space over the selected widget. The selected widget is rotated according to a rotating gesture. Depth of the widget is modified. The three-dimensional multi-sensor is configured to detect the motions of the input units in a space, without touching the display device, thus enabling a user to control the terminal in a convenient and appropriate manner.

2.2 Claimed invention

The application concerns an invention defined in independent claims 1, 11, and 18.

Claim 1 defines a method comprising
A1. receiving an indication of a pinch event at a touch screen display generating a locked screen, the locked screen preventing user interaction with hidden content obscured by the locked screen,
A2. generating a preview window providing visibility of a portion of the hidden content based on characteristics of the pinch event, and
A3. determining whether to unlock user interaction with the hidden content based on the characteristics of the pinch event.

Claim 11 defines an apparatus comprising at least one processor and at least one memory including computer program code, the at least one memory and the computer program code configured to, with the processor, cause the apparatus to at least perform the steps of a method of claim 1.

Claim 18 defines a computer program product comprising at least one non-transitory computer-readable storage medium having computer-executable program code instructions stored therein, the computer-executable program code instructions comprising program code instructions for performing the steps of a method of claim 1.

2.3 Novelty under PCT Article 33(2)

Documents D1, D2, D3, D4, and D5 represent the general state of the art.

2.3.1 Independent claims

Document D1, which is considered to represent the most relevant prior art, discloses a control method of mobile terminal comprising receiving an indication of a pinch event at a touch screen display generating a locked screen, the locked screen preventing user interaction with hidden content obscured by the locked screen (A1) (paragraphs [0093], [0135], [0150], figures 21, 31). The subject matter of claim 1 differs from the teachings of D1 in that generating a preview window providing visibility of a portion of the hidden content is based on characteristics of the pinch event (A2) and determining whether to unlock user interaction with the hidden content is based on the characteristics of the pinch event (A3).

Continued to next page

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000298

Supplemental Box

Continuation of: Box V (2 / 3)

Document D2 discloses a method for unlocking screen comprising receiving an indication of a pinch event at a touch screen display generating a locked screen, the locked screen preventing user interaction with hidden content obscured by the locked screen (A1) (paragraphs [0043], [0046]-[0050], figure 3). The subject matter of claim 1 differs from the teachings of D2 in that generating a preview window providing visibility of a portion of the hidden content is based on characteristics of the pinch event (A2) and determining whether to unlock user interaction with the hidden content is based on the characteristics of the pinch event (A3).

Document D3 discloses security providing method for apparatus e.g. wireless communication telephone. The subject matter of claim 1 differs from the teachings of D3 in that receiving an indication of a pinch event at a touch screen display generates a locked screen, the locked screen preventes user interaction with hidden content obscured by the locked screen (A1), generating a preview window providing visibility of a portion of the hidden content is based on characteristics of the pinch event (A2) and determining whether to unlock user interaction with the hidden content is based on the characteristics of the pinch event (A3).

Document D4 discloses an unlocking method and apparatus for an electronic appliance e.g. mobile communication terminal.The subject matter of claim 1 differs from the teachings of D4 in that receiving an indication of a pinch event at a touch screen display generates a locked screen, the locked screen preventes user interaction with hidden content obscured by the locked screen (A1), generating a preview window providing visibility of a portion of the hidden content is based on characteristics of the pinch event (A2) and determining whether to unlock user interaction with the hidden content is based on the characteristics of the pinch event (A3).

Document D5 discloses a three-dimensional user interface controlling method for e.g. mobile terminal. The subject matter of claim 1 differs from the teachings of D5 in that receiving an indication of a pinch event at a touch screen display generates a locked screen, the locked screen preventes user interaction with hidden content obscured by the locked screen (A1), generating a preview window providing visibility of a portion of the hidden content is based on characteristics of the pinch event (A2) and determining whether to unlock user interaction with the hidden content is based on the characteristics of the pinch event (A3).

The subject matter of claim 1 is not anticipated by any of the documents D1-D5 as explained above. Therefore, the subject matter of claim 1 is novel. The same reasoning applies, mutatis mutandis, to the subject matter of the corresponding independent claims 11 and 18 which therefore are also considered novel.

2.3.2 Dependent claims

Because the subject matter of independent claims 1, 11, and 18 is novel, dependent claims 2-10, 12-17, and 19-24 are also novel.

2.4 Inventive step under PCT Article 33(3)

The technical problem solved by the claimed invention is related to user interface technology providing a device unlock mechanism for touch screen devices.

2.4.1 Independent claims

Considering the prior art, the subject matter of independent claims 1, 11, and 18 is not obvious to a person skilled in the art. D1-D5 do not teach that a preview window providing visibility of a portion of the hidden content is generated based on characteristics of the pinch event (A2). In view of D1-D5, generating a preview window and determining whether to unlock the device are not dependent on the characteristics of the pinch event (A2, A3). Thus, claims 1, 11, and 18 involve an inventive step.

Continued to next page

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000299

Supplemental Box

Continuation of: Box V (3 / 3)

2.4.2 Dependent claims

The subject matter of independent claims 1, 11, and 18 involves an inventive step. Consequently, dependent claims 2-10, 12-17, and 19-24 also involve an inventive step.

2.5 Industrial applicability under PCT Article 33(4)

Claims 1-24 meet the requirement of industrial applicability because the claimed subject matter can be made or used in industry.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000300

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/FI2011/050776

Box No. VI Certain documents cited

1. Certain published documents (Rules 43*bis*.1 and 70.10)

Application No. Patent No.	Publication date *(day/month/year)*	Filing date *(day/month/year)*	Priority date (valid claim) *(day/month/year)*
EP2256610 A1	01/12/2010	11/09/2009	27/05/2009

2. Non-written disclosures (Rules 43*bis*.1 and 70.9)

Kind of non-written disclosure	Date of non-written disclosure *(day/month/year)*	Date of written disclosure referring to non-written disclosure *(day/month/year)*

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000301

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

Claims 1, 11, and 18 are not drafted in the two-part form in accordance with PCT Rule 6.3(b), which in the present case would be appropriate, with those features known from the prior art placed in the preamble (PCT Rule 6.3(b)(i)) and the remaining features included in the characterising part (PCT Rule 6.3(b)(ii)).

The features of the claims are not provided with reference signs placed in parentheses (PCT Rule 6.2(b)).

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000302

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**

Continuation of: International Patent Classification (IPC)

Int.Cl.
G06F 3/033 (2006.01)
G06F 3/048 (2006.01)
G06F 21/00 (2006.01)
G06F 3/01 (2006.01)

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000303

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Application No	Ref.	Date
08 776 289.4 - 1960	SDH/26013EP1	26.04.2013

Applicant
Nokia Corporation

Communication pursuant to Article 94(3) EPC

The examination of the above-identified application has revealed that it does not meet the requirements of the European Patent Convention for the reasons enclosed herewith. If the deficiencies indicated are not rectified the application may be refused pursuant to Article 97(2) EPC.

You are invited to file your observations and insofar as the deficiencies are such as to be rectifiable, to correct the indicated deficiencies within a period

of 4 months

from the notification of this communication, this period being computed in accordance with Rules 126(2) and 131(2) and (4) EPC. One set of amendments to the description, claims and drawings is to be filed within the said period on separate sheets (R. 50(1) EPC).

If filing amendments, you must identify them and indicate the basis for them in the application as filed. Failure to meet either requirement may lead to a communication from the Examining Division requesting that you correct this deficiency (R. 137(4) EPC).

Failure to comply with this invitation in due time will result in the application being deemed to be withdrawn (Art. 94(4) EPC).

The notification of this communication starts the 24-month period according to Rule 36(1)(a) EPC for filing a voluntary divisional application divided from this application or from any sequential application. For further information see Guidelines for Examination, A-IV, 1.1.1.2 and 1.1.1.4.

Registered Letter
EPO Form 2001 12.10CSX

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000304

Quesson, Christophe
Primary Examiner
For the Examining Division

Enclosure(s): 10 page/s reasons (Form 2906)
WO-0033570-A1

Registered Letter
EPO Form 2001 12.10CSX

The examination is being carried out on the **following application documents**

Description, Pages

1-22	filed in electronic form on	18-01-2010

Claims, Numbers

1-15	filed in electronic form on	18-01-2010

Drawings, Sheets

1/10-10/10	as published

1. Reference is made to the following documents; the numbering will be adhered to in the rest of the procedure.

D1 US 2007/150842 A1 (CHAUDHRI IMRAN [US]; ORDING BAS [US]; ANZURES FREDDY A [US]; OS MARCEL) 28 June 2007 (2007-06-28)

D2 EP 1 450 248 A1 (GIAT IND SA [FR]) 25 August 2004 (2004-08-25)

D3 US 2007/067734 A1 (CUNNINGHAM AARON W [US]; JONES DAVID [US]; WATSON MARIEKE I [US]; MINE) 22 March 2007 (2007-03-22)

The following document is cited by the Examiner. A copy of the document is annexed to the communication and the numbering will be adhered to in the rest of the procedure.

D4 WO 00/33570 A1 (SONY CORP [JP]; NASHIDA TATSUSHI [JP]; HASHIMOTO TAKESHI [JP]; KOBAYAS) 8 June 2000 (2000-06-08); & US 7 610 599 B1 (NASHIDA TATSUSHI [JP] ET AL) 27 October 2009 (2009-10-27)

D1: a user interface displays multiple unlock images on the touch screen, each unlock image corresponding to an active application or incoming event. Performing the unlock action using one of the multiple unlock images unlocks the device and displays the application and/or event corresponding to the unlock image.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000306

D2: To avoid inadvertently selecting a feature, an icon must first be selected by a curve drawn on the pad (preferably a cross, with the intersection lying on the icon); this makes the icon selectable. The icon can then be selected as usual by pressing it, to activate the function it represents. The different status of the icon are illustrated graphically, by changing the icon. From the selectable state, the icon goes back to the locked state if it is not selected for some time, or if the user presses a locking icon.

D3: A tooltip may be shown whenever the user hovers the cursor over an icon; if the corresponding application is not active then another image may be shown, e.g., a Not Connected icon may be shown.

D4: User interface wherein an icon or menu item is is gradually enlarged and rendered gradually transparent so that application icons in a lower layer can be viewed with eyes.

2. The amendments filed with the letter dated 18-01-2010 introduce subject-matter which extends beyond the content of the application as filed, contrary to Article 123(2) EPC.

The amendments concerned are the following:

2.1 in claim 1, replacing "moving the icon to an unlock region of the device to change a state of the device ..." into "changing a state of the device...", whereby "moving the icon to an unlock region of the device" has been deleted.

Such a broadening of the claimed subject matter is not directly and unambiguously supported by the application as filed, contrary to Article 123(2) EPC.

This objection would be overcome by introducing the features of claim 2 - clearly reformulated as user steps and system steps - into claim 1.

2.2 in claim 5, the term "revealed" has been unduly introduced, contrary to Article 123 (2) EPC. since illuminating a contacted application icon is not disclosed for a "revealed application icon".

3. The application lacks unity within the meaning of Article 82 EPC.

3.1 This communication of the Examining Division is the first one in this examination proceedings raising the specific objection as regards unity of invention set out below, and thus starts the time period for filing divisional applications pursuant to Rule 36(1) (b) EPC.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000307

3.2 In respect of the above identified European patent application, only part of the claimed subject-matter has been searched, following an objection of lack of unity of the invention by the European Patent Office acting as International Searching Authority (see Article 17(3)(a) PCT).

In the procedure before the European Patent Office as designated/elected Office, the Examining Division agrees with the finding of lack of unity of the invention for the reasons given in the International Preliminary Report on Patentability.

3.2.1 The technical features in claims 1-20 can be grouped as follows (the references being to the original PCT claims):

3.2.1.1 Invention 1 (claims 1-11): A method comprising:

(i) a touch screen device

(ii) the device having an idle/locked mode/state and an active/unlocked mode/state

(iii) contacting an icon displayed on a screen of the device in the idle mode and moving the icon on the screen to reveal at least one application icon associated with an active/unlocked state of the device; and

(iv) moving the icon to an unlock region of the device to change a state of the device to an active/unlocked mode and activate an application associated with the revealed application icon.

3.2.1.2 Invention 2 (claims 12-13): A user interface comprising:

(ii) at least one region that is non-active in a locked mode of a device;

(v) a reduced active region on top of the at least one non-active region, the reduced active region being displayed in a contrasting manner relative to the non- active region

(vi) the reduced active region being configured to be expanded to reveal the at least one region that is non-active in a locked mode

(vii) the reduced active region being configured to transition a state of the device from an idle/locked state to a active/unlocked state as the reduced active region is expanded and reaches an edge of the user interface, wherein the user interface opens to a set of user elements corresponding to an application revealed by the expanded active region.

3.2.1.3 Invention 3 (claims 14-16): An apparatus comprising a user interface; and a processor configured to display at least

(viii) a reduced active region and a non-active region on the user interface

(ii) when the apparatus is in a non-active mode, wherein the processor is further configured to:

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000308

(ix) illuminate at least one application icon associated with an active/unlocked state when the reduced active region is moved at least partially over the at least one application icon;

(x) change a state of the apparatus from a locked/in-active mode to an active/ unlocked mode when the reduced active region is moved into an unlock region of the user interface and the change is confirmed.

3.2.1.4 Invention 4 (claims 17-18): A computer program product stored in a memory comprising: a computer usable medium having computer readable code means embodied therein for causing

(ii) a computer to change a state of a device to an active/unlocked mode, the computer readable code means in the computer program product comprising:

(ix) computer readable program code means for causing a computer to move a reduced active area over at least one application icon associated with an active/ unlocked state of the device while the device is in the non-active locked mode; computer readable program code means for causing a computer to highlight the at least one application icon;

(xi) computer readable program code means for causing a computer to move the reduced active area to an unlock region on a display of the device; and computer readable program code means for causing a computer to change the state of the device and open the highlighted application when the reduced active area is in the unlock region.

3.2.1.5 Invention 5 (claims 19-20): A device comprising:

(xii) means for moving a reduced active region on a display of a device in a non-active mode over at least one application region on the display; means for moving the reduced active region to an unlocking region of the display of the device while the reduced active region is still at least partially over the at least one application region; means for confirming that a state of the device is to be changed from the locked mode to the unlocked mode; and means for unlocking the device from the locked mode when the reduced active region is in the unlocking region and the state change is confirmed.

3.2.2 The inventions 1 to 5 have in common the technical feature (ii) (which is included in feature xii of invention 5). Feature (ii), i.e. a device having an idle/locked mode/state and an active/unlocked mode/state, is obviously not novel, see for example D1 or D2.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000309

The inventions 1 to 5 have additional features, each contained only in one of the inventions 1-5, respectively, and constituting distinguishing features of each of those inventions, as follows:

invention 1: features (i), (iii), (iv);

invention 2: features (v), (vi), (vii);

invention 3: features (viii), (ix), (x);

invention 4: features (ix), (xi);

invention 5: features (xii).

No technical relationship can be found between these additional technical features contained in each of said inventions.

Therefore, there is no single unifying inventive concept underlying the entire group of claims of the present application as required by Rule 13.1 PCT.

3.3 In accordance with Rule 164(2) EPC the applicant is invited to limit the application to one invention covered by the international search report.

As the applicant has not had a search report drawn up on the other inventions (Rule 64 EPC), the application will be prosecuted on the basis of the invention in respect of which a search has already been carried out, in other words the invention first mentioned in the original PCT claims.

The applicant should therefore limit the application to the invention searched and excise those parts of the application relating to the other inventions.

This is presently not the case since newly introduced independent Claim 13 is directed to subject matter which clearly does not fall under said first invention (because it concerns changing from an active mode to inactive/locked mode). Claims 13 - which has not been searched and can therefore not be examined - should therefore be deleted.

The subject-matter to be excised may be made the subject of one or more divisional applications according to Rule 36 EPC.

4. **The application does not meet the requirements of Article 84 EPC, because claims 1-15 are not clear.**

4.1 The features of claims 1-15 are not provided with reference signs placed in parentheses, relating to the drawings to increase their intelligibility (Rule 43(7) EPC).

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000310

4.2 The term "icon" is used in claim 1 for at least two different features; it appears therefore necessary to specify an "unlocking icon" when this is meant (lines 3,4), to unambiguously distinguish that feature from an "application icon". The same applies in dependent claims 2-15.

4.3 Claims 1-15 do not meet the requirements of Article 84 EPC in that the matter for which protection is sought is not clearly defined.

Claim 1 should specify the following **essential** features:

- the definition of "idle mode" e.g. as *"... in an idle mode, wherein at least one application is displayed in a dimmed state, and any user input will be ignored except to unlock the device" (see [0019) "FIG. 2A illustrates a locked or idle mode of the device 100 of FIG. 1. In this example, there are two icons 202 and 204 that appear in a relatively dimmed or less highlighted mode", [0004] "... a locked mode, wherein certain information is displayed, however any user inputs to the device will be ignored in the idle state, except to unlock the device" and [0005] "The term idle mode generally be referred to as a reduced active region that can be manipulated in limited ways, such as by the unlocking gesture or interaction described herein"*).

Since independent claim 1 does not contain these features it does not meet the requirement following from Article 84 EPC, taken in combination with Rule 43(1) and (3) EPC, that any independent claim must contain all the technical features **essential** to the definition of the invention.

4.3 Similarly, Claim 1 attempts to define the subject-matter ("...moving the icon on the screen ***to reveal at least one application icon***...") in terms of the result to be achieved, which merely amounts to a statement of the underlying problem, without providing the **essential** technical features necessary for achieving this result. The same applies to the formulation of claim 3 ("... to reveal the active area below the idle mode screen" ??), which does not define clear technical features. From the description it is understood that :

> *"[0029] As shown in FIG. 2B, in one embodiment, when the icon 206 of FIG. 2A is selected, the icon can expand in size, as shown by icon 210. The icon 210 can expand, dilate or open up to reveal the user interface and icons 202, 204 "*, whereby *[0029] "icons 202 and 204 each represent an application"* and should therefore be called application icons 202, 204; and
>
> *[0055] As the icon is moved or dragged, the icon can expand to reveal one or more active areas below the icon, or below the path that the icon travels*.

Also these **essential** features should be specified in any independent claim.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000311

4.4 Further, Claim 1 should specify the **essential** user step responsive to which the system step "changing a state of the device to an active/unlocked mode" takes place, for example : "responsive to a user input comprising dragging the the unlocking icon to an unlock region, changing a state ..." (see [0016] and claim 2).

4.5 Claims 1-15 do not meet the requirements of Article 6 PCT - clarity - in that amended claim 1 **still** does not consistently and clearly distinguish user steps and system steps. However, patent protection can not be obtained for user steps, but only for system steps (some of which can be responsive to given user steps), thus the claims should be formulated accordingly (e.g. "responsive to user input action A, executing system operation B..."). The same applies in dependent claims 2-15.

To be specific, the terms of claim 1 "to reveal at least one application icon ..." seem to indicate an intention of the user during the input, but in fact they refer to a system step (consequential to the received user input) and should therefore be formulated as such (see also 4.3 above).

Further Claim 1 should specify the user step responsive to which the system step "changing a state of the device to an active/unlocked mode" takes place (see also [0016], claim 2 and 4.4 above).

Similarly, claim 5 does not specify the user step responsive to which the system step "temporarily illuminating" takes place; the present formulation suggests that it could be a purely automatic step.

Also Claim 9 does not distinguish the user step ("selecting an **application** icon") and the triggered system step "unlock the device and activate the application".

Claims 11-12 again are silent about the user step necessary to trigger the system step of "dimly illuminating application ~~areas~~ **icons**".

4.6 The following formulation of claim 1 "at least one application icon associated with an active/unlocked state of the device" is not clear and - based on the description, see [0021] - should apparently read "at least one application icon associated with an application that is activatable in the active/unlocked mode of the device, but not in the idle mode".

4.7. Claim 1 is further unclear, contrary to Art. 6 PCT, because it does not define which of the possibly multiple applications (the icons of which have been "revealed") is selected for being activated : "... activate an **[which ?]** application associated with the revealed application icon".

4.8 Claims 3-4 are obscure, as they do not define how /when a user movement is to be interpreted by the system as being a command for either moving the (unlocking) icon, or for expanding its size (or both?). Claim 4 should apparently refer to claim 3 rather than to claim 2 (cf. "expanding").

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000312

4.9 The feature of claim 7 "contacting an edge of the icon" was not found in the description and therefore appears to have no support therein, contrary to Art. 84 EPC. Further, the wording "dragging the (unlocking) icon" is confusing in that the operation referred to appears to be expanding the unlocking icon (see [0029]), as opposed to dragging it - without modifying its shape or size - (see [0016], [0024]). Finally, it is not clear towards which edge (of the icon itself ? or rather of the display area, as apparent from the description, see [0016], [0024]) the icon expands.

4.10 Claim 9 is contradictory with claim 1, to which it refers, since claim 10 specifies "selecting an application revealed by the expanded icon to unlock the device and activate the application" while according to claim 1 (when clarified based on the description, see 4.4 above) moving the (unlock) icon to an unlock area is necessary for triggering the same actions.

4.11 The language of Claim 10 ("background area", "contrasting image") appears to merely reformulate - in vague and undefined terms - the features seen as essential and therefore to be defined in independent claim 1 (see objections above). The terms of claim 10 "one icon" (is an "unlocking icon" meant, or an "application icon" or else ?), "elements", and "contrasting image" are obscure, since they have neither a clear meaning in the art, nor a definition in the claims. Claim 10 therefore appears redundant and should be deleted.

4.12 Claim 12 is unclear and/or unsupported in that the illumination levels appear - see [0019]-[0020] - to indicate a corresponding level of activity, not a "degree of accessibility".

4.13 The claims should use consistently the same term designating a same feature. for example application area in claims 11-12 should read "application icons".

5. Furthermore, notwithstanding the above-mentioned lack of clarity, **the subject-matter of claims1, 14 and 15 is not new within the meaning of Article 54(1) and (2) EPC**, and the requirements of Article 52(1) EPC are therefore not met.

5.1 D1 discloses, according to the terms of Claim 1:

> A method comprising:
>
> providing a touch screen device (see [0002]) in an idle mode (see [0007] and claim 1);
>
> receiving an input comprising contacting an icon displayed on a screen of the device in the idle mode and dragging the icon on the screen (see [0007]) to reveal (see the increase in optical intensity in [0108]) at least one application icon (user interface objects 702, see [0108] and [0080]-[0098] with Fig. 6-8C) associated with an active/unlocked state of the device;

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000313

changing a state of the device to an active/unlocked mode ("transitioning the device to the user-interface unlock state" in [0007] and claim 1); and

activating an application associated with the revealed application icon (see e.g. [0093] with FIG. 7D: "dragging the unlock image to the right end of the channel 704" **both** transitions the device to the unlock state **and** activates the application, since from this moment "the user may interact with the virtual buttons 708 and accept or decline the incoming call").

The subject-matter of claim1 - and *mutatis mutandis* of corresponding claims 14 and 15 is therefore not new (Article 54(1) and (2) EPC).

6. Dependent claims - Lack of novelty and/or inventive step

Dependent claims 2-12 do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of the EPC with respect to novelty and/or inventive step, since they merely specify implementation details which either:

- are known from D1 and therefore not novel: claim 2 (Fig. 7 of D1) and claim 10; or

- would be provided by the skilled person implementing the method of D1 based on common general knowledge and/or the disclosure of D2-D4: claims 3-9. Concerning in particular claims 3-4 and 7-9, expanding or enlarging an icon or menu item is described in D4 (see col. 11, l. 16-26 with Fig. 15-16 in US 7 610 599), and this feature would be applied by the skilled person in the method of D1 as needed to further improve the ease of use of the user interface.

7. Conclusion

The applicant is invited, if any amended claims are filed, to provide evidence in his letter of reply :

i. which of the claimed features and method steps of the independent claims are not known from D1 (Art. 54 EPC);

ii. which is the technical significance thereof which does not follow from the teaching of D1 in an obvious manner (Art. 56 EPC);

iii. where in the application as originally filed these features, corresponding method steps or any other features introduced or deleted by amendments have been unequivocally defined (Art. 123(2) EPC);

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000314

iv. where in the application as subject to the search these features, corresponding method steps or any other features introduced or deleted by amendments have been claimed (Rule 137(5) EPC).

Further :

v. the description is to be adapted and limited to the claimed subject-matter (Rule 42(1)(c) EPC); and

vi. To meet the requirements of Rule 42(1)(b) EPC, the documents D1-D4 should be identified in the description and their relevant contents should be indicated. The applicant should ensure that it is clear from the description which feature/s of the subject-matter of the independent claims are known from these documents.

vii The independent claims should be in the two-part form in accordance with Rule 43(1) EPC, with those features known in combination from the closest prior art being placed in the preamble (Rule 43(1)(a) EPC) and with the remaining features being included in the characterising part (Rule 43(1)(b) EPC).

If, however, the applicant is of the opinion that the two - part form would be inappropriate, then reasons therefor should be provided. In addition, the applicant should ensure that it is clear from the description which features of the subject - matter of the independent claims are already known in combination from the closest prior (see the Guidelines, C - III, 2.3.2).

viii All other defects mentioned herein above have to be remedied by amendment or convincing arguments to the contrary.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000315

Electronic Patent Application Fee Transmittal

Application Number:	13889750
Filing Date:	08-May-2013
Title of Invention:	UNLOCKING A TOUCH SCREEN DEVICE
First Named Inventor/Applicant Name:	Phillip Lindberg
Filer:	Christopher Jason Gegg/Joyce Smith
Attorney Docket Number:	042933/427718

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

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:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

Electronic Acknowledgement Receipt	
EFS ID:	18006381
Application Number:	13889750
International Application Number:	
Confirmation Number:	1050
Title of Invention:	UNLOCKING A TOUCH SCREEN DEVICE
First Named Inventor/Applicant Name:	Phillip Lindberg
Customer Number:	10949
Filer:	Christopher Jason Gegg/Joyce Smith
Filer Authorized By:	Christopher Jason Gegg
Attorney Docket Number:	042933/427718
Receipt Date:	23-JAN-2014
Filing Date:	08-MAY-2013
Time Stamp:	16:02:05
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$180
RAM confirmation Number	2681
Deposit Account	160605
Authorized User	
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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		IDS427718.PDF	151108 087601542c6d682e075845e1facbec1fcc450791	yes	3

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Transmittal Letter	1	1
Information Disclosure Statement (IDS) Form (SB08)	2	3

Warnings:

Information:

2	Foreign Reference	1ART427718.PDF	3942520 fb75f0c1c19ebec3e404333c70484f98c4dd1bc2	no	108

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3		2ART427718.PDF	5773971 5850495dff854bac26d27af0cbec4c350989c2c8	yes	115

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Foreign Reference	1	43
Foreign Reference	44	59
Foreign Reference	60	88
Non Patent Literature	89	103
Non Patent Literature	104	115

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4	Fee Worksheet (SB06)	fee-info.pdf	30474 cafdf478fa924aa1051b3c6bd376ad5ce4ee0e6e	no	2

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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.

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Attorney's Docket No. 042933/427718

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re:	Lindberg et al.	Confirmation No.:	1050
Appl. No.:	13/889,750	Group Art Unit:	2142
Filed:	May 8, 2013	Examiner:	O. R. Abdul-Ali
For:	UNLOCKING A TOUCH SCREEN DEVICE		

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

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT UNDER 37 C.F.R. § 1.97(c)

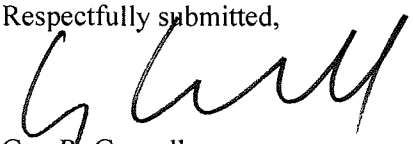
Attached is a list of documents on form PTO-1449 along with a copy of any cited foreign patent documents and non-patent literature document in accordance with 37 CFR 1.98(a)(2). Also enclosed is a translation or a concise explanation of each non-English language document.

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Respectfully submitted,



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Attorney's Docket No. 042933/427718

PATENT

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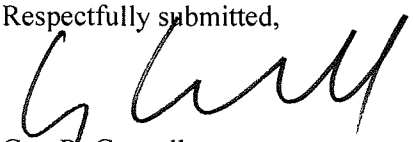
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT *(Use as many sheets as necessary)*	Application Number	13/889,750
	Filing Date	May 8, 2013
	First Named Inventor	Lindberg et al.
	Art Unit	2142
	Examiner Name	O. R. Abdul-Ali
Sheet 1 of 4	Attorney Docket Number	042933/427718

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.	Document Number Number - Kind Code (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages of Relevant Figures Appear
	1	US-5,754,306	05-19-1998	Taylor et al.	
	2	US-5,884,185	03-16-1999	Kim	
	3	US-6,055,439	04-25-2000	Helin et al.	
	4	US-6,799,061	09-28-2004	Jeoung	
	5	US-7,487,467	02-03-2009	Kawahara et al.	
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	7	US-8,082,523	12-20-2011	Forstall et al.	
	8	US-8,130,206	03-06-2012	Lindroos	
	9	US-2003/0090506 A1	05-15-2003	Moore et al.	
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	24	US-2010/0125905 A1	05-20-2010	Samuels	

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Substitute for form 1449/PTO (Revised 07/2007)				Complete if Known	
				Application Number	13/889,750
				Filing Date	May 8, 2013
INFORMATION DISCLOSURE STATEMENT BY APPLICANT *(Use as many sheets as necessary)*				First Named Inventor	Lindberg et al.
				Art Unit	2142
				Examiner Name	O. R. Abdul-Ali
Sheet	2	of	4	Attorney Docket Number	042933/427718

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.	Document Number Number - Kind Code (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages of Relevant Figures Appear
	25	US-2010/0205563 A1	08-12-2010	Haapsaari et al.	
	26	US-2010/0231533 A1	09-16-2010	Chaudhri	
	27	US-2010/0235794 A1	09-16-2010	Ording	
	28	US-2010/0257490 A1	10-07-2010	Lyon et al.	
	29	US-2010/0269040 A1	10-21-2010	Lee	
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	45	US-2013/0239065 A1	09-12-2013	Lindberg et al.	

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				Art Unit	2142
				Examiner Name	O. R. Abdul-Ali
Sheet	3	of	4	Attorney Docket Number	042933/427718

FOREIGN PATENT DOCUMENTS

Examiner Initials	Cite No.	Foreign Patent Document Country Code - Number Kind Code (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	English Language Translation Attached
	46	EP 1 032 183 A2	08-30-2000	Nokia Mobiles Phones Ltd.		
	47	EP 2 282 275 A1	02-09-2011	Apple Inc.		
	48	EP-2 284 646 A1	02-16-2011	Apple Inc.		
	49	GB 2 310 567 A	08-27-1997	Vanttila et al.		*
	50	JP 2007-72233 A	03-22-2007	Matsushita Electric Ind Co Ltd		* (corresponds to US 7,610,599 previously cited)
	51	WO 2010/040670 A2	04-15-2010	Tathe Astonishing Tribe AB		
	52	WO 2011/100623 A2	08-18-2011	Microsoft Corporation		
		***Abstract only**				

OTHER DOCUMENTS

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, page(s) , volume-issue number(s), publisher, city and/or country where published.	English Language Translation Attached
	53	mixed molo: 5 Best Things About iOS4 [online] [retrieved 01/17/2012]. Retrieved from the Internet: <URL: http://migmol.blogspot.com/2010/06/5-best-things-about-ios4.html>. (dated June 23, 2010) 6 pages	
	54	Shaky Beginnings: March 2010 [online] [retrieved 01/17/2012]. Retrieved from the Internet: <URL: http://rs250-squid.blogspot.com/2010_03_01_archive.html>. (dated March 9, 2010) 5 pages	
	55	"Flex 4.5 – Using Mobile View Transitions"; Downloaded from http://devgirl.org/2011/05/12/flex-4-5-using-mobile-view-transitions/ Published on May 12, 2011	
	56	"LauncherPro Plus Home Screen Transition Effects Effects on CyanogenMod 7 –RC 2 Motorola Milestone"; Downloaded from http://www.youtube.com/watch?v=bRcMAOLsBP4; Published on March 6, 2011	

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				Art Unit	2142
				Examiner Name	O. R. Abdul-Ali
Sheet	*4*	of	4	Attorney Docket Number	042933/427718

OTHER DOCUMENTS

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, page(s) , volume-issue number(s), publisher, city and/or country where published.	English Language Translation Attached
	57	"DevTools for .NET"; Downloaded from http://www.telerik.com/community/forums/windows-phone/transition-control/transition-from-page-to-page.aspx; Published on November 16, 2010	
	58	"Interfaces That Flow: Transitions as Design Elements"; Downloaded from http://www.uxmatters.com/mt/archives/2007/04/interfaces-that-flow-transitions-as-design-elements.php; Published on April 26, 2007	
	59	Sprint Personal Communication Services, User Guide, QUALCOMM QCP-2700/2700F Sony CM-B1201SPR (July 1997) 78 pages	
	60	Written Opinion from International Application No. PCT/FI2011/050739, mailed December 16, 2011	
	61	International Search Report from International Application No. PCT/FI2011/050739, mailed December 16, 2011	
	62	International Search Report and Written Opinion for Application No. PCT/FI2012/051220, dated April 25, 2013	
	63	European Search Report for Application No. 13159698 dated September 9, 2013	
	64	Office Action for U.S. Application No. 12/874,206 dated April 8, 2013	
	65	Office Action for U.S. Application No. 12/874,206 dated October 23, 2013	
	66	Office Action for U.S. Application No. 13/323,132 dated June 20, 2013	
	67	Office Action for U.S. Application No. 13/323,132 dated October 16, 2013	
	68	Office Action for U.S. Application No. 13/323,132 dated February 14, 2014	
	69	Office Action in U.S. Application No. 13/594,238 dated November 19, 2012	
	70	Office Action in U.S. Application No. 13/594,238 dated May 29, 2013	

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(54) A radiophone provided with an operation key with multiple functionality for handling access to a menu structure

(57) Radiophone (1) provided with an operation key (8a) with multiple functionality for handling access to a menu structure. The radiophone is arranged to assume a plurality of states (30, 70, 85, 115, 145, 175, 195), wherein the phone assumes an idle state (30) in one of the plurality of states. The phone (1) comprises a user interface provided with, a display (3) and a keypad (2), and control means (18). The keypad (2) is arranged to enter the plurality of states, which changes said plurality of states. The keypad comprises a first group of keys (7) and a second group of keys (8a,8b,9,10). The second group of keys comprises an operation key (8a) and a scroll key (10) to scroll between a group of items (90-110) in a menu of said menu structure. The control means (18) is arranged to control the display (340) of an action, from said group of actions, as a default function, and to detect a state change event (310), which will change the state (320) of the radiophone and redefine the functionality of said operation key (330,340) in response to the preceding state and the nature of the detected state change event.

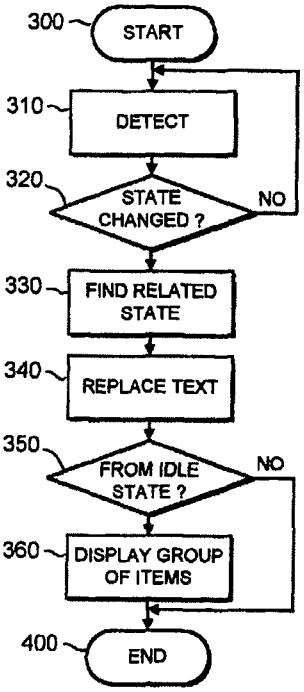


FIG. 4

EP 1 032 183 A2

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000327

Description

[0001] The present invention relates to a radiophone provided with an operation key with multiple functionality for handling access to a menu structure, according to the preamble of claim 1.

[0002] The term "radiophone" covers a portable unit provided with a transmitter/receiver, which is capable of transmitting signals with speech and/or data via electromagnetic waves/radio waves to another unit comprising a transmitter/receiver.

The phones sold by the applicants, as for example the models Nokia 5110™, Nokia 6110™ and Nokia 8810™, are exponents of the presently dominating user interface style based on two menu handling keys (soft keys) with multiple functionality for accessing different features in the phone. These features can e.g. be user settings, handling messages, setting call options, security options, etc. In idle mode, the two soft keys on e.g. Nokia 6110™ and Nokia 8810™ allow access to the menu structure and the phone book, respectively. The phone book is a phone number database stored on the SIM card of the phone and/or in the memory in the phone itself The call handling is handled by two other keys - one for establishing or answering a call and one for terminating a call. Even if the soft keys facilitate the access to different features, the users desire an even more well-arranged and manageable keypad.

[0003] One example of an improvement is disclosed in GB-A-2,319,691, which describes a user interface for a radiophone. The radiophone comprises a user interface and a controller unit connected to the user interface. The user interface comprises a display and a keypad having an operation key, of which function is controlled by the controller unit and is displayed in a predetermined area of the display. The radiophone is capable of assuming a plurality of states in which a group of predetermined actions associated with the state concerned may be performed by the operation key. The controller unit displays one of the actions as a default function in the predetermined area of the display. This improvement as disclosed in GB-A-2,319,691 provides a user interface for a radiophone, which facilitates the normal operation for accessing different features in the radiophone.

[0004] Another example of an improvement is disclosed in GB-A-2,322,512, which also describes a user interface for a radiophone. The radiophone is provided with a user interface including a single multi-functionality key with multiple functionality, including call handling. The functionality of the multi-functionality key is displayed on a display, and is controlled by a controller. The controller monitors the information displayed on the display and controls the functionality of the multi-functionality key in dependence of the displayed information. This means that the call handling keys can be included in a single menu handling key, instead of having separate call handling keys. Thus, this improvement as disclosed in GB-A-2,322,512 provides a user interface for a radiotelephone which facilitates the normal operation. This improvement is also a very appreciated feature called NaviKey™ in the applicant's phone Nokia 3110™.

[0005] However, even if both GB-A-2,319,691 and GB-A-2,322,512 provide a well-arranged and manageable user interface, it is a general desire to facilitate the access to predetermined actions associated with a state when the radiophone is in an idle state. For example, upon pressing on a key on the alphanumerical keyboard on the phone, it is desired to facilitate the access to features which are related to actions affected by the alphanumerical keyboard.

[0006] The main object of the present invention is to provide a radiophone provided with an operation key, which enables an easy access to predetermined actions associated with a state when the radiophone is in an idle state. Thus, upon pressing on a key on e.g. an alphanumerical keyboard on the phone, it shall be easy to access different features related to actions caused by the alphanumerical keyboard.

[0007] This object is achieved in accordance with the present invention by claim 1.

[0008] One particular advantage of the invention is that it is possible to receive a menu with several options, upon pressing on a key in a first group of keys, e.g. an alphanumerical key, in idle mode, and thereafter pressing on an operational key. In some of the preferred embodiments of the invention, these options can be e.g. saving a number, call a number, add numbers, send messages, convert currencies and/or calculate. Thus, it will be very easy to access different features which are related to actions affected by the first group of keys. In this way, it may no longer be necessary for the user to browse among the plurality of menus in the menu structure, when he/she is going to use a feature related to an input from the first group of keys. Instead, the user gets a fast access to the menu items, when using the first group of keys, in combination with the operational key.

[0009] Further advantages of the present invention will be apparent from the dependent claims.

[0010] The invention will be described in greater detail in the following by way of example only and with reference to the attached drawings, in which

Fig. 1 schematically illustrates a preferred embodiment of a hand portable phone according to the present invention,

Fig. 2 schematically shows the essential parts of a telephone for communicating with a cellular or cordless network,

Fig. 3 a, b shows a sequence of images as an example of a user interface in a phone according to the present invention, and

Fig. 4 shows a flowchart of the decision process in

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000328

the control means in a phone, in accordance with the present invention.

[0011] Fig. 1 shows a preferred embodiment of a cellular telecommunication apparatus, hereafter also referred to as a radiophone or just phone, according to the present invention. The radiophone, which is generally designated by 1, comprises a user interface having a keypad 2, a display 3, an on/off button 4, a speaker 5, and a microphone 6. The phone 1 according to the preferred embodiment is adapted for communication via a wireless telecommunication network, e.g. a cellular network. However, the phone could also have been designed for a cordless network.

[0012] The keypad 2 has a first group of keys 7, e.g. alphanumeric keys, by means of which the user can enter a telephone number, write a text message (SMS), write a name (associated with the phone number), etc. Each of the twelve alphanumeric keys 7 is provided with a figure "0-9" or a sign "#" or "*", respectively. In alpha mode each key is associated with a number of letters and special signs used in text editing.

[0013] The keypad 2 additionally comprises a second group of keys provided with two soft keys 8, two call handling keys 9, and a navigation key 10. The two soft keys 8 have a functionality corresponding to what is known from e.g. the phones Nokia 2110™ and Nokia 8110™. At least one of the soft keys is defined as an operation key 8a having multiple functionality for handling access to a menu structure. The functionality of the operation key 8a depends on the present state of the phone. The operation key is arranged to perform a group of predetermined actions associated with a state. The default function or the present function of the operation key 8a can be displayed in a predetermined area 21 of the display 3, just above the key 8a.

[0014] The scroll key 10, which can also be called a navigation key, is an up/down key and is placed centrally on the front surface of the phone between the display 3 and the group of alphanumeric keys 7. Hereby the user will be able to control this key by simply pressing the up/down key using his/her thumb, i.e. it allows the user to scroll between a group of items in e.g. a menu provided in the user interface. Since many experienced phone users are used to one-hand control, it is a very good solution to place an input key, requiring precise motor movements. Thus, the user may place the phone in the hand between the finger tips and the palm of the hand. Hereby, the thumb is free for inputting information. In a preferred embodiment, the scroll key can be a roller key (not shown), which is arranged to rotate in one or several directions. The roller allows the user to roll the key to scroll between different items in a menu. In case of a roller key, the operation key 8a could be arranged to the roller, i.e. upon pressing on the roller the same functionality, as the operation key has, could be entered. The roller key is incorporated by reference in US patent application 08/923,696.

[0015] Further, the scroll key 10 allows the user to scroll selectively between a group of items in a menu. This means that the user can select an item preceding or succeeding the item in the menu loop of the phone, while he/she can access a sub-menu loop under the item concerned in the menu loop by activation of the operation key 8a.

[0016] In some states, e.g. upon entering a phone number on the alphanumeric keypad 7, the other soft key 8b can be defined as a clear key, which may be used e.g. for erasing the last entered digit or letter by brief depression on the clear key 8b. If the clear key 8b being depressed under a longer duration the entire number or word will be erased. Like the operation key 8a, the scroll key 10 and the clear key 8b may advantageously be redefined in some states, which will be apparent from Fig. 3.

[0017] Although it is shown in the preferred embodiment that many of the functions of the phone might be controlled by the operational key 8a, it sometimes can be expedient to use two or more operational keys in the second group of keys, which can be integrated in a touch-sensitive display (not shown).

[0018] The two call handling keys 9 according to the preferred embodiment are used for establishing a call or a conference call, terminating a call or rejecting an incoming call.

[0019] Fig. 2 schematically shows the most essential parts of a preferred embodiment of the phone. These parts being essential to understand the invention. The preferred embodiment of the phone of the invention is adapted for use in connection with a GSM network, but, of course, the invention may also be applied in connection with other phone networks, such as other kinds of cellular networks and various forms of cordless phone systems or in dual band phones accessing sets of these systems/networks. The microphone 6 records the users speech, and the analogue signals formed thereby are A/D converted in an A/D converter (not shown) before the speech is encoded in an audio part 14. The encoded speech signal is transferred to control means 18. The control means 18 comprises a processor, which may support software in the phone. The control means 18 also forms the interface to the peripheral units of the apparatus, wherein the peripheral units can comprise a RAM memory 17a and a Flash ROM memory 17b, a SIM card 16, the display 3 and the keypad 2 (as well as data, power supply, etc.). The control means 18 communicates with a transmitter/receiver means 19, e.g. a circuit which is adapted to send/receive a request/respond to/from a telecommunication network. The audio part 14 speech-decodes the signal, which is transferred from the control means 18 to the earpiece 5 via a D/A converter (not shown).

[0020] The control means 18 is connected to the user interface. Thus, it is the control means 18 which monitors the activity in the phone and controls the display 3 in response thereto, in order to display the plural-

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000329

ity of states which is assumed by the radiophone. Therefore, the control means 18 is arranged to detect the occurrence of a state change event, and changes the state of the radiophone. This state change event will affect the functionality of the operation key, and redefine it, in response to the preceding state and the nature of the detected state change event. Thus, this may also cause a change of the display text. A state change event may be caused by the user when he presses on the keypad, as shown in Fig. 1. These type of state change events are called entry events or user events. Also, the network communicating with the phone may cause a state change event. This type of event and other events beyond the users control are called non user events. Non user events comprise status change during call set-up, change in battery voltage, change in antenna conditions, message on reception of SMS, etc.

[0021] The phone can assume a plurality of predetermined states, which is shown as examples with reference to Fig. 3. A plurality of actions may be performed in these states. The display image in a state may be a phone number or the name of a person contained in the phone book of the phone, which is indicated by "state". "State" might also cover "incoming calls", "E-mail received", "SMS received", etc. If the display contains a phone number, the default function might be "call". The scroll key in Fig. 1 allows switching from the default function to the group of possible functions, to which the default function belongs. The scroll key toggles between the default function and the group of possible functions (options). An example of toggling can be when the user browses among the different menus. Also, the scroll key switches between items in the group of possible functions, once this group has been selected by means of the operation key. An example of switching can be when the user scrolls over a group of items, e.g. names and/or numbers in a built-in phone book database. The state is maintained during toggling and scrolling through the options. One of the plurality of states is an idle state, even called idle mode. In idle mode the two soft keys of the phone may allow access to the menu structure and the phone book, respectively. The function of the soft key 8, as shown in Fig.1, in the idle mode is to provide access to the main menu loop of the phone.

[0022] A state change event will result in a change from one state to another. The new state depends on the old state and the nature of the state change event. During an established call ("call established" state), the default function of the operation key 8 can be "end". If a new incoming call "is waiting", the user may use the scroll key 9 to change state to a list of options, including items such as "end", "join", "answer" and "swap" without interrupting the call.

[0023] Each state is associated with a predefined group of functions, actions and/or options. An action can also give access to different functions and/or options of a state. Establishment of conference calls, e.g., can be performed only when a call has already been established. A preferred function serving as the default function can be designated in each of these groups. This designation may be performed by a programmer during programming, by the user through his redefinition of the default function, or by the phone itself If the phone itself designates a function, the phone may record the frequency of the use of the individual functions and appoints the most frequently used one in each group as the default function.

[0024] When the phone changes its state, the operation key can perform the default function if it is activated, and the user may toggle between the default function and the whole group of options by means of the scroll key. If the group of options is selected with the operation key, the user will be able to scroll through the group of options with the scroll key and to select the desired (designated) function with the operation key. When a function is selected with the operation key, the control means 18 runs the associated program sequence to execute the function.

[0025] Furthermore, in accordance with the present invention, upon a state change event entered by the first group of keys when the radiophone is in its idle state and the function of said operation key is redefined, and thereafter a state change event entered by the operation key, the control means 18 is further arranged to control the display of a menu comprising a group of items, which is selectable by the scroll key. This will facilitate the access to the plurality of states when the phone is in an idle state. In other words, when the phone is in an idle state and one of the first group of keys is pressed, which can be an alphanumeric key, the operational key will change its appearance and the display accordingly. Thereafter, if the user presses on the operational key, a menu comprising a group of hems will appear on the display. The items will be selectable by using the scroll key. In this way, it is no longer necessary for the user to browse among the different menus in the menu structure, when he/she is going to use a feature related to an input from the first group of keys. Instead, the user gets a fast access to the menu items, when using the first group of keys.

The user interface

[0026] With reference to Figs. 3a and 3b, an example is shown on how the display in a user interface can act in idle mode 30 according to the present invention. The user interface may comprise the same elements as shown in Fig. 1, i.e. a keypad 2, a display 3, an on/off button 4, a speaker 5 and a microphone 6. Also, it is the control means 18 in Fig. 2 which controls the user interface. Starting from Fig. 3a, there is a layout 30 presented of a display in a phone, as shown in Fig.1 and 2, which indicates signal strength 35 from the wireless telecommunication network "D1 Telekom" 40, the battery power 45 and a clock showing the time 50 in hours and minutes. Preferably, the display in the phone is an LCD

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000330

(Liquid Crystal Display) display. The display, can be controlled by the control means 18 as shown in Fig.2. The layout 30 presents an example of the phone in idle mode 30, i.e. a state when the phone is activated and awaiting an action, e.g. by pressing an alphanumeric key, receiving an incoming call or establishing an outgoing call. In the bottom of the display there are two items which are denoted as "Menu" 55 and "Names" 60, which defines the functionality of the two soft keys shown in Fig. 1, wherein the "Menu" 55 in this example is referring to the operational key. If the user selects "Names" 60 he/she can e.g. access a built in phone book. If the user selects "Menu" 55, he/she can select among several different menus. The actual selection of features in the bottom of the display, like "Menu" and "Names", can be selected by means of the soft keys as is disclosed with reference to Fig. 1.

[0027] When the user presses on one of the keys on the first group of keys, as defined with reference to Fig. 1, the control means detects the state change event, change the state of the radiophone and redefine the functionality of the operational key (see Fig. 1). In this example, the user has given an input of the integer "200" 65, as shown in the layout 70. The operational key is changed from "Menu" 55, as shown in the previous layout 30, to "Options" 75. The other soft key has also changed its function from "Names" 60 to "Clear" 80. The functionality of the "Clear" key is to erase the last entered digit or letter by a brief depression on the clear key. If the clear key is depressed for a longer duration the entire number or word will be erased. Naturally, the operation key, may be redefined as the clear key instead, and vice versa. In this example, it is default to enter integers upon pressing on one of the first group of keys. However, as an alternative input in idle state, it could be possible to redefine the first group of keys to enter letters instead of integers.

[0028] In accordance with the present invention, the next layout 85, shows the state after the user has pressed on the operational key having the functionality as "Menu" 75. This layout 85 is a menu 86 comprising a group of items, which are selectable by the scroll key from Fig. 1. The operational key is changed from "Options" 75, as shown in the previous layout 70, to "Select" 87. The other soft key has also changed its function from "Clear" 80 to "Back" 88. The "Back" 88 key changes the state back to the previous layout. The scroll key in Fig. 1 allows switching from the default item to the other items in the group. The state is maintained during switching and scrolling through the options. The items defines different functions (options) available in the phone, which are related to an input from the first group of keys.

[0029] In a preferred embodiment, a default item, might be "Save" 90. The save function 90 allows the user to save a record of the number in a phone book. The phone book is a phone number database stored in memory means, e.g. on the SIM (Subscriber Identity Module) card of the phone or in the memory in the phone itself. It may also be possible to add the number to an existing name in the database. Other preferable items in the menu 86, might be to establish a call to the entered number, to send an SMS (Short Message Service) message, "Send SMS" 95, to convert currencies, "To Domestic" 100 / "To Foreign" 110, and/or to use a built-in calculator for processing the entered number in a calculation. All these features can be operatively arranged to the control means.

[0030] If the user chooses to convert currencies, e.g. "To Domestic" 100, he/she presses on the "Select' key 87, and the display changes to the state as shown in layout 115. The operational key is changed from "Select" 87, as shown in the previous layout 85, to "Options" 120. The other soft key has also changed its function from "Back" 88 to "Exit" 125. The "Exit" 125 key changes the state back to the previous layout. The layout can be provided with different editable fields and selection list placeholders, which in this example are shown in square brackets ([ ]).

[0031] Since the user has entered the number "200" in idle state, as shown in layout 75, the selected amount to be converted is set to 200, "Amount:[200]" 130. The selection which is highlighted can indicate a default state of the selection. Therefore, since the user in this example selected to convert the selected amount to a domestic currency, the default selection in this state is the currency which the user would like to convert from, "From: [DKK]" 135. The currency to convert to, "converted to [DKK]:" 140, is already set according to the users domestic currency, as in this example is DKK.

[0032] The next step is to select the foreign currency, which is done by selecting "Options" 120. If the user chooses to select "Options" 120, this will change the state and take us to the next layout 145. In this layout 145, a list of different available currencies are shown, "DEM" 150, "DKK" 155, "FIM" 160 and "NOK" 165. The user selects e.g. "FIM" 160, and selects the entry by selecting "Ok" 170. The next layout 175 highlights the selected currency FIM 180 to convert from. Thereafter, the user may select "Options" 185, which in this layout 175 activates the calculation of the currency conversion and the result "[DKK]: 250" 190 is displayed with the selected information in the next layout 195.

The decision process

[0033] Fig. 4 shows a flow chart, in accordance with the present invention, describing the decision process in the control means in a phone. The control means are the same as described earlier with reference to Fig. 2. When the phone is activated and establishes, a wireless connection to a cellular network, e.g. when the phone roams to a new network, "START" 300, it is possible to establish a voice call and/or to communicate with different telecommunication services, e.g. WAP related services, i.e. a service which can be accessed from a server

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000331

to the phone. By using this kind of service, it might be possible to obtain information from a server to the phone, e.g. by using SMS (Short Message Service), or a similar service.

[0034] When the phone is in idle mode, it communicates with a fixed station at regular intervals via paging messages to maintain the connection, and it monitors its peripheral units in the form of battery, keypad, etc. It is the control means which controls these activities, and when it detects an event, it checks whether the phone is to change its state, e.g. from the "idle mode state" to the "incoming call state". Fig. 4 illustrates this process, where the control means at stage 310 monitors and detects occurring events. If the control means identifies the event as a state change event at the decision stage 320, the control means identifies the new state at stage 330. The identification of the new state at stage 330 takes place by means of a state tree, and replaces the old display text by a new default function indication of the new text. The replacement of the display text takes place in stage 340. If a detected event is not a state change event, the control means returns to the detect stage 310 to search for a new event.

[0035] In accordance with the present invention, a state change event caused by an input of the first group of keys when the radiophone is in its idle state, will redefine the function of the operation key, by replacing the old display text as disclosed in step 340. Thereafter, if the following state change event is caused by an input by the operation key, the control means will detect the combination of these two state change events in the next step 350, and display of a menu comprising a group of items as shown in step 360. Thereafter, the process can be completed "END" 400. The group of items is selectable by the scroll key, and is arranged to facilitate the access to the plurality of states when the phone is in an idle state. In other words, when the phone is in an idle state and one of the first group of keys is pressed, preferably an alphanumeric key, the operational key will change its appearance and the display accordingly. Thereafter, if the user presses on the operational key, a menu comprising a group of items will appear on the display. The items will be selectable by using the scroll key. Naturally, if the no state change event is detected in step 350, the process can be completed "END" 400.

[0036] The invention is not limited to the above described and in the drawings shown examples of an embodiment but can be varied within the scope of the appended claims. For example, it is possible to have additional actions in the menu to process an input from the first group of keys. Another action could be to search for a name or a number in the database provided in the memory means.

Claims

1. A radiophone (1) provided with an operation key (8a) with multiple functionality for handling access to a menu structure, said radiophone arranged to assume a plurality of states (30, 70, 85, 115, 145, 175, 195), wherein the phone assumes an idle state (30) in one of said plurality of states, said phone (1) comprises,

- a user interface provided with,
- a display (3), to display the plurality of states,
- a keypad (2), to enter and/or change the plurality of states, said keypad comprises a first group of keys (7) and a second group of keys (8a,8b,9,10), said second group of keys comprises an operation key (8a) and a scroll key (10) to scroll between a group of items (90-110) in a menu of said menu structure, and
- control means (18), arranged to control the display (340) of an action, from a group of predetermined actions, and to detect a state change event (310), which will change the state (320) of the radiophone and redefine the functionality of said operation key (330,340) in response to the preceding state and the nature of the detected state change event,

wherein the function of said operation key (8a) is controlled by the control means (18), and is displayed in a predetermined area of said display (3), and said operation key (8a) is arranged to perform said group of predetermined actions associated with a state,

characterised in that, the control means (18) is further arranged to, upon a state change event entered by the first group of keys (7) when the radiophone is in its idle state (30) and the function of said operation key is redefined, and thereafter a state change event entered by the operation key, control the display of a menu (360) comprising a group of items, which is selectable by the scroll key, in order to facilitate the access to the plurality of states when the phone is in an idle state.

2. A radiophone (1) according to claim 1, characterised in that the first group of keys (7) are alphanumerical keys, wherein the control means (18) determines whether the individual keys in the first group of keys are in numerical or in alphabetic mode depending on the present state of the telephone.

3. A radiophone (1) according to claim 1 or 2, characterised in that the scroll key (10) is a roller key, to scroll between several items in a menu.

4. A radiophone (1) according to claim 2, characterised in that said group of items in the menu comprises at least the following action to process a number, as was entered on the first group of keys

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000332

(7),

- to access a currency converter (100,110), in order to convert said number from one monetary unit to another,
  wherein said currency converter is operatively arranged to said control means (18).

5. A radiophone (1) according to claim 2 or 4, characterised in that said phone further comprises memory means (17), and that said group of items in a menu comprises the following actions to process a number, as was entered by the first group of keys (7),

- to save a record (90) of the number in a database, provided in said memory means (17), and
- to establish a call to the number.

6. A radiophone (1) according to claim 2, 4 or 5, characterised in that said phone further comprises memory means (17), and that said group of items in the menu comprises the following actions to process a number and/or at least one letter, as was entered by the first group of keys,

- to add said number and/or said letter to an existing name in a database, provided in said memory means, and
- to send an SMS message (95).

7. A radiophone (1) according to claim 2, 4, 5 or 6, characterised in that said group of items in the menu comprises at least the following action to process a number, as was entered on the first group of keys, to access a calculator, in order to process said number in a calculation, wherein said pocket calculator is operatively arranged to said control means (18).

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000333

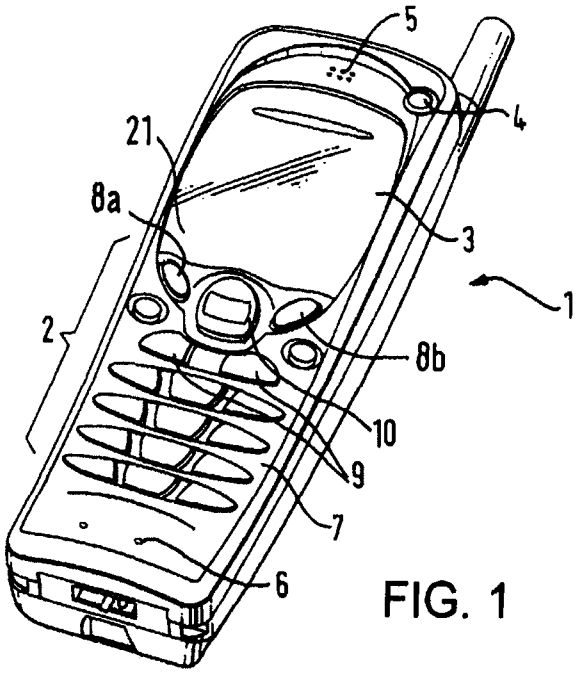


FIG. 1

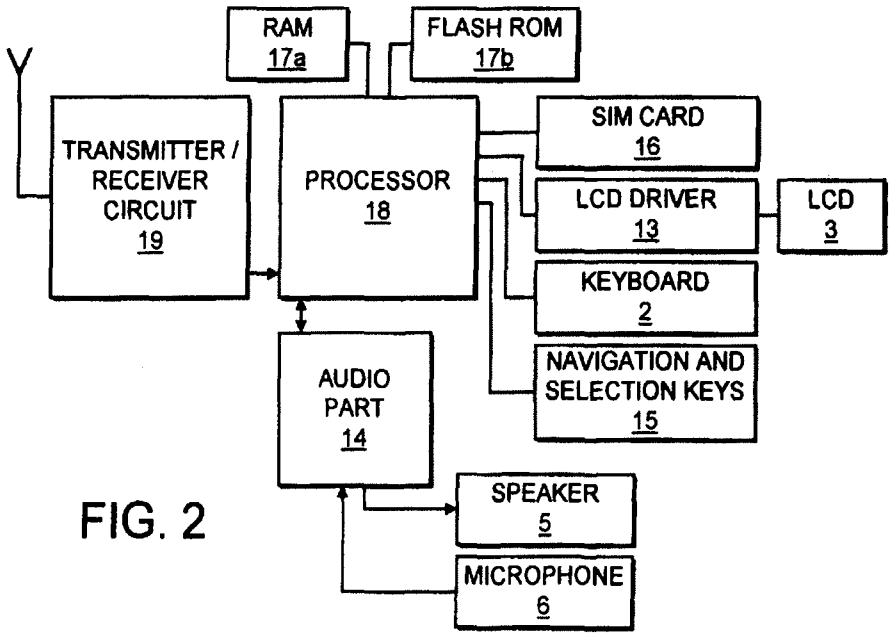


FIG. 2

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000334

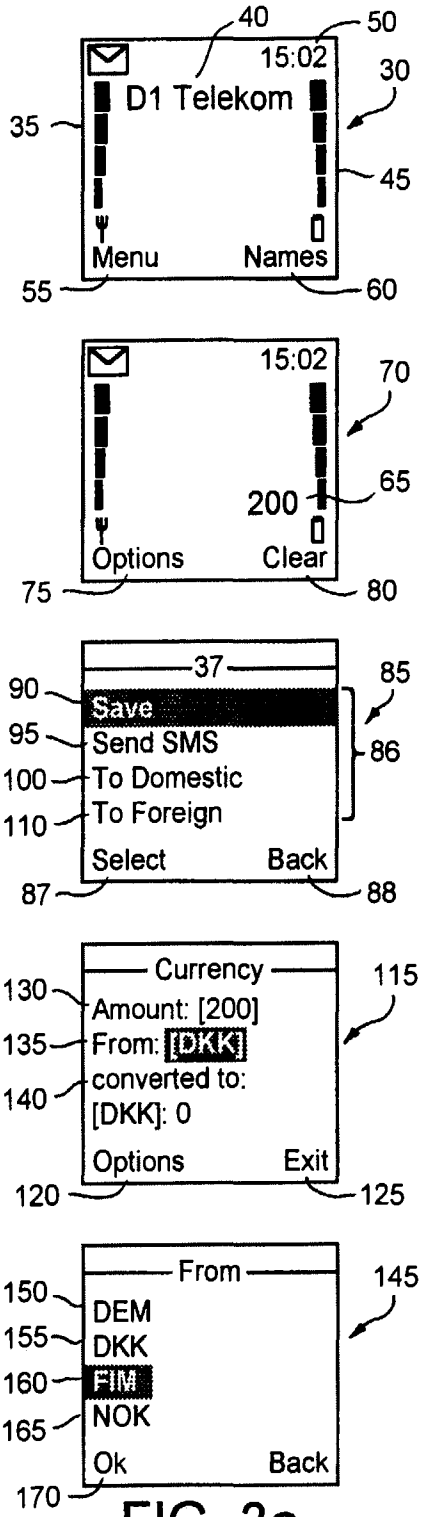


FIG. 3a

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000335

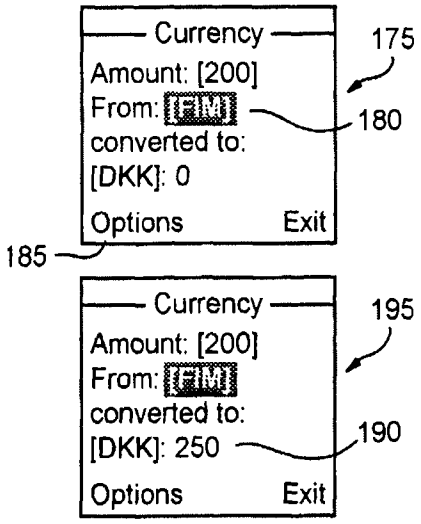


FIG. 3b

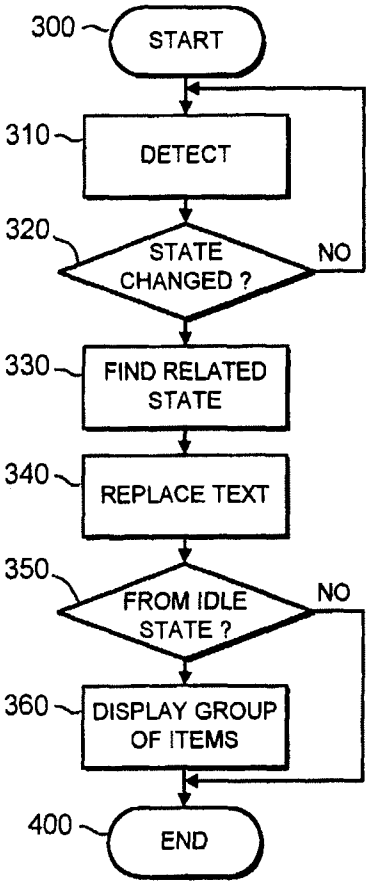


FIG. 4

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000336

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(54) Portable electronic device for photo management

(57) A portable electronic device with a touch screen display for photo management is disclosed. One aspect of the invention involves a computer-implemented method in which the portable electronic device displays an array of thumbnail images corresponding to a set of photographic images. The device replaces the displayed array of thumbnail images with a user-selected photographic image upon detecting a user contact with a corresponding thumbnail image in the array. The user-selected photographic image is displayed at a larger scale than the corresponding thumbnail image. The portable device displays a different photographic image in replacement of the user-selected photographic image in accordance with a scrolling gesture. The scrolling gesture comprises a substantially horizontal movement of user contact with the touch screen display.

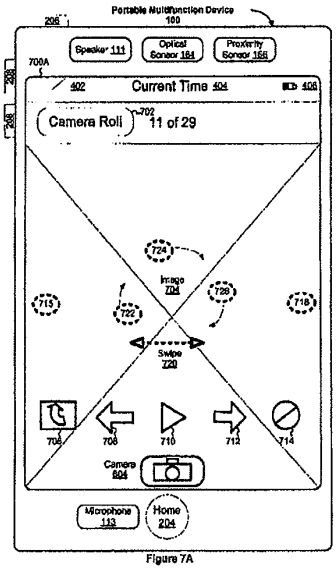


Figure 7A

EP 2 282 275 A1

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000337

Description

TECHNICAL FIELD

[0001] The disclosed embodiments relate generally to portable electronic devices, and more particularly, to portable devices for photo management, such as digital photographing, photo editing, and emailing photos.

BACKGROUND

[0002] As portable electronic devices become more compact and capable of performing functions, it has become a significant challenge to design a user interface that allows users to easily interact with such a multifunction device. This challenge is more significant for handheld portable electronic devices, which have much smaller screens than desktop or laptop computers. This situation is unfortunate because a user interface is the gateway through which a user receives information and a device receives user actions or behaviors, including user attempts to access the portable electronic device's features, tools, and functions.

[0003] Some portable devices (e.g., mobile telephones, sometimes called mobile phones, cell phones, cellular telephones, and the like) have resorted to adding more push buttons, increasing the density of push buttons, overloading the functions of push buttons, or using complex menu systems to allow a user to access, store, and manipulate data. These approaches often result in complicated key sequences and menu hierarchies that must be memorized by the user.

[0004] Many conventional user interfaces, such as those that include physical push buttons, are also inflexible because a physical push button may prevent a user interface from being configured and/or adapted by either an application running on the portable electronic device or by users. When coupled with the time consuming requirement to memorize multiple key sequences and menu hierarchies, and the difficulty in activating a desired push button, such inflexibility is frustrating to most users.

[0005] For example, cell phones with a built-in digital camera have been on the market for some time. But existing cell phones are difficult to use for even basic photo-related operations such as displaying, deleting and sending a photo because of limitations with the cell phones' user interface.

[0006] Accordingly, there is a need for portable multifunction devices with more transparent and intuitive user interfaces for photo management.

SUMMARY

[0007] The above deficiencies and other problems associated with user interfaces for portable devices are reduced or eliminated by the disclosed portable multifunction device. In some embodiments, the portable electronic device has a touch-sensitive display (also known as a "touch screen" or "touch screen display") with a graphical user interface (GUI), one or more processors, memory and one or more modules, programs or sets of instructions stored in the memory for performing multiple functions. In some embodiments, the user interacts with the GUI primarily through finger contacts and gestures on the touch-sensitive display. Instructions for performing photo management may be included in a computer program product configured for execution by one or more processors.

[0008] One aspect of the invention involves a computer-implemented method in which a portable electronic device with a touch screen: displays an array of thumbnail images corresponding to a set of photographic images; replaces the displayed array of thumbnail images with a user-selected photographic image upon detecting a user contact with a corresponding thumbnail image in the array, wherein the user-selected photographic image is displayed at a larger scale than the corresponding thumbnail image; and displays a different photographic image in replacement of the user-selected photographic image, wherein the different photographic image is selected in accordance with a scrolling gesture comprising a substantially horizontal movement of user contact with the touch screen display.

[0009] Another aspect of the invention involves a computer-implemented method in which a portable electronic device with a touch screen: displays an array of thumbnail images corresponding to a set of photographic images; detects a scrolling gesture comprising a substantially vertical movement of user contact with the touch screen display; and responds to the scrolling gesture by scrolling the display of thumbnail images in accordance with a direction of the scrolling gesture; wherein the scrolling gesture is substantially independent of a horizontal position of the user contact with the touch screen display.

[0010] Another aspect of the invention involves a portable electronic device. The device includes a touch screen display, one or more processors, memory, and one or more programs. The one or more program are stored in the memory and configured to be executed by the one or more processors. The one or more programs include: instructions for displaying an array of thumbnail images corresponding to a set of photographic images; instructions for replacing the displayed array of thumbnail images with a user-selected photographic image upon detecting a user contact with a corresponding thumbnail image in the array, wherein the user-selected photographic image is displayed at a larger scale than the corresponding thumbnail image; and instructions for displaying a different photographic image in replacement of the user-selected photographic image, wherein the different photographic image is selected in accordance with a scrolling gesture comprising a substantially horizontal movement of user contact with the touch screen display.

[0011] Another aspect of the invention involves a portable electronic device. The device includes a touch screen display, one or more processors, memory, and

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000338

one or more programs. The one or more program are stored in the memory and configured to be executed by the one or more processors. The one or more programs include: instructions for displaying an array of thumbnail images corresponding to a set of photographic images; instructions for detecting a scrolling gesture comprising a substantially vertical movement of user contact with the touch screen display; and instructions for responding to the scrolling gesture by scrolling the display of thumbnail images in accordance with a direction of the scrolling gesture; wherein the scrolling gesture is substantially independent of a horizontal position of the user contact with the touch screen display.

[0012] Another aspect of the invention involves a computer-program product that includes a computer readable storage medium and a computer program mechanism embedded therein. The computer program mechanism includes instructions, which when executed by a portable electronic device with a touch screen display, cause the device to: display an array of thumbnail images corresponding to a set of photographic images; replace the displayed array of thumbnail images with a user-selected photographic image upon detecting a user contact with a corresponding thumbnail image in the array, wherein the user-selected photographic image is displayed at a larger scale than the corresponding thumbnail image; and display a different photographic image in replacement of the user-selected photographic image, wherein the different photographic image is selected in accordance with a scrolling gesture comprising a substantially horizontal movement of user contact with the touch screen display.

[0013] Another aspect of the invention involves a computer-program product that includes a computer readable storage medium and a computer program mechanism embedded therein. The computer program mechanism includes instructions, which when executed by a portable electronic device with a touch screen display, cause the device to: display an array of thumbnail images corresponding to a set of photographic images; detect a scrolling gesture comprising a substantially vertical movement of user contact with the touch screen display; and respond to the scrolling gesture by scrolling the display of thumbnail images in accordance with a direction of the scrolling gesture; wherein the scrolling gesture is substantially independent of a horizontal position of the user contact with the touch screen display.

[0014] Another aspect of the invention involves a portable electronic device with a touch screen display, comprising: means for displaying an array of thumbnail images corresponding to a set of photographic images; means for replacing the displayed array of thumbnail images with a user-selected photographic image upon detecting a user contact with a corresponding thumbnail image in the array, wherein the user-selected photographic image is displayed at a larger scale than the corresponding thumbnail image; and means for displaying a different photographic image in replacement of the user-selected photographic image, wherein the different photographic image is selected in accordance with a scrolling gesture comprising a substantially horizontal movement of user contact with the touch screen display.

[0015] Another aspect of the invention involves a portable electronic device with a touch screen display, comprising: means for displaying an array of thumbnail images corresponding to a set of photographic images; means for detecting a scrolling gesture comprising a substantially vertical movement of user contact with the touch screen display; and means for responding to the scrolling gesture by scrolling the display of thumbnail images in accordance with a direction of the scrolling gesture; wherein the scrolling gesture is substantially independent of a horizontal position of the user contact with the touch screen display.

[0016] Another aspect of the invention involves a computer-implemented method in which an electronic device with a touch screen: detects a first movement of a physical object on or near the touch screen display; while detecting the first movement, translates a first digital object displayed on the touch screen display in a first direction, wherein the first digital object is associated with a set of digital objects; in response to display of a previously hidden edge of the first digital object and continued detection of the first movement, displays an area beyond the edge of the first digital object; after the first movement is no longer detected, translates the first digital object in a second direction until the area beyond the edge of the first digital object is no longer displayed; detects a second movement of the physical object on or near the touch screen display; and, in response to detecting the second movement while the previously hidden edge of the first digital object is displayed, translates the first digital object in the first direction and displays a second digital object in the set of digital objects.

[0017] Another aspect of the invention involves an electronic device. The device includes a touch screen display, one or more processors, memory, and one or more programs. The one or more program are stored in the memory and configured to be executed by the one or more processors. The one or more programs include: instructions for detecting a first movement of a physical object on or near the touch screen display; instructions for, while detecting the first movement, translating a first digital object displayed on the touch screen display in a first direction, wherein the first digital object is associated with a set of digital objects; instructions for, in response to display of a previously hidden edge of the first digital object and continued detection of the first movement, displaying an area beyond the edge of the first digital object; instructions for, after the first movement is no longer detected, translating the first digital object in a second direction until the area beyond the edge of the first digital object is no longer displayed; instructions for detecting a second movement of the physical object on or near the touch screen display; and instructions for, in response to detecting the second movement while the

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000339

previously hidden edge of the first digital object is displayed, translating the first digital object in the first direction and displaying a second digital object in the set of digital objects.

[0018] Another aspect of the invention involves a computer-program product that includes a computer readable storage medium and a computer program mechanism embedded therein. The computer program mechanism includes instructions, which when executed by an electronic device with a touch screen display, cause the device to: detect a first movement of a physical object on or near the touch screen display; while detecting the first movement, translate a first digital object displayed on the touch screen display in a first direction, wherein the first digital object is associated with a set of digital objects; in response to display of a previously hidden edge of the first digital object and continued detection of the first movement, display an area beyond the edge of the first digital object; after the first movement is no longer detected, translate the first digital object in a second direction until the area beyond the edge of the first digital object is no longer displayed; detect a second movement of the physical object on or near the touch screen display; and, in response to detecting the second movement while the previously hidden edge of the first digital object is displayed, translate the first digital object in the first direction and display a second digital object in the set of digital objects.

[0019] Another aspect of the invention involves an electronic device with a touch screen display, comprising: means for detecting a first movement of a physical object on or near the touch screen display; means for, while detecting the first movement, translating a first digital object displayed on the touch screen display in a first direction, wherein the first digital object is associated with a set of digital objects; means for, in response to display of a previously hidden edge of the first digital object and continued detection of the first movement, displaying an area beyond the edge of the first digital object; means for, after the first movement is no longer detected, translating the first digital object in a second direction until the area beyond the edge of the first digital object is no longer displayed; means for detecting a second movement of the physical object on or near the touch screen display; and means for, in response to detecting the second movement while the previously hidden edge of the first digital object is displayed, translating the first digital object in the first direction and displaying a second digital object in the set of digital objects.

[0020] Thus, the invention provides a transparent and intuitive user interface for managing photos on a portable electronic device with a touch screen display

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] For a better understanding of the aforementioned embodiments of the invention as well as additional embodiments thereof, reference should be made to the Description of Embodiments below, in conjunction with the following drawings in which live reference numerals refer to corresponding parts throughout the figures.

[0022] Figure 1 is a block diagram illustrating a portable electronic device with a touch-sensitive display in accordance with some embodiments.

[0023] Figure 2 illustrates a portable electronic device having a touch screen in accordance with some embodiments.

[0024] Figure 3 illustrates an exemplary user interface for unlocking a portable electronic device in accordance with some embodiments.

[0025] Figure 4 illustrates an exemplary user interface for a menu of applications on a portable electronic device in accordance with some embodiments.

[0026] Figure 5 illustrates an exemplary user interface for a camera in accordance with some embodiments.

[0027] Figure 6 illustrates an exemplary user interface for a camera roll in accordance with some embodiments.

[0028] Figures 7A through 7C illustrate an exemplary user interface for viewing and manipulating images in accordance with some embodiments.

[0029] Figure 8 illustrates an exemplary user interface for viewing photo albums in accordance with some embodiments.

[0030] Figure 9 illustrates an exemplary user interface for setting user preferences in accordance with some embodiments.

[0031] Figure 10 illustrates an exemplary user interface for viewing an album in accordance with some embodiments.

[0032] Figure 11 illustrates an exemplary user interface for viewing images in an album in accordance with some embodiments.

[0033] Figure 12 illustrates an exemplary user interface for selecting a use for an image in an album in accordance with some embodiments.

[0034] Figures 13A through 13G illustrate an exemplary user interface for incorporating an image in an email message template in accordance with some embodiments.

[0035] Figures 14A and 14B illustrate an exemplary user interface for assigning an image to a contact in the user's contact list in accordance with some embodiments.

[0036] Figure 15 illustrates an exemplary user interface for incorporating an image in the user's wallpaper in accordance with some embodiments.

[0037] Figure 16 is a flowchart ,illustrating a process for displaying thumbnail images on a touch screen in accordance with some embodiments.

[0038] Figure 17 is a flowchart illustrating a process for performing operations in response to user contact with the touch screen in accordance with some embodiments.

[0039] Figure 18 is a flowchart illustrating a process for deleting an image in response to a user contact with the touch screen in accordance with some embodiments.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000340

[0040] Figure 19 is a flowchart illustrating a process for displaying multiple photo albums on the touch screen in accordance with some embodiments.

[0041] Figure 20 is a flowchart illustrating a process for performing additional operations upon a user selection of an additional options icon in accordance with some embodiments.

[0042] Figure 21 is a flowchart illustrating an animated process for rendering an email service interface that includes a user selected image in accordance with some embodiments.

[0043] Figure 22 is a flowchart illustrating a process for assigning an image to a user selected contact in the user's contact list in accordance with some embodiments.

[0044] Figures 23A-23H illustrate an exemplary user interface for viewing digital objects in a set of digital objects in accordance with some embodiments.

[0045] Figure 24 is a flowchart illustrating a process for viewing digital objects in a set of digital objects in accordance with some embodiments.

DESCRIPTION OF EMBODIMENTS

[0046] Reference will now be made in detail to embodiments, examples of which are illustrated in the accompanying drawings. In the following detailed description, numerous specific details are set forth in order to provide a thorough understanding of the invention. However, it will be apparent to one skilled in the art that the invention may be practiced without these specific details. In other instances, well-known methods, procedures, components, circuits, and networks have not been described in detail so as not to unnecessarily obscure aspects of the embodiments.

[0047] Embodiments of a portable electronic device, user interfaces for such devices, and associated processes for using such devices are described. In some embodiments, the portable electronic device is a portable communications device such as a mobile telephone that also contains other functions, such as PDA and/or music player functions.

[0048] The user interface may include a physical click wheel in addition to a touch screen or a virtual click wheel displayed on the touch screen. A click wheel is a physical user-interface device that may provide navigation commands based on an angular displacement of the wheel or a point of contact with the wheel by a user of the portable electronic device. A click wheel may also be used to provide a user command corresponding to selection of one or more items, for example, when the user of the portable electronic device presses down on at least a portion of the wheel or the center of the wheel. Alternatively, breaking contact with a click wheel image on a touch screen surface may indicate a user command corresponding to selection. For simplicity, in the discussion that follows, a portable electronic device that includes a touch screen is used as an exemplary embodiment. It should be understood, however, that some of the user interfaces and associated processes may be applied to other devices, such as personal computers and laptop computers, which may include one or more other physical user-interface devices, such as a physical click wheel, a physical keyboard, a mouse and/or a joystick.

[0049] In addition to photo management, the device may support a variety of other applications, such as a telephone application, a video conferencing application, an e-mail application, an instant messaging application, a blogging application, a web browsing application, a digital music player application, and/or a digital video player application.

[0050] The various applications that may be executed on the portable electronic device may use at least one common physical user-interface device, such as the touch screen. One or more functions of the touch screen as well as corresponding information displayed on the portable electronic device may be adjusted and/or varied from one application to the next and/or within a respective application. In this way, a common physical architecture (such as the touch screen) of the portable electronic device may support the variety of applications with user interfaces that are intuitive and transparent.

[0051] The user interfaces may include one or more soft keyboard embodiments. 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 No. 11/459,606, "Keyboards For Portable Electronic Devices," filed July 24, 2006, and U.S. Patent Application No. 11/459,615, "Touch Screen Keyboards For Portable Electronic Devices," filed July 24, 2006, the contents of which are hereby incorporated by reference. The keyboard embodiments may include a reduced number of icons (or soft keys) relative to the number of keys in existing physical keyboards, such as that for a typewriter. This may make it easier for users to select one or more icons in the keyboard, and thus, one or more corresponding symbols. The keyboard embodiments may be adaptive. For example, displayed icons may be modified in accordance with user actions, such as selecting one or more icons and/or one or more corresponding symbols. One or more applications on the portable electronic device may utilize common and/or different keyboard embodiments. Thus, the keyboard embodiment used may be tailored to at least some of the applications. In some embodiments, one or more keyboard embodiments may be tailored to a respective user. For example, based on a word usage history (lexicography, slang, individual usage) of the respective user. Some of the keyboard embodiments may be adjusted to reduce a probability of a user error when selecting one or more icons, and thus one or more symbols, when using the soft keyboard embodiments.

[0052] Attention is now directed towards embodiments of the portable electronic device. Figure 1 is a block diagram illustrating a portable electronic device 100 with

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000341

a touch-sensitive display 112 in accordance with some embodiments. The touch-sensitive display 112 is sometimes called a "touch screen" for convenience. The device 100 may include a memory 102 (which may include one or more computer readable storage mediums), a memory controller 122, one or more processing units (CPU's) 120, a peripherals interface 118, RF circuitry 108, audio circuitry 110, a speaker 111, a microphone 113, an input/output (I/O) subsystem 106, other input or control devices 116, and an external port 124. The device 100 may include one or more optical sensors 164. These components may communicate over one or more communication buses or signal lines 103.

[0053] It should be appreciated that the portable electronic device 100 is only one example of a portable electronic device 100, and that the portable electronic device 100 may have more or fewer components than shown, may combine two or more components, or a may have a different configuration or arrangement of the components. The various components shown in Figure 1 may be implemented in hardware, software or a combination of hardware and software, including one or more signal processing and/or application specific integrated circuits.

[0054] Memory 102 may include high-speed random access memory and may also include non-volatile memory, such as one or more magnetic disk storage devices, flash memory devices, or other non-volatile solid-state memory devices. Access to memory 102 by other components of the portable electronic device 100, such as the CPU 120 and the peripherals interface 118, may be controlled by the memory controller 122.

[0055] The peripherals interface 118 couples the input and output peripherals of the portable electronic device to the CPU 120 and memory 102. The one or more processors 120 run or execute various software programs and/or sets of instructions stored in memory 102 to perform various functions for the portable electronic device 100 and to process data.

[0056] In some embodiments, the peripherals interface 118, the CPU 120, and the memory controller 122 may be implemented on a single chip, such as a chip 104. In some other embodiments, they may be implemented on separate chips.

[0057] The RF (radio frequency) circuitry 108 receives and sends RF signals, also called electromagnetic signals. The RF circuitry 108 converts electrical signals to/from electromagnetic signals and communicates with communications networks and other communications devices via the electromagnetic signals. The RF circuitry 108 may include well-known circuitry for performing these functions, including but not limited to an antenna system, an RF transceiver, one or more amplifiers, a tuner, one or more oscillators, a digital signal processor, a CODEC chipset, a subscriber identity module (SIM) card, memory, and so forth. The RF circuitry 108 may communicate with networks, such as the Internet, also referred to as the World Wide Web (WWW), an intranet and/or a wireless network, such as a cellular telephone network, a wireless local area network (LAN) and/or a metropolitan area network (MAN), and other devices by wireless communication. The wireless communication may use any of a plurality of communications standards, protocols and technologies, including but not limited to Global System for Mobile Communications (GSM), Enhanced Data GSM Environment (EDGE), high-speed downlink packet access (HSDPA), wideband code division multiple access (W-CDMA), code division multiple access (CDMA), time division multiple access (TDMA), Bluetooth, Wireless Fidelity (Wi-Fi) (e.g., IEEE 802.11a, IEEE 802.11b, IEEE 802.11g and/or IEEE 802.11n), voice over Internet Protocol (VoIP), Wi-MAX, a protocol for email, instant messaging (IM), and/or Short Message Service (SMS)), or any other suitable communication protocol, including communication protocols not yet developed as of the filing date of this document.

[0058] The audio circuitry 110, the speaker 111, and the microphone 113 provide an audio interface between a user and the portable electronic device 100. The audio circuitry 110 receives audio data from the peripherals interface 118, converts the audio data to an electrical signal, and transmits the electrical signal to the speaker 111. The speaker 111 converts the electrical signal to human-audible sound waves. The audio circuitry 110 also receives electrical signals converted by the microphone 113 from sound waves. The audio circuitry 110 converts the electrical signal to audio data and transmits the audio data to the peripherals interface 118 for processing. Audio data may be retrieved from and/or transmitted to memory 102 and/or the RF circuitry 108 by the peripherals interface 118. In some embodiments, the audio circuitry 110 also includes a headset jack (not shown). The headset jack provides an interface between the audio circuitry 110 and removable audio input/output peripherals, such as output-only headphones or a headset with both output (e.g., a headphone for one or both ears) and input (e.g., a microphone).

[0059] The I/O subsystem 106 couples input/output peripherals on the portable electronic device 100, such as the display system 112 and other input/control devices 116, to the peripherals interface 118. The I/O subsystem 106 may include a display controller 156 and one or more input controllers 160 for other input or control devices. The one or more input controllers 160 receive/send electrical signals from/to other input or control devices 116. The other input/control devices 116 may include physical buttons (e.g., push buttons, rocker buttons, etc.), dials, slider switches, joysticks, click wheels, and so forth. In some alternate embodiments, input controller(s) 160 may be coupled to any (or none) of the following: a keyboard, infrared port, USB port, and a pointer device such as a mouse. The one or more buttons (e.g., 208, Figure 2) may include an up/down button for volume control of the speaker 111 and/or the microphone 113. The one or more buttons may include a push button (e.g., 206, Figure 2). A quick press of the push button may disengage a lock of the touch screen 112 or begin a process that

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000342

uses gestures on the touch screen to unlock the portable electronic device, as described in U.S. Patent Application No. 11/322,549, "Unlocking a Device by Performing Gestures on an Unlock Image," filed December 23, 2005, which is hereby incorporated by reference. A longer press of the push button (e.g., 206) may turn power to the portable electronic device 100 on or off. The user may be able to customize a functionality of one or more of the buttons. The touch screen 112 is used to implement virtual or soft buttons and one or more soft keyboards.

[0060] The touch-sensitive display system 112 provides an input interface and an output interface between the portable electronic device and a user. The display controller 156 receives and/or sends electrical signals from/to the display system 112. The display system 112 displays visual output to the user. The visual output may include graphics, text, icons, video, and any combination thereof (collectively termed "graphics"). In some embodiments, some or all of the visual output may correspond to user-interface objects, further details of which are described below.

[0061] A touch screen in display system 112 is a touch-sensitive surface that accepts input from the user based on haptic and/or tactile contact. The display system 112 and the display controller 156 (along with any associated modules and/or sets of instructions in memory 102) detect contact (and any movement or breaking of the contact) on the display system 112 and converts the detected contact into interaction with user-interface objects (e.g., one or more soft keys, icons, web pages or images) that are displayed on the touch screen. In an exemplary embodiment, a point of contact between a touch screen in the display system 112 and the user corresponds to a fmger of the user.

[0062] The touch screen in the display system 112 may use LCD (liquid crystal display) technology, or LPD (light emitting polymer display) technology, although other display technologies may be used in other embodiments. The touch screen in the display system 112 and the display controller 156 may detect contact and any movement or breaking thereof using any of a plurality of touch sensing technologies now known or later developed, including but not limited to capacitive, resistive, infrared, and surface acoustic wave technologies, as well as other proximity sensor arrays or other elements for determining one or more points of contact with a touch screen in the display system 112. A touch-sensitive display in some embodiments of the display system 112 may be analogous to the multi-touch sensitive tablets described in the following U.S. Patents: 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. However, a touch screen in the display system 112 displays visual output from the portable electronic device 100, whereas touch sensitive tablets do not provide visual output. The touch screen in the display system 112 may have a resolution in excess of 100 dpi. In an exemplary embodiment, the touch screen in the display system has a resolution of approximately 168 dpi. The user may make contact with the touch screen in the display system 112 using any suitable object or appendage, such as a stylus, a finger, and so forth. In some embodiments, the user interface is designed to work primarily with finger-based contacts and gestures, which are much less precise than stylus-based input due to the larger area of contact of a finger on the touch screen. In some embodiments, the portable electronic device translates the rough finger-based input into a precise pointer/cursor position or command for performing the actions desired by the user.

[0063] A touch-sensitive display in some embodiments of the display system 112 may be as described in the following applications: (1) U.S. Patent Application No. 11/381,313, "Multipoint Touch Surface Controller," filed on May 2, 2006; (2) U.S. Patent Application No. 10/840,862, "Multipoint Touchscreen," filed on May 6, 2004; (3) U.S. Patent Application No. 10/903,964, "Gestures For Touch Sensitive Input Devices," filed on July 30, 2004; (4) U.S. Patent Application No. 11/048,264, "Gestures For Touch Sensitive Input Devices," filed on January 31, 2005; (5) U.S. Patent Application No. 11/038,590, "Mode-Based Graphical User Interfaces For Touch Sensitive Input Devices," filed on January 18, 2005; (6) U.S. Patent Application No. 11/228,758, "Virtual Input Device Placement On A Touch Screen User Interface," filed on September 16, 2005; (7) U.S. Patent Application No. 11/228,700, "Operation Of A Computer With A Touch Screen Interface," filed on September 16, 2005; (8) U.S. Patent Application No. 11/228,737, "Activating Virtual Keys Of A TouchScreen Virtual Keyboard," filed on September 16, 2005; and (9) U.S. Patent Application No. 11/367,749, "Multi-Functional Hand-Held Device," filed on March 3, 2006. All of these applications are incorporated by reference herein.

[0064] In some embodiments, in addition to the touch screen, the portable electronic device 100 may include a touchpad (not shown) for activating or deactivating particular functions. In some embodiments, the touchpad is a touch-sensitive area of the portable electronic device that, unlike the touch screen, does not display visual output. The touchpad may be a touch-sensitive surface that is separate from the touch screen in the display system 112 or an extension of the touch-sensitive surface formed by the touch screen.

[0065] In some embodiments, the portable electronic device 100 may include a physical or virtual click wheel as an input control device 116. A user may navigate among and interact with one or more graphical objects (henceforth referred to as icons) displayed in the display system 112 by rotating the click wheel or by moving a point of contact with the click wheel (e.g., where the amount of movement of the point of contact is measured by its angular displacement with respect to a center point of the click wheel). The click wheel may also be used to select one or more of the displayed icons. For example,

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000343

the user may press down on at least a portion of the click wheel or an associated button. User commands and navigation commands provided by the user via the click wheel may be processed by an input controller 160 as well as one or more of the modules and/or sets of instructions in memory 102. For a virtual click wheel, the click wheel and click wheel controller may be part of the display system 112 and the display controller 156, respectively. For a virtual click wheel, the click wheel may be either an opaque or semitransparent object that appears and disappears on the touch screen display in response to user interaction with the device. In some embodiments, a virtual click wheel is displayed on the touch screen of a portable multifunction device and operated by user contact with the touch screen.

[0066] The device 100 also includes a power system 162 for powering the various components. The power system 162 may include a power management system, one or more power sources (e.g., battery, alternating current (AC)), a recharging system, a power failure detection circuit, a power converter or inverter, a power status indicator (e.g., a light-emitting diode (LED)) and any other components associated with the generation, management and distribution of power in portable electronic devices.

[0067] The device 100 may also include one or more optical sensors 164. Figure 1 shows an optical sensor coupled to an optical sensor controller 158 in I/O subsystem 106. The optical sensor 164 may include charge-coupled device (CCD) or complementary metal-oxide semiconductor (CMOS) phototransistors. The optical sensor 164 receives light from the environment, projected through one or more lens, and converts the light to data representing an image. In conjunction with an imaging module 143, the optical sensor 164 may capture still images or video. In some embodiments, an optical sensor is located on the back of the portable electronic device 100, opposite the touch screen display 112 on the front of the portable electronic device, so that the touch screen display may be used as a viewfinder for either still and/or video image acquisition. In some embodiments, an optical sensor is located on the front of the portable electronic device so that the user's image may be obtained for videoconferencing while the user views the other video conference participants on the touch screen display. In some embodiments, the position of the optical sensor 164 can be changed by the user (e.g., by rotating the lens and the sensor in the portable electronic device housing) so that a single optical sensor 164 may be used along with the touch screen display for both video conferencing and still and/or video image acquisition.

[0068] The device 100 may also include one or more proximity sensors 166. Figure 1 shows a proximity sensor 166 coupled to the peripherals interface 118. Alternately, the proximity sensor 166 may be coupled to an input controller 160 in the I/O subsystem 106. The proximity sensor 166 may perform as described in U.S. Patent Application Nos. 11/241,839, "Proximity Detector In Handheld Device," filed September 30, 2005, and 11/240,788, "Proximity Detector In Handheld Device," filed September 30, 2005, which are hereby incorporated by reference. In some embodiments, the proximity sensor turns off and disables the touch screen 112 when the multifunction device is placed near the user's ear (e.g., when the user is making a phone call). In some embodiments, the proximity sensor keeps the screen off when the portable electronic device is in the user's pocket, purse, or other dark area to prevent unnecessary battery drainage when the portable electronic device is a locked state.

[0069] In some embodiments, the software components stored in memory 102 may include an operating system 126, a communication module (or set of instructions) 128, a contact/motion module (or set of instructions) 130, a graphics module (or set of instructions) 132, a text input module (or set of instructions) 134, a Global Positioning System (GPS) module (or set of instructions) 135, and applications (or set of instructions) 136.

[0070] The operating system 126 (e.g., Darwin, RTXC, LINUX, UNIX, OS X, WINDOWS, or an embedded operating system such as VxWorks) includes various software components and/or drivers for controlling and managing general system tasks (e.g., memory management, storage device control, power management, etc.) and facilitates communication between various hardware and software components.

[0071] The communication module 128 facilitates communication with other devices over one or more external ports 124 and also includes various software components for handling data received by the RF circuitry 108 and/or the external port 124. The external port 124 (e.g., Universal Serial Bus (USB), FIREWIRE, etc.) is adapted for coupling directly to other devices or indirectly over a network (e.g., the Internet, wireless LAN, etc.). In some embodiments, the external port is a multi-pin (e.g., 30-pin) connector that is the same as, or similar to and/or compatible with the 30-pin connector used on iPod (trademark of Apple Computer, Inc.) devices.

[0072] The contact/motion module 130 may detect contact with the touch screen in the display system 112 (in conjunction with the display controller 156) and other touch sensitive devices (e.g., a touchpad or physical click wheel). The contact/motion module 130 includes various software components for performing various operations related to detection of contact, such as determining if contact has occurred, determining if there is movement of the contact and tracking the movement across the touch screen in the display system 112, and determining if the contact has been broken (i.e., if the contact has ceased). Determining movement of the point of contact may include determining speed (magnitude), velocity (magnitude and direction), and/or an acceleration (a change in magnitude and/or direction) of the point of contact. These operations may be applied to single contacts (e.g., one finger contacts) or to multiple simultaneous contacts (e.g., "multitouch"/multiple finger contacts). In some embodiments, the contact/motion module 130 and

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000344

the display controller 156 also detects contact on a touchpad. In some embodiments, the contact/motion module 130 and the controller 160 detects contact on a click wheel.

[0073] The graphics module 132 includes various known software components for rendering and displaying graphics on the display system 112, including components for changing the intensity of graphics that are displayed. As used herein, the term "graphics" includes any object that can be displayed to a user, including without limitation text, web pages, icons (such as user-interface objects including soft keys), digital images, videos, animations and the like.

[0074] The text input module 134, which may be a component of graphics module 132, provides soft keyboards for entering text in various applications (e.g., contacts 137, email 140, IM 141, blogging 142, browser 147, and any other application that needs text input).

[0075] The GPS module 135 determines the location of the portable electronic device and provides this information for use in various applications (e.g., to telephone 138 for use in location-based dialing, to camera 143 and/or blogger 142 as picture/video metadata, and to applications that provide location-based services such as weather widgets, local yellow page widgets, and map/navigation widgets).

[0076] The applications 136 may include the following modules (or sets of instructions), or a subset or superset thereof:

- a contacts module 137 (sometimes called an address book or contact list);
- a telephone module 138;
- a video conferencing module 139;
- an e-mail client module 140;
- an instant messaging (IM) module 141;
- a blogging module 142;
- a camera module 143 for still and/or video images;
- an image management module 144;
- a video player module 145;
- a music player module 146;
- a browser module 147;
- a calendar module 148;
- widget modules 149, which may include weather widget 149-1, stocks widget 149-2, calculator widget 149-3, alarm clock widget 149-4, dictionary widget 149-5, and other widgets obtained by the user, as well as user-created widgets 149-6;
- widget creator module 150 for making user-created widgets 149-6; and/or
- search module 151.

[0077] Examples of other applications 136 that may be stored in memory 102 include memo pad and other word processing applications, JAVA-enabled applications, encryption, digital rights management, voice recognition, and voice replication.

[0078] In conjunction with display system 112, display controller 156, optical sensor(s) 164, optical sensor controller 158, contact module 130, graphics module 132, and image management module 144, the camera module 143 may be used to capture still images or video (including a video stream) and store them into memory 102, browse the still images or videos, modify characteristics of a still image or video, or delete a still image or video from memory 102. Embodiments of user interfaces and associated processes using camera module 143 are described further below.

[0079] In conjunction with display system 112, display controller 156, contact module 130, graphics module 132, text input module 134, and camera module 143, the image management module 144 may be used to arrange, modify or otherwise manipulate, label, delete, present (e.g., in a digital slide show or album), and store still and/or video images. Embodiments of user interfaces and associated processes using image management module 144 are described further below.

[0080] Note that the above identified modules and applications (including the camera module 143 and the image management module 144) correspond to a set of instructions for performing one or more functions described above. These modules (i.e., sets of instructions) need not be implemented as separate software programs, procedures or modules, and thus various subsets of these modules may be combined or otherwise re-arranged in various embodiments. In some embodiments, memory 102 may store a subset of the modules and data structures identified above. Furthermore, memory 102 may store additional modules and data structures not described above.

[0081] In some embodiments, the portable electronic device 100 is a device where operation of a predefined set of functions on the portable electronic device is performed exclusively through a touch screen in the display system 112 and/or a touchpad. By using a touch screen and/or a touchpad as the primary input/control device for operation of the portable electronic device 100, the number of physical input/control devices (such as push buttons, dials, and the like) on the portable electronic device 100 may be reduced.

[0082] The predefined set of functions that may be performed exclusively through a touch screen and/or a

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000345

touchpad include navigation between user interfaces. In some embodiments, the touchpad, when touched by the user, navigates the portable electronic device 100 to a main, home, or root menu from any user interface that may be displayed on the portable electronic device 100. In such embodiments, the touchpad may be referred to as a "menu button." In some other embodiments, the menu button may be a physical push button or other physical input/control device instead of a touchpad.

[0083] Figure 2 illustrates a portable electronic device 100 having a touch screen 112 in accordance with some embodiments. The touch screen may display one or more graphics. In this embodiment, as well as others described below, a user may select one or more of the graphics by making contact or touching the graphics, for example, with one or more fingers 202 (not drawn to scale in the figure) or a stylus (not shown in the figure). In some embodiments, selection of one or more graphics occurs when the user breaks contact with the one or more graphics. In some embodiments, the contact may include a gesture, such as one or more taps, one or more swipes (from left to right, right to left, upward and/or downward and/or a rolling of a finger (from right to left, left to right, upward and/or downward) that has made contact with the portable electronic device 100. In some embodiments, inadvertent contact with a graphic may not select the graphic. For example, a swipe gesture with that sweeps over an application icon may not select the corresponding application when the gesture corresponding to selection is a tap. In other words, the portable electronic device 100 interprets the meaning of a gesture and acts accordingly after considering which application or module is in use at the moment.

[0084] The device 100 may also include one or more physical buttons, such as "home" or menu button 204. As described previously, the menu button 204 may be used to navigate to any application 136 in a set of applications that may be executed on the portable electronic device 100. Alternatively, in some embodiments, the menu button is implemented as a soft key in a GUI in touch screen 112.

[0085] In one embodiment, the portable electronic device 100 includes a touch screen 112, a menu button 204, a push button 206 for powering the portable electronic device on/off and locking the portable electronic device, and volume adjustment button(s) 208. The push button 206 may be used to turn the power on/off on the portable electronic device by depressing the button and holding the button in the depressed state for a predefined time interval; to lock the portable electronic device by depressing the button and releasing the button before the predefined time interval has elapsed; and/or to unlock the portable electronic device or initiate an unlock process. In an alternative embodiment, the portable electronic device 100 also may accept verbal input for activation or deactivation of some functions through the microphone 113.

[0086] Attention is now directed towards embodiments of user interfaces ("UI") and associated processes that may be implemented on a portable electronic device 100.

[0087] Figure 3 illustrates an exemplary user interface for unlocking a portable electronic device in accordance with some embodiments. In some embodiments, user interface 300 includes the following elements, or a subset or superset thereof:

- Unlock image 302 that is moved with a finger gesture to unlock the portable electronic device;
- Arrow 304 that provides a visual cue to the unlock gesture;
- Channel 306 that provides additional cues to the unlock gesture;
- Time 308;
- Day 310;
- Date 312; and
- Wallpaper image 314.

[0088] In some embodiments, the portable electronic device detects contact with the touch-sensitive display (e.g., a user's finger making contact on or near the unlock image 302) while the portable electronic device is in a user-interface lock state. The device moves the unlock image 302 in accordance with the contact. The device transitions to a user-interface unlock state if the detected contact corresponds to a predefined gesture, such as moving the unlock image across channel 306. Conversely, the portable electronic device maintains the user-interface lock state if the detected contact does not correspond to the predefined gesture. As noted above, processes that use gestures on the touch screen to unlock the portable electronic device are described in U.S. Patent Application 11/322,549, "Unlocking a Device by Performing Gestures on an Unlock Image," filed December 23, 2005, which is hereby incorporated by reference.

[0089] Figure 4 illustrates an exemplary user interface for a menu of applications on a portable electronic device in accordance with some embodiments. In some embodiments, user interface 400 includes the following elements, or a subset or superset thereof:

- Signal strength indicator 402 for wireless communication;
- Time 404;
- Battery status indicator 406;
- Tray 408 with icons for frequently used applications, such as one or more of the following:

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000346

- O Phone 138;
- O E-mail client 140, which may include an indicator 410 of the number of unread e-mails;
- O Browser 147; and
- O Music player 146; and

- Icons for other applications, such as one or more of the following:
  - O IM 141;
  - O Image management 144;
  - O Camera 143;
  - O Video player 145;
  - O Weather 149-1;
  - O Stocks 149-2;
  - O Blog 142;
  - O Calendar 148;
  - O Calculator 149-3;
  - O Alarm clock 149-4;
  - O Dictionary 149-5; and
  - O User-created widget 149-6.

[0090] In some embodiments, UI 400 displays all of the available applications 136 on one screen so that there is no need to scroll through a list of applications (e.g., via a scroll bar). In some embodiments, as the number of applications increase, the icons corresponding to the applications may decrease in size so that all applications may be displayed on a single screen without scrolling. In some embodiments, having all applications on one screen and a menu button enables a user to access any desired application with at most two inputs, such as activating the menu button 204 and then activating the desired application (e.g., by a tap or other finger gesture on the icon corresponding to the application).

[0091] In some embodiments, UI 400 provides integrated access to both widget-based applications and non-widget-based applications. In some embodiments, all of the widgets, whether user-created or not, are displayed in UI 400. In other embodiments, activating the icon for user-created widget 149-6 may lead to another UI (not shown) that contains the user-created widgets or icons corresponding to the user-created widgets.

[0092] In some embodiments, a user may rearrange the icons in UI 400, e.g., using processes described in U.S. Patent Application No. 11/459,602, "Portable Electronic Device With Interface Reconfiguration Mode," filed July 24, 2006, which is hereby incorporated by reference. For example, a user may move application icons in and out of tray 408 using finger gestures on or near corresponding icons displayed on the touch screen 112.

[0093] Figure 5 illustrates an exemplary user interface for a camera in accordance with some embodiments. In some embodiments, user interface 500 includes the following elements; or a subset or superset thereof:

- Viewfinder 502;
- Camera roll 504 that manages images and/or videos taken with the camera;
- Shutter 506 for taking still images;
- Record button 508 for starting and stopping video recording;
- Timer 510 for taking an image or recording a video after a predefined time delay; and
- Image 512 that appears (e.g., via the animation illustrated schematically in Figure 5) to be added to camera roll 504 when it is obtained.

[0094] Figure 6 illustrates an exemplary user interface for a virtual camera roll in accordance with some embodiments. The portable electronic device displays the user interface after a user finger gesture 514 on the camera roll icon 504 in Figure 5. In some embodiments, the finger gesture is a momentary, substantially single-position contact with the touch screen, while in other embodiments other finger gestures may be used. In some embodiments, user interface 600 includes the following elements, or a subset or superset thereof:

- 402, 404, and 406, as described above;
- Thumbnail images 602 of images and/or videos obtained by camera 143;
- Camera icon 604 that when activated (e.g., by a finger gesture on the icon) initiates transfer to the camera UI (e.g., UI 500);

[0095] Figure 16 is a flowchart illustrating a process for displaying thumbnail images on a touch screen in accordance with some embodiments. Upon detecting the finger gesture 514 (1602), the portable electronic device identifies a set of thumbnail images in the virtual camera roll (1604) and displays the thumbnail images on the touch screen (1606). In some embodiments, the thumbnail images are displayed in a 2-D array (Figure 6). In some other embodiments, the thumbnail images are dis-

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000347

played in a vertical column or a horizontal row. In some embodiments, a thumbnail image may have a description including a name, a file size, and a timestamp indicating when the image was created. In some embodiments, the thumbnail images of videos have a unique appearance that is visually distinguishable from the other still images. The portable electronic device displays the camera icon 604 at the bottom of the touch screen (1608) and starts monitoring next user contact with the touch screen (1610).

[0096] In some embodiments, the user may scroll through the thumbnail images 602 using vertically upward/downward finger gestures 606 on the touch screen (1612). Upon detecting such a finger gesture (e.g., a vertical finger swipe), the portable electronic device scrolls the set of thumbnail images accordingly (1618). In some embodiments, the scrolling gesture is independent of a horizontal position of the user contact with the touch screen display. In some embodiments, the scrolling gesture is substantially independent of a horizontal position of the user contact with the touch screen display (e.g., one or more side regions of the touch screen display may be reserved for other functions, such as functions corresponding to icons, soft keys or application navigation functions, and not available for the scroll gesture). In some embodiments, in response to a stationary gesture on a particular thumbnail image (1614), e.g., a finger tap 608 on the thumbnail image 602-11, the portable electronic device initiates a process of generating an enlarged display of the corresponding image (e.g., UI 700A) on the touch screen. A more detailed description of this process is provided below in connection with Figures 7 and 17. In some embodiments, upon detecting a user's finger gesture on the camera icon 604 (1616), the portable electronic device brings back the camera UI 500 as shown in Figure 5.

[0097] Figures 7A through 7C illustrate an exemplary user interface for viewing and manipulating images in accordance with some embodiments. Note that one skilled in the art would understand that the term "image" in the present application covers both still images and video streams.

[0098] In some embodiments, user interface 700A includes the following elements, or a subset or superset thereof:

- 402, 404, 406, and 604, as described above;
- Camera roll icon 702 that when activated (e.g., by a finger gesture on the icon) initiates transfer to the camera roll UI (e.g., UI 600);
- Image 704;
- Additional options icon 706 that when activated (e.g., by a finger gesture on the icon) initiates transfer to a UI with additional options for use of image 704 (e.g., UI 1200, Figure 12));
- Previous image icon 708 that when activated (e.g., by a finger gesture on the icon) initiates display of the previous image in the virtual camera roll (e.g., 602-10);
- Play icon 710 that when activated (e.g., by a finger gesture on the icon) initiates a slide show of the images in the virtual camera roll;
- Next image icon 712 that when activated (e.g., by a finger gesture on the icon) initiates display of the next image in the virtual camera roll (e.g., 602-12); and
- Delete symbol icon 714 that when activated (e.g., by a finger gesture on the icon) initiates display of a UI to confirm that the user wants to delete image 704 (e.g. UI 700B, Figure 7B).

[0099] Figure 17 is a flowchart illustrating a process for performing operations in response to user contact with the touch screen in accordance with some embodiments. After detecting a user selection of a thumbnail image (1702), the portable electronic device identifies an image associated with the thumbnail image (1704). Generally, this identified image is larger than the thumbnail image. In some embodiments, the thumbnail image is a sub-sampled version of the larger image. As shown in Figure 7A, the large image is displayed on the touch screen in replacement of all the thumbnail images (1706). The portable electronic device displays various icons at predefined locations on the touch screen (1708) and waits for next user contact with the touch screen (1710).

[0100] In some embodiments, as shown in Figure 7A, the portable electronic device performs the same operation(s) in response to different user contacts. In some embodiments, a user can browse images in the virtual camera roll through three different gestures: (i) a finger gesture on the previous/next image icon 708/712 (1716), (ii) a user image navigation gesture by a finger tap 715/718 adjacent to the left/right edge of the touch screen (1714), or (iii) a leftward/rightward horizontal finger swipe gesture 720 on the touch screen (1712). Upon detecting any of these user gestures, the portable electronic device replaces the image on the touch screen with the previous/next one in the virtual camera roll (1724). In some embodiments, this replacement is an animated process of moving the current image out of the touch screen to the right/left side and moving the previous/next image into the touch screen from the left/right side. With multiple means to perform the same task, the portable electronic device allows a user to choose whichever the user prefers, thereby making the photo management simpler and more intuitive. In some embodiments, the tap gestures 715 and 718 are used to magnify (e.g., by zooming in) an image by a predetermined amount, rather than to view a previous or next image. For this case, the user is still provided with two different types of gestures for browsing

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000348

images: (i) a finger gesture on the previous/next image icon 708/712 (1716) and (ii) a leftward/rightward horizontal finger swipe gesture 720 on the touch screen (1712).

[0101] In some embodiments, the portable electronic device rotates the image 704 by an angle in response to a user image rotation gesture. For example, the user image rotation gesture may include three simultaneous finger contacts 722, 724 and 726 with the image 704. When the three finger contacts move in the directions indicated by the respective arrows for at least a predefined distance, the portable electronic device rotates the image 704 from a portrait orientation to a landscape orientation or from a landscape orientation to a portrait orientation. In some embodiments, the rotation gesture is a two-finger multitouch gesture (e.g., simultaneous finger contacts 722 and 726). In some embodiments, the image rotates in response to detection of a change in the orientation of the device (e.g., using accelerometers to detect the orientation of the device). For example, the image may rotate to maintain proper viewing orientation as the touch screen 112 is physically rotated from a portrait orientation to a landscape orientation.

[0102] In some embodiments, a user finger gesture on the additional options icon 706 (1718) triggers the portable electronic device to render additional operations on the image 704. A more detailed description of some exemplary operations associated with the icon 706 is provided below in connection with Figures 12 and 20.

[0103] In some embodiments, a user finger gesture on the delete symbol icon 714 (1717) causes the portable electronic device to provide a user interface 700B as shown in Figure 7B. Through the user interface 700B, the user can delete the current image 704 from the camera roll. The user interface 700B includes the following elements, or a subset or superset thereof:

- 402, 404, 406, 604, 702, and 704, as described above;
- Delete icon 716 that when activated (e.g., by a finger gesture on the icon) deletes the image 704; and
- Cancel icon 718 that when activated (e.g., by a finger gesture on the icon) returns the portable electronic device to the previous user interface (e.g. UI 700A)

[0104] Figure 18 is a flowchart illustrating a process for deleting an image in response to a user contact with the touch screen in accordance with some embodiments. Upon detecting a user contact with the delete symbol icon 714 (1802), the portable electronic device displays the delete icon 716, the cancel icon 718, and the camera icon 604 on top of the image 704 (1804) and then monitors next user contact with the touch screen (1806).

[0105] In some embodiments, in response to a finger gesture on the delete icon 716 (1810), the portable electronic device eliminates the icons 716, 718 from the touch screen (1816) and initiates an animated process of "shredding" the image 704 (1818). In some embodiments, the shredding process includes breaking the image 704 into vertical stripes and dropping the vertical stripes from the touch screen at different paces. Other shredding animations, such as placing the image in a trash icon, may be used in other embodiments.

[0106] In some embodiments, the portable electronic device brings back the camera roll user interface 600 as shown in Figure 6 after deleting the image 704. The user can then repeat any aforementioned processes shown in Figure 16. In some other embodiments, the portable electronic device displays the next image in the virtual camera roll on the touch screen. The user may repeat any aforementioned processes shown in Figure 17.

[0107] If the portable electronic device detects a finger gesture on the cancel icon 718 (1812), it the device brings back the user interface 700A as shown in Figure 7A. If the next user action is a finger gesture on the camera icon 604 (1814), the portable electronic device switches back to the camera mode user interface 500, which allows the user to take new photos.

[0108] This deletion process, which requires user finger gestures on two different user interfaces (e.g., 700A and 700B), reduces the chance of a user accidentally deleting an image or other similar item.

[0109] In some embodiments, the portable electronic device stores images within different photo albums. The images may come from different sources. They may be downloaded from locations such as the user's desktop or laptop computer and a website on the Internet, etc. For example, one album may include images downloaded from a website through the web browser 147, images attached to email messages received by the user of the portable electronic device, and photos taken by the portable electronic device using the camera module 143.

[0110] Figure 8 illustrates an exemplary user interface for viewing photo albums in accordance with some embodiments. In some embodiments, user interface 800 includes the following elements, or a subset or superset thereof:

- 402, 404, and 406, as described above;
- Graphics 804, e.g., thumbnail images of the first picture or a u.ser-selected picture in the corresponding albums;
- Album names 806;
- Selection icons 808 that when activated (e.g., by a finger gesture on the icon) initiates display of the corresponding album (e.g., UI 1000, Figure 10); and
- Settings icon 810, that brings up a settings menu (e.g., Figure 9) when activated by a user gesture (e.g., a tap gesture).

[0111] Figure 19 is a flowchart illustrating a process

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000349

for displaying multiple photo albums on the touch screen in accordance with some embodiments. After detecting a finger gesture 412 (Figure 4) on the icon for the image management module 144 (1902), the portable electronic device identifies a set of photo albums (1904) and displays them on the touch screen (1906). Figure 8 depicts a vertically list of photo albums 804 list, each album having a thumbnail image 804, a name 806, and a selection icon 808. In some embodiments, the photo albums are ordered alphabetically by their names. In some other embodiments, the photo albums are ordered by their creation timestamps, e.g., with the most recent one at the top of the list.

[0112] The portable electronic device displays a setting icon 810 at the bottom of the touch screen (1908) and monitors user contact with the touch screen (1910). As will be described below in connection with Figure 9, a user can configure the image management module 144 to operate in a user-chosen manner through the setting icon 810.

[0113] If there is a long photo album list, the user may scroll through the list using vertically upward/downward finger gestures 812 such as a vertical finger swipe on the touch screen (1912, 1920). When the user selects a particular album by a finger gesture (1914), the portable electronic device opens the album by executing the process described above in connection with Figure 16. The virtual camera roll shown in Figure 6 is one of many photo albums. User operations associated with the virtual camera roll also applies to images in a user-chosen album. A more detailed description of exemplary user operations is provided below in connection with Figures 10-12. In some embodiments, a user may initiate display of an album by contacting any region on the touch screen corresponding to the album (e.g., a finger tap on the graphic 804, album name 806, or selection icon 808).

[0114] Upon detecting a finger gesture on the setting icon 810 (1916), the portable electronic device renders a Settings user interface that enables the user to configure the image management service (1918). Figure 9 illustrates an exemplary Settings user interface 900 for setting user preferences in accordance with some embodiments. In some embodiments, user interface 900 includes the following elements, or a subset or superset thereof:

- 402, 404, and 406, as described above;
- Music setting 902 for selecting the music during a slide show (e.g., Now Playing, 90s Music, Recently Added, or Off);
- Repeat setting 904 for selecting whether the slide show repeats (e.g., On or Off);
- Shuffle setting 906 for selecting whether the images in the slide show are displayed in a random or pseudo-random order (e.g., On or Off);
- Time per slide setting 908 (e.g., 2, 3, 5, 10, 20 seconds or manual);
- Transition setting 910 (e.g., random, wipe across, wipe down, or off);
- TV out setting 912 for external display (e.g., on, off, or ask user);
- TV signal setting 914 (e.g., NTSC or PAL);
- Auto Rotate setting 916 (e.g. on or off);
- Done icon 918 that when activated (e.g., by a finger gesture on the icon) returns the portable electronic device to the previous UI (c.g., UI 800); and
- Selection icons 920 that when activated (e.g., by a finger gesture on the icon) show choices for the corresponding settings.

[0115] In some embodiments, a user may touch anywhere in a row for a particular setting to initiate display of the corresponding setting choices. For example, upon detecting a finger tap on TV Signal setting 914, the portable electronic device brings up a dropdown menu adjacent to the corresponding row. The dropdown menu lists configuration options associated with the setting. The user can select one option over another by applying a finger gesture on the selected option.

[0116] Figure 10 illustrates an exemplary user interface for viewing an album in accordance with some embodiments. In some embodiments, user interface 1000 includes the following elements, or a subset or superset thereof:

- 402, 404, and 406, as described above;
- Photo albums icon 1002 that when activated (e.g., by a finger gesture on the icon) initiates transfer to the photo albums UI (e.g., UI 800);
- Thumbnail images 1006 of images in the corresponding album;
- Play icon 1008 that when activated (e.g., by a finger gesture on the icon) initiates a slide show of the images in the album;

[0117] The user interface 1000 is similar to the user interface 600 associated with the camera roll icon 504. Both user interfaces perform similar operations upon detecting a user contact with the thumbnail images. For example, the user may scroll through the thumbnails 1006 using vertically upward/downward gestures 1010 on the touch screen. In some embodiments, a stationary gesture on a particular thumbnail (e.g., a finger tap 1012 on thumbnail 1006-11) initiates transfer to an enlarged

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000350

display of the corresponding image (e.g., UI 1100).

[0118] In some embodiments, there are differences between the two user interfaces. For example, the user interface 1000 has a play icon 1008 while the user interface 600 has a camera icon 604. A user selection of the play icon 1008 triggers the portable electronic device to begin a slide show of the images in the user-selected album. In contrast, the portable electronic device returns to the camera mode (e.g., for taking pictures) when there is a user finger gesture on the camera icon 604.

[0119] Upon user selection of a particular image, the portable electronic device renders a new user interface displaying the user-selected image. Figure 11 illustrates such an exemplary user interface for viewing images in an album in accordance with some embodiments. In some embodiments, user interface 1100 includes the following elements, or a subset or superset thereof:

- 402, 404, and 406, as described above;
- Album name icon 1102 that when activated (e.g., by a finger gesture on the icon) initiates transfer to the corresponding album UI (e.g., UI 1000);
- Image 1106;
- Additional options icon 1108 that when activated (e.g., by a finger gesture on the icon) initiates transfer to a UI with additional options for use of image 1106 (e.g., UI 1200, Figure 12));
- Previous image icon 1110 that when activated (e.g., by a finger gesture on the icon) initiates display of the previous image in the album (e.g., 1006-10);
- Play icon 1112 that when activated (e.g., by a finger gesture on the icon) initiates a slide show of the images in the album; and
- Next image icon 1114 that when activated (e.g., by a finger gesture on the icon) initiates display of the next image in the album.

[0120] Clearly, the user interface 1100 is very similar to the user interface 700A. Various image browsing functions described above with respect to Figure 7A are also available at the user interface 1100. For example, the user can initiate viewing of the previous image by making a tap gesture 1118 on the left side of the image or making a swipe gesture 1116 from left to right on the image. Similarly, the user can initiate viewing of the next image by making a tap gesture 1120 on the right side of the image or making a swipe gesture 1116 from right to left on the image.

[0121] In some embodiments, image 1106 moves off screen to the left as the next image moves on screen from the right. In some embodiments, image 1106 moves off screen to the right as the previous image moves on screen from the left.

[0122] With multiple ways to perform the same task, the portable electronic device enables a user to choose whichever methodology or gesture the user prefers, thereby making the photo management simpler and more intuitive.

[0123] A detailed description of the portable electronic device's operations in response to user selections of the previous image icon 1110, the play icon 1112, and the next image icon 1114 have been provided above in connection with Figures 7A and 17. In response to a user contact with the additional options icon 706 (Figure 7A) or 1108 (Figure 11), the portable electronic device renders a new interface with additional options for the user to choose in connection with the image being displayed.

[0124] Figure 12 illustrates such an exemplary user interface for selecting a use for an image in an album in accordance with some embodiments. In some embodiments, user interface 1200 includes the following elements, or a subset or superset thereof:

- 402, 404, 406, 1602, and 1106 as described above;
- Email photo icon 1208 that when activated (e.g., by a finger gesture on the icon) initiates a process for incorporating the image 1106 in an email (e.g., as illustrated in Figures 13A-13G);
- Assign to contact icon 1210 that when activated (e.g., by a finger gesture on the icon) initiates a process for associating the image 1106 with a contact in the user's contact list (e.g., as illustrated in Figures 14A-14B);
- Use as wallpaper icon 1212 that when activated (e.g., by a finger gesture on the icon) initiates a process for incorporating the image 1106 in the user's wallpaper (e.g., as illustrated in Figure 15); and
- Cancel icon 1214 that when activated (e.g., by a finger gesture on the icon) initiates transfer back to the previous UI (e.g., UI 1100).

[0125] In some embodiments, as shown in Figure 12, the image 1106 is displayed in the background and one or more the function icons 1208, 1210, 1212, 1214, are superimposed over the displayed image 1106.

[0126] Figure 20 is a flowchart illustrating a process for performing additional operations upon a user selection of an additional options icon (e.g., icon 1108 in UI 1100, Figure 11) in accordance with some embodiments. Upon detecting a finger gesture 1122 on the additional options icon (2002), the portable electronic device displays a list of option icons on the touch screen (2004). Each option icon corresponds to a specific operation on the image being displayed. As shown in Figure 12, the list includes Email photo icon 1208, Assign to contact

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000351

icon 1210, Use as wallpaper icon 1212, and Cancel icon 1214. In some other embodiments, the user interface 1200 may include a subset of these icons, and may also include additional image usage icons for invoking other image usage functions.

[0127] If the user selects the email photo icon 1208 by a finger gesture (2008), the portable electronic device renders an email service interface that allows the user to send the image 1106 to somebody through email. If the user selects the assign to contact icon 1210 (2010), the portable electronic device displays a user interface (having a list of contacts) for the user to select a contact to be associated with the image 1106. Similarly, if the user selects the use as wallpaper icon 1212 (2012), the portable electronic device displays a user interface for the user to edit the image 1106 and set it as the portable electronic device's wallpaper.

[0128] Figure 21 is a flowchart illustrating an animated process for rendering an email service interface that includes a user selected image in accordance with some embodiments. After detecting the user selection of Email photo icon 1208 (2102), the portable electronic device animates a process of introducing an email message template onto the touch screen and placing the image into a predefined region of the email message template. In some embodiments, the animation includes initially reducing the image's size (Figure 13A) (2104); sliding or otherwise rendering an email message template behind the image 1106 (Figure 13B) (2106); and fitting the image into the message body field (Figure 13C) of an email composition user interface 1300C (2108).

[0129] In some embodiments, following the animation, the device monitors the touch screen for user contact (2110). When the user taps on or makes other predefined gestures 1302 (Figure 13D) on the To: field of the email recipient field to enter an email address (2112). The portable electronic device then displays the user's contact list (2122) (Figure 13E). After detecting a user finger gesture or other predefined gesture on a recipient/contact (2124) (e.g., a finger tap 1316 on Bob Adams in Figure 13E), the portable electronic device associates the recipient's email address with the email message and displays the contact's name in the To: field (2126) (e.g., "Bob Adams" in Figure 13F).

[0130] In some embodiments, in response to a user finger tap or other predefined gestures on predefined fields within the email message template (2114, 2116) (e.g., finger taps 1304, 1306 in Figure 13D, or "Other Email" in Figure 13E), the portable electronic device displays a letter keyboard 616 (2128) on the touch screen. The user may enter text into the respective fields through the letter keyboard 616 (Figure 13F). In some embodiments, the user may also enter an email address by tapping on character icons in the letter keyboard or other character keyboards.

[0131] As shown in Figure 13G, after detecting a finger gesture on the send icon 1314 (2120), the portable electronic device sends the email message to its recipient(s) (2132) and returns to the user interface 1000 or 1100. But if the user selects the cancel icon 1308 (2118), the portable electronic device may display the save draft icon 1310 and the don't save icon 1312 (2130). The device saves the draft in a draft folder associated with the e-mail client module 140 if the user chooses the save draft icon 1310 or deletes the draft if the user chooses the don't save icon 1312.

[0132] Assuming that the user taps or makes other predefined gestures on the assign to contact icon 1210 shown in Figure 12, Figure 22 is a flowchart illustrating a process for assigning an image to a user selected contact in the user's contact list in accordance with some embodiments.

[0133] Upon a user selection of the assign to contact icon 1210, the portable electronic device displays the user's contact list (Figure 14A). After the user selects a contact in the contact list (e.g., a finger tap 1401 on Bob Adams in Figure 14A), the portable electronic device produces a new user interface 1400B as shown in Figure 14B and monitors next user contact with the touch screen (2208). In some embodiments, the user interface 1400B includes the user instructions 1402 (2202), the user-selected image 1106 (2204), the cancel icon 1404 and the set photo icon 1406 (2206).

[0134] The portable electronic device modifies the image (2214) in response to a user finger gesture on the image 1106 (2212). For example, the user may crop, scale, and otherwise adjust the image 1106 using different types of finger gestures. In some embodiments, the portable electronic device moves the image on the touch screen in response to a movement of one-finger contact gesture 1408; enlarges the image in response to a de-pinching gesture including at least two simultaneous and continuous contacts 1410 and 1412; reduces the image in response to a pinching gesture including at least two simultaneous and continuous contacts 1410 and 1412; and/or rotates the image in response to a twisting gesture including two or more simultaneous and continuous contacts 1410 and 1412.

[0135] In some embodiments, the user assigns the modified image to the user-selected contact by tapping on the set photo icon 1406 (2216). This triggers the portable electronic device to associate the modified image with the contact. If the user selects the cancel icon 1404 (2218), the portable electronic device terminates the image assignment and brings back the user interface 1100.

[0136] If the user taps or makes other predefined gestures on the use as wallpaper icon 1212 in Figure 12, the portable electronic device displays a user interface for incorporating an image in the user's wallpaper. Figure 15 illustrates such an exemplary user interface 1500 in accordance with some embodiments.

[0137] In some embodiments, this wallpaper setting process is similar to the assign to contact process. For example, the user may move the image with a one-finger gesture 1508; enlarge the image with a de-pinching gesture using multiple contacts 1510 and 1512; reduce the

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000352

image with a pinching gesture using multiple contacts 1510 and 1512; and/or rotate the image with a twisting gesture using multiple contacts 1510 and 1512.

[0138] The wallpaper setting process is completed after the user selects the set photo icon 1506. If the user selects the cancel icon 1504, the portable electronic device stops the assignment process and brings back the UI 1100 in Figure 11. In some embodiments, the interface 1500 also includes user instruction information 1502.

[0139] Figures 23A-23H illustrate an exemplary user interface for viewing digital objects in a set of digital objects in accordance with some embodiments.

[0140] In Figure 23A, the displayed digital object is a digital image 2300-1. In this example, the entire image 2300-1 is displayed in Figure 23A. This exemplary image includes a first person 2302-1 and a second person 2302-2. In response to detecting a de-pinching gesture 2304 and 2306 on or about the second person 2302-2, a command to zoom in on a portion of the image 2300-1 that includes the second person 2302-2 is executed. Upon execution of the command to zoom in, a reduced portion of the image 2300-1 is displayed at a higher magnification than in Figure 23A. For example, in Figure 23B the second person 2302-2 is shown at a higher magnification than in Figure 23A and the first person 2302-1 is no longer shown.

[0141] In Figure 23C, a swipe gesture 2310 is detected on or near the touch screen display. In response, the displayed portion of the image 2300-1, including the second person 2302-2, is translated in a direction corresponding to the direction of the swipe gesture 2310, as shown in Figures 23C-23D, where the image is translated horizontally from right to left. An edge 2312 of the (enlarged) image 2300-1 is displayed in Figure 23D. In response to continued detection of the swipe gesture 2310 (Figure 23D), an area 2314 beyond the edge 2312 is displayed (e.g., a black area or other area visually distinct from the digital object). After the swipe gesture 2310 is no longer detected, as shown in Figure 23E, the image 2300-1, including the image of the second person 2302-2, is translated in a second direction 2316 until the area 2314 is no longer displayed (e.g., horizontally from left to right).

[0142] In response to detection of a second swipe gesture 2318, the displayed portion of the image 2300-1 is translated in a direction corresponding to the direction of the second swipe gesture 2318, as shown in Figure 23G, and a second digital image 2300-2 is displayed. In some embodiments, as shown in Figures 23G and 23H, the second digital image 2300-2 (or, more generally, digital object) slides on to the touch screen as the first digital image 2300-1 slides off of the touch screen.

[0143] In this example, the display of area 2314 lets the user know that the edge of the (enlarged) digital object has been reached during the first gesture 2310. Upon detecting the second gesture 2318 in the same or substantially the same direction as the first gesture, the device transitions to the display of another image in a set of images, rather than just repeating the visual indication that the edge of the digital object has been reached.

[0144] Figure 24 is a flowchart illustrating a process 2400 for viewing digital objects in a set of digital objects in accordance with some embodiments.

[0145] In some embodiments, a device with a touch screen display (e.g., device 100, a tablet computer, or a desktop computer with a touch screen display) detects (2402) a first movement of a physical object on or near the touch screen display. In some embodiments, the device is a portable electronic device. In some embodiments, the physical object is a finger. In some embodiments, the physical object is a stylus. In some embodiments, the first movement is a horizontal swipe gesture (e.g., 2310, Figure 23C).

[0146] While detecting the first movement, the device translates (2404) a first digital object (e.g., a digital image 2300-1) displayed on the touch screen display in a first direction. In some embodiments, prior to the translating, at least one edge of the first digital object extends beyond the touch screen display in the first direction.

[0147] The first digital object is associated with a set of digital objects. In some embodiments, the set of digital objects is a set of digital images (e.g., 2300-1, 2300-2, etc., which may be part of an album or part of a set of images taken with a camera in the device). In some embodiments, the set of digital objects is a set of web pages (e.g., a set of web pages selected by a user for display in a browser). In some embodiments, the set of digital objects is a set of electronic documents.

[0148] In response to display of a previously hidden edge (e.g., edge 2312, Figure 23D) of the first digital object and continued detection of the first movement (e.g., swipe gesture 2310, Figure 23D), the device displays (2406) an area beyond the edge of the first digital object (e.g., area 2314).

[0149] After the first movement is no longer detected, the device translates (2408) the first digital object in a second direction until the area beyond the edge of the first digital object is no longer displayed. For example, in Figure 23E the digital image 2300-1 is translated in a direction 2316 (e.g., horizontally from left to right) until the area 2314 is no longer displayed. In some embodiments, the second direction is opposite the first direction. In some embodiments, the first digital object is translated in the second direction using a damped motion. In some embodiments, the change from translating the first digital object in the first direction to translating the first digital object in the second direction until the area beyond the edge of the first digital object is no longer displayed makes the edge of the first digital object appear to be elastically attached to an edge of the touch screen display or to an edge displayed on the touch screen display.

[0150] The device detects (2410) a second movement (e.g., a second swipe gesture 2318 from right to left, Figure 23F) of the physical object on or near the touch screen display.

[0151] In response to detecting the second movement

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000353

while the previously hidden edge of the first digital object is displayed (e.g., edge 2312, Figure 23F), the device translates (2412) the first digital object in the first direction and displays a second digital object (e.g., a digital image 2300-2, Figures 23G and 23H) in the set of digital objects.

[0152] Thus, depending on the context, similar movements (e.g., 2310 and 2318 are both right to left swipe gestures) allow a user to either (1) translate a displayed first digital object or (2) transition from displaying the first digital object to displaying a second digital object in a set of digital objects.

[0153] In some embodiments, the time between the first and second movements must be less than a predetermined value (e.g., 0.5 seconds). Otherwise, the device will not transition to displaying the second digital object. Rather, the device may just translate the first digital object and show the area beyond the edge of the object (to show the user again that the edge of the first digital object has been reached).

[0154] In some embodiments, if the entire first digital object is displayed (e.g., Figure 23A), then the first movement (e.g., a horizontal swipe gesture) will transition the device to display another digital object in the set of digital objects.

[0155] Process 2400 permits a touch screen user to easily navigate within a displayed digital object and between digital objects in a set of digital objects.

[0156] The foregoing description, for purpose of explanation, has been described with reference to specific embodiments. However, the illustrative discussions above are not intended to be exhaustive or to limit the invention to the precise forms disclosed. Many modifications and variations are possible in view of the above teachings. The embodiments were chosen and described in order to best explain the principles of the invention and its practical applications, to thereby enable others skilled in the art to best utilize the invention and various embodiments with various modifications as are suited to the particular use contemplated.

Further embodiments

[0157]

1. A computer-implemented method, comprising: at a portable electronic device with a touch screen display, displaying an array of thumbnail images corresponding to a set of photographic images; replacing the displayed array of thumbnail images with a user-selected photographic image upon detecting a user contact with a corresponding thumbnail image in the array, wherein the user-selected photographic image is displayed at a larger scale than the corresponding thumbnail image; and displaying a different photographic image in replacement of the user-selected photographic image, wherein the different photographic image is selected in accordance with a scrolling gesture comprising a substantially horizontal movement of a user contact with the touch screen display.

2. The method of embodiment 1, including: detecting a user image navigation gesture adjacent to a vertical edge of the touch screen display; and upon detecting the user image navigation gesture, displaying a different photographic image in the set of photographic images, selected in accordance with the vertical edge adjacent to the user image navigation gesture.

3. The method of embodiment 2, wherein the user image navigation gesture comprises a momentary, substantially single-position contact with the touch screen display.

4. The method of embodiment 1, including: detecting a user image rotation gesture, comprising rotation of multiple simultaneous contacts with touch screen display; and upon detection of the user image rotation gesture, rotating the user-selected image on the touch screen display.

5. The method of embodiment 1, including: upon detecting user selection of an image deletion icon, displaying an image destruction animation of the user selected image.

6. The method of embodiment 5, wherein the image destruction animation includes: splitting the user selected image into multiple vertical stripes; and visually moving the multiple vertical stripes out of the touch screen display with different stripes moving at different speeds.

7. The method of embodiment 1, including: upon detecting user selection of an email image icon, displaying an email composition user interface for composing an email message, with the user selected image included in the email message being composed.

8. The method of embodiment 7, including:

upon detecting the user selection of the email image icon, displaying an animation of the user selected image being resized and placed into the email message being composed.

9. The method of embodiment 8, wherein the animation of the user selected image includes visually shrinking the user selected image to a predefined size; visually moving the email composition user interface into the touch screen, the user interface including a message body region; and visually fitting the shrunk image into the message body region.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000354

10. The method of embodiment 9, including: upon detecting a user selection of the message body region, displaying a letter keyboard overlaid on the user selected image; and
upon detecting a user selection of the letter keyboard, displaying a user selected character in the message body region.

11. The method of embodiment 1 , including: upon detecting user selection of an image contact assignment icon, displaying a list of contacts; and upon detecting user selection of a respective contact from the list of contact, displaying a user interface for associating the user selected image with the user selected contact.

12. The method of embodiment 11 , wherein displaying a user interface for associating the user selected image with the user selected contact includes enabling the user to adjust the user selected image to form an adjusted image to be associated with the user selected contact.

13. The method of embodiment 12, wherein the adjustment of the image includes:

moving the image on the touch screen in response to a movement of an one-finger contact gesture; enlarging the image in response to a de-pinching gesture including multiple simultaneous and continuous contacts with the touch screen; reducing the image in response to a pinching gesture including multiple simultaneous and
continuous contacts with the touch screen; and/or rotating the image in response to a twisting gesture including multiple simultaneous and continuous contacts with the touch screen.

14. A computer-implemented method, comprising:
at a portable electronic device with a touch screen display,
displaying an array of thumbnail images corresponding to a set of photographic images; detecting a scrolling gesture comprising a substantially vertical movement of user contact with the touch screen display; and responding to the scrolling gesture by scrolling the display of thumbnail images in accordance with a direction of the scrolling gesture; wherein the scrolling gesture is substantially independent of a horizontal position of the user contact with the touch screen display.

15. A portable electronic device, comprising: a display;
one or more processors; memory; and a program, wherein the program is stored in the memory and configured to be executed by the one or more processors, the program including: instructions for displaying an array of thumbnail images corresponding to a set of photographic images; instructions for replacing the displayed array of thumbnail images with a user- selected photographic image upon detecting a user contact with a corresponding thumbnail image in the array, wherein the user-selected photographic image is displayed at a larger scale than
the corresponding thumbnail image; and instructions for displaying a different photographic image in replacement of the user-selected photographic image, wherein the different photographic image is selected in accordance with a scrolling gesture comprising a substantially horizontal movement of user contact with the touch screen display.

16. The device of embodiment 15 , including :

instructions for detecting a user image navigation gesture in proximity to a vertical edge of the touch screen display; and instructions for, upon detecting the user image navigation gesture, displaying a different photographic image in the set of photographic images, selected in accordance with the vertical edge in proximity to the user image navigation gesture.

17. The device of embodiment 15, including: instructions for detecting a user image rotation gesture, comprising rotation of multiple simultaneous contacts with touch screen display; and instructions for, upon detection of the user image rotation gesture, rotating the user selected image on the touch screen display.

18. The device of embodiment 15, including: instructions for, upon detecting user selection of an image deletion icon, displaying an image destruction animation of the user selected image.

19. The device of embodiment 18, wherein the image destruction animation includes: instructions for splitting the user selected image into multiple vertical stripes; and
instructions for visually moving the multiple vertical stripes out of the touch screen display with different stripes moving at different speeds.

20. The device of embodiment 15, including: instructions for, upon detecting user selection of an email image icon, displaying an email composition user interface for composing an email message, with the user selected image included in the email message being composed.

21. The device of embodiment 20, including: instructions for, upon detecting the user selection of the email image icon, displaying an animation of the user

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000355

selected image being resized and placed into the email message being composed.

22. The device of embodiment 21, wherein the animation of the user selected image includes: instructions for visually shrinking the user selected image to a predefined size; instructions for visually moving the email composition user interface into the touch screen, the user interface including a message body region; and instructions for visually fitting the shrunk image into the message body region.

23. The device of embodiment 22, including: instructions for, upon detecting a user selection of the message body region, displaying a letter keyboard overlaid on the user selected image; and instructions for, upon detecting a user selection of the letter keyboard, displaying a user selected character in the message body region.

24. The device of embodiment 15, including: instructions for, upon detecting user selection of an image contact assignment icon, displaying a list of contacts; and instructions for, upon detecting user selection of a respective contact from the list of contact, displaying a user interface for associating the user selected image with the user selected contact.

25. The device of embodiment 24, wherein the instructions for displaying a user interface for associating the user selected image with the user selected contact further include: instructions for enabling the user to adjust the user selected image to form an adjusted image to be associated with the user selected contact.

26. The device of embodiment 25, wherein the instructions for adjusting the image include: instructions for moving the image on the touch screen in response to a movement of an one-finger contact gesture; instructions for enlarging the image in response to a de-pinching gesture including multiple simultaneous and continuous contacts with the touch screen; instructions for reducing the image in response to a pinching gesture including multiple simultaneous and continuous contacts with the touch screen; and instructions for rotating the image in response to a twisting gesture including multiple simultaneous and continuous contacts with the touch screen.

27. A portable electronic device, comprising: a display; one or more processors; memory; and a program, wherein the program is stored in the memory and configured to be executed by the one or more processors, the program including: instructions for displaying an array of thumbnail images corresponding to a set of photographic images; instructions for detecting a scrolling gesture comprising a substantially vertical movement of user contact with the touch screen display; and instructions for responding to the scrolling gesture by scrolling the display of thumbnail images in accordance with a direction of the scrolling gesture; wherein the scrolling gesture is substantially independent of a horizontal position of the user contact with the touch screen display.

28. A computer program product, comprising: a computer readable storage medium and a computer program mechanism embedded therein, the computer program mechanism comprising instructions, which when executed by a portable electronic device with a touch screen display, cause the device to: displaying an array of thumbnail images corresponding to a set of photographic images; replacing the displayed array of thumbnail images with a user-selected photographic image upon detecting a user contact with a corresponding thumbnail image in the array, wherein the user-selected photographic image is displayed at a larger scale than the corresponding thumbnail image; and displaying a different photographic image in replacement of the user-selected photographic image, wherein the different photographic image is selected in accordance with a scrolling gesture comprising a substantially horizontal movement of user contact with the touch screen display.

29. A computer program product, comprising: a computer readable storage medium and a computer program mechanism embedded therein, the computer program mechanism comprising instructions, which when executed by a portable electronic device with a touch screen display, cause the device to: display an array of thumbnail images corresponding to a set of photographic images; detect a scrolling gesture comprising a substantially vertical movement of user contact with the touch screen display; and respond to the scrolling gesture by scrolling the display of thumbnail images in accordance with a direction of the scrolling gesture; wherein the scrolling gesture is substantially independent of a horizontal position of the user contact with the touch screen display.

30. A portable electronic device with a touch screen display, comprising:

means for displaying an array of thumbnail images corresponding to a set of photographic images; means for replacing the displayed array of thumbnail images with a user-selected photographic image upon detecting a user contact with a corresponding thumbnail image in the array, wherein the user-selected photographic image is displayed at a larger scale than the corresponding thumbnail image; and

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000356

means for displaying a different photographic image in replacement of the user-selected photographic image, wherein the different photographic image is selected in accordance with a scrolling gesture comprising a substantially horizontal movement of user contact with the touch screen display.

31. A portable electronic device with a touch screen display, comprising:

means for displaying an array of thumbnail images corresponding to a set of photographic images; means for detecting a scrolling gesture comprising a substantially vertical movement of user contact with the touch screen display; and means for responding to the scrolling gesture by scrolling the display of thumbnail images in accordance with a direction of the scrolling gesture; wherein the scrolling gesture is substantially independent of a horizontal position of the user contact with the touch screen display.

32. A computer-implemented method, comprising: at a device with a touch screen display, detecting a first movement of a physical object on or near the touch screen display; while detecting the first movement, translating a first digital object displayed on the touch screen display in a first direction, wherein the first digital object is associated with a set of digital objects; in response to display of a previously hidden edge of the first digital object and continued detection of the first movement, displaying an area beyond the edge of the first digital object; after the first movement is no longer detected, translating the first digital object in a second direction until the area beyond the edge of the first digital object is no longer displayed; detecting a second movement of the physical object on or near the touch screen display; and in response to detecting the second movement while the previously hidden edge of the first digital object is displayed, translating the first digital object in the first direction and displaying a second digital object in the set of digital objects.

33. The computer-implemented method of embodiment 32, wherein, prior to the translating, at least one edge of the first digital object extends beyond the touch screen display in the first direction.

34. The computer-implemented method of embodiment 32, wherein the physical object is a finger or a stylus.

35. The computer-implemented method of embodiment 32, wherein the first movement is a horizontal swipe gesture.

36. The computer-implemented method of embodiment 32, wherein the set of digital objects is a set of digital images, a set of web pages, or a set of electronic documents.

37. The computer-implemented method of embodiment 32, wherein the device is a portable electronic device.

38. An electronic device, comprising: a display; one or more processors; memory; and a program, wherein the program is stored in the memory and configured to be executed by the one or more processors, the program including: instructions for detecting a first movement of a physical object on or near the touch screen display; instructions for, while detecting the first movement, translating a first digital object displayed on the touch screen display in a first direction, wherein the first digital object is associated with a set of digital objects; instructions for, in response to display of a previously hidden edge of the first digital object and continued detection of the first movement, displaying an area beyond the edge of the first digital object; instructions for, after the first movement is no longer detected, translating the first digital object in a second direction until the area beyond the edge of the first digital object is no longer displayed; instructions for detecting a second movement of the physical object on or near the touch screen display; and instructions for, in response to detecting the second movement while the previously hidden edge of the first digital object is displayed, translating the first digital object in the first direction and displaying a second digital object in the set of digital objects.

39. A computer program product, comprising: a computer readable storage medium and a computer program mechanism embedded therein, the computer program mechanism comprising instructions, which when executed by an electronic device with a touch screen display, cause the device to: detect a first movement of a physical object on or near the touch screen display; while detecting the first movement, translate a first digital object displayed on the touch screen display in a first direction, wherein the first digital object is associated with a set of digital objects; in response to display of a previously hidden edge of the first digital object and continued detection of the first movement, display an area beyond the edge of the first digital object; after the first movement is no longer detected, translate the first digital object in a second direction until the area beyond the edge of the first digital object is no longer displayed; detect a second movement of the physical object on or near the touch screen display; and in response to detecting the second movement while the previously hidden edge of the first digital object

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000357

is displayed, translate the first digital object in the first direction and display a second digital object in the set of digital objects.

40. An electronic device with a touch screen display, comprising: means for detecting a first movement of a physical object on or near the touch screen display; means for, while detecting the first movement, translating a first digital object displayed on the touch screen display in a first direction, wherein the first digital object is associated with a set of digital objects; means for, in response to display of a previously hidden edge of the first digital object and continued detection of the first movement, displaying an area beyond the edge of the first digital object; means for, after the first movement is no longer detected, translating the first digital object in a second direction until the area beyond the edge of the first digital object is no longer displayed; means for detecting a second movement of the physical object on or near the touch screen display; and means for, in response to detecting the second movement while the previously hidden edge of the first digital object is displayed, translating the first digital object in the first direction and displaying a second digital object in the set of digital objects.

Claims

1. A computer-implemented method, comprising:

at a portable electronic device with a phone, a photo manager, a touch screen display adapted to provide control of both the phone and the photo manager, and one or more accelerometers to detect an orientation of the device:

displaying an array of thumbnail images corresponding to a set of photographic images;
replacing the displayed array of thumbnail images with a user-selected photographic image upon detecting a user contact with a corresponding thumbnail image in the array, wherein the user-selected photographic image is displayed at a larger scale than the corresponding thumbnail image;
displaying a different photographic image in replacement of the user-selected photographic image, wherein the different photographic image is selected in accordance with a scrolling gesture comprising a substantially horizontal movement of a user contact with the touch screen display; and,
upon detection of a change in the orientation of the device by the one or more accelerometers, rotating the different photographic image on the touch screen display to maintain a proper viewing orientation.

2. The method of claim 1, including:

detecting a user image navigation gesture adjacent to a vertical edge of the touch screen display; and
upon detecting the user image navigation gesture, displaying a different photographic image in the set of photographic images, selected in accordance with the vertical edge adjacent to the user image navigation gesture.

3. The method of claim 2, wherein the user image navigation gesture comprises a momentary, substantially single-position contact with the touch screen display.

4. The method of any of claims 1-3, including:

detecting a user image rotation gesture, comprising rotation of multiple simultaneous contacts with touch screen display; and,
upon detection of the user image rotation gesture, rotating the different photographic image on the touch screen display.

5. The method of any of claims 1-4, including:

upon detecting user selection of an image deletion icon, displaying an image destruction animation of the different photographic image.

6. The method of claim 5, wherein the image destruction animation includes:

splitting the different photographic image into multiple vertical stripes; and
visually moving the multiple vertical stripes out of the touch screen display with different stripes moving at different speeds.

7. The method of any of claims 1-6, including:

upon detecting user selection of an email image icon, displaying an email composition user interface for composing an email message, with the different photographic image included in the email message being composed.

8. The method of claim 7, including:

upon detecting the user selection of the email image icon, displaying an animation of the different photographic image being resized and placed into the email message being composed.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000358

9. The method of claim 8, wherein the animation of the different photographic image includes
visually shrinking the different photographic image to a predefined size;
visually moving the email composition user interface into the touch screen, the user interface including a message body region; and
visually fitting the shrunken different photographic image into the message body region.

10. The method of claim 9, including:

upon detecting a user selection of the message body region, displaying a letter keyboard overlaid on the user selected image; and
upon detecting a user selection of the letter keyboard, displaying a user selected character in the message body region.

11. The method of any of claims 1-10, including:

upon detecting user selection of an image contact assignment icon, displaying a list of contacts; and,
upon detecting user selection of a respective contact from the list of contact, displaying a user interface for associating the different photographic image with the user selected contact.

12. The method of claim 11, wherein displaying a user interface for associating the different photographic image with the user selected contact includes enabling the user to adjust the different photographic image to form an adjusted image to be associated with the user selected contact.

13. The method of claim 12, wherein the adjustment of the different photographic image includes:

moving the different photographic image on the touch screen in response to a movement of an one-finger contact gesture;
enlarging the different photographic image in response to a de-pinching gesture including multiple simultaneous and continuous contacts with the touch screen;
reducing the different photographic image in response to a pinching gesture including multiple simultaneous and continuous contacts with the touch screen; and/or
rotating the different photographic image in response to a twisting gesture including multiple simultaneous and continuous contacts with the touch screen.

14. The method of any of claims 1-13, including displaying a vertical list of photo albums.

15. The method of claim 14, wherein displaying the array of thumbnail images corresponding to the set of photographic images occurs upon detecting a touch input corresponding to a photo album in the vertical list of photo albums.

16. A portable electronic device with a touch screen display, the portable electronic device adapted to implement the method of any one of claims 1 to 15.

17. A computer program with software code adapted to perform the method of any one of claims 1 to 15.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000359

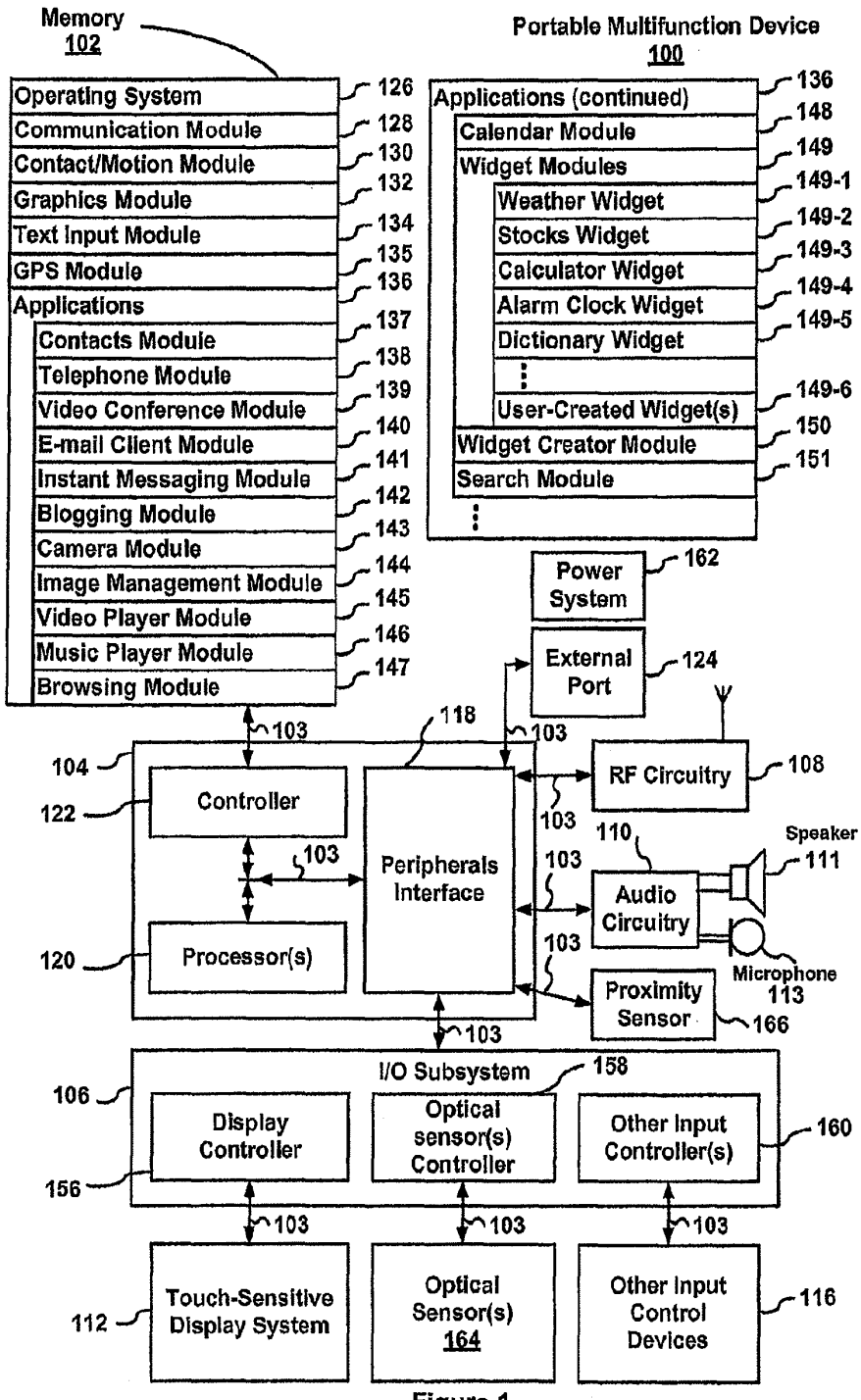


Figure 1

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000360

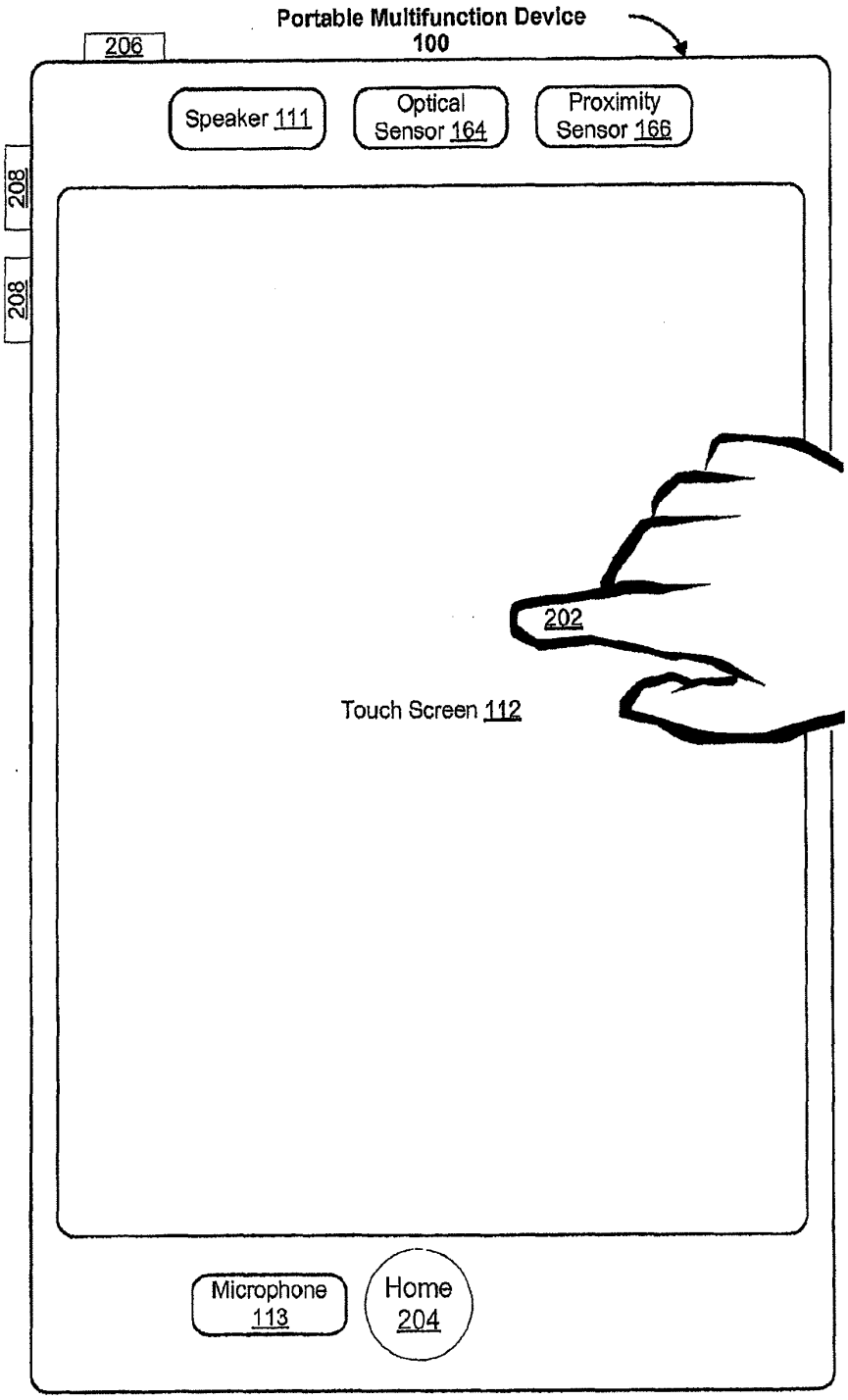


Figure 2

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000361

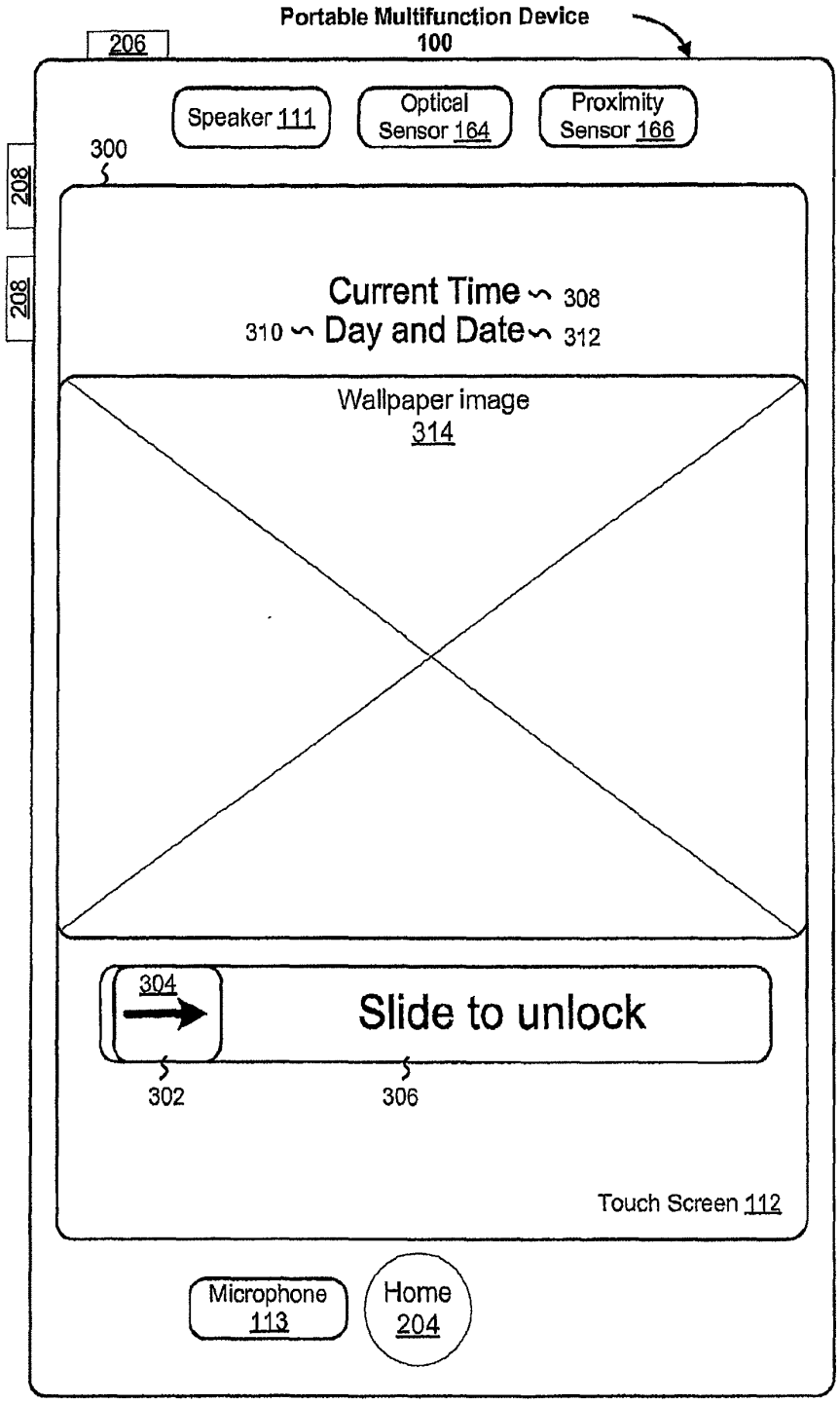


Figure 3

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000362

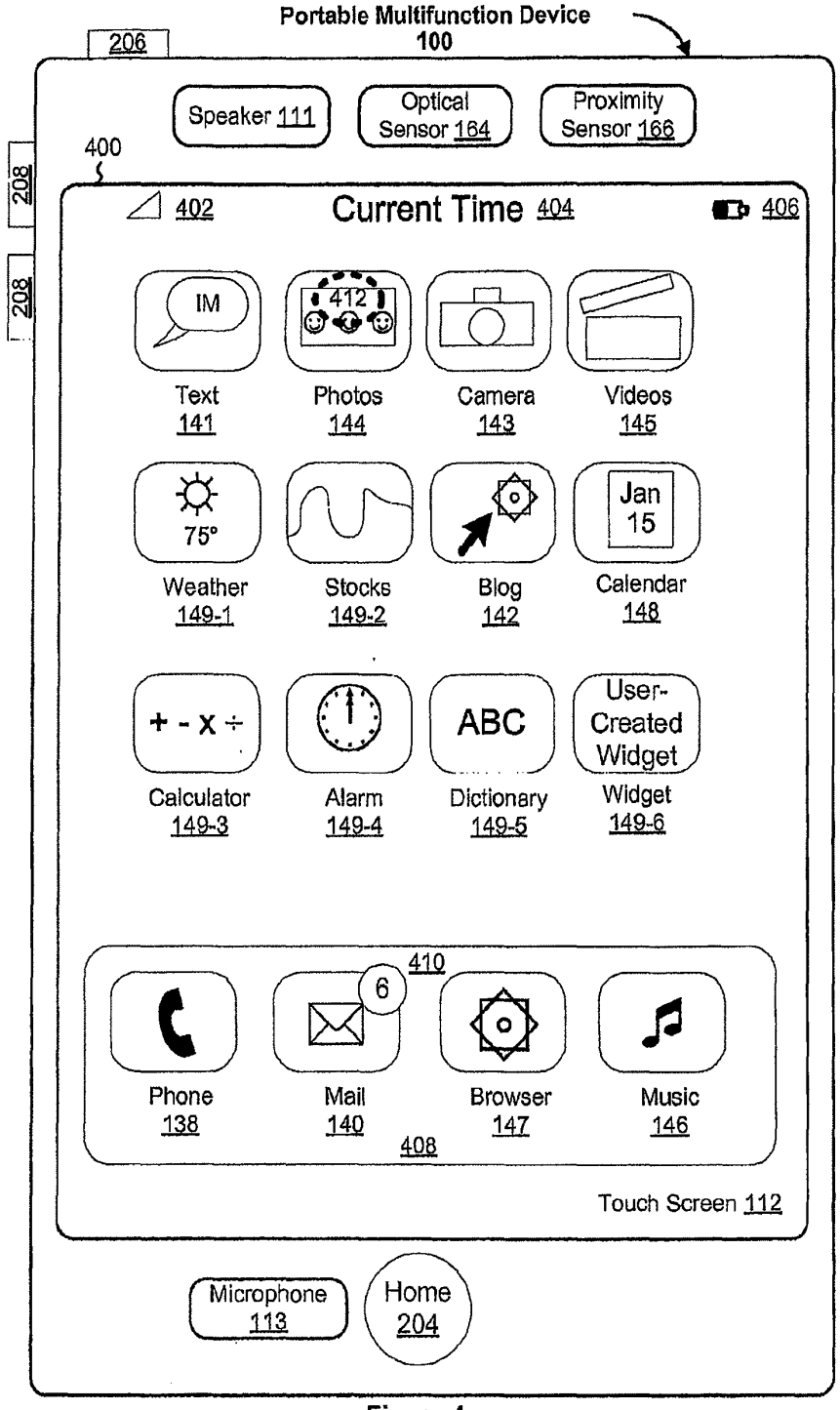


Figure 4

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000363

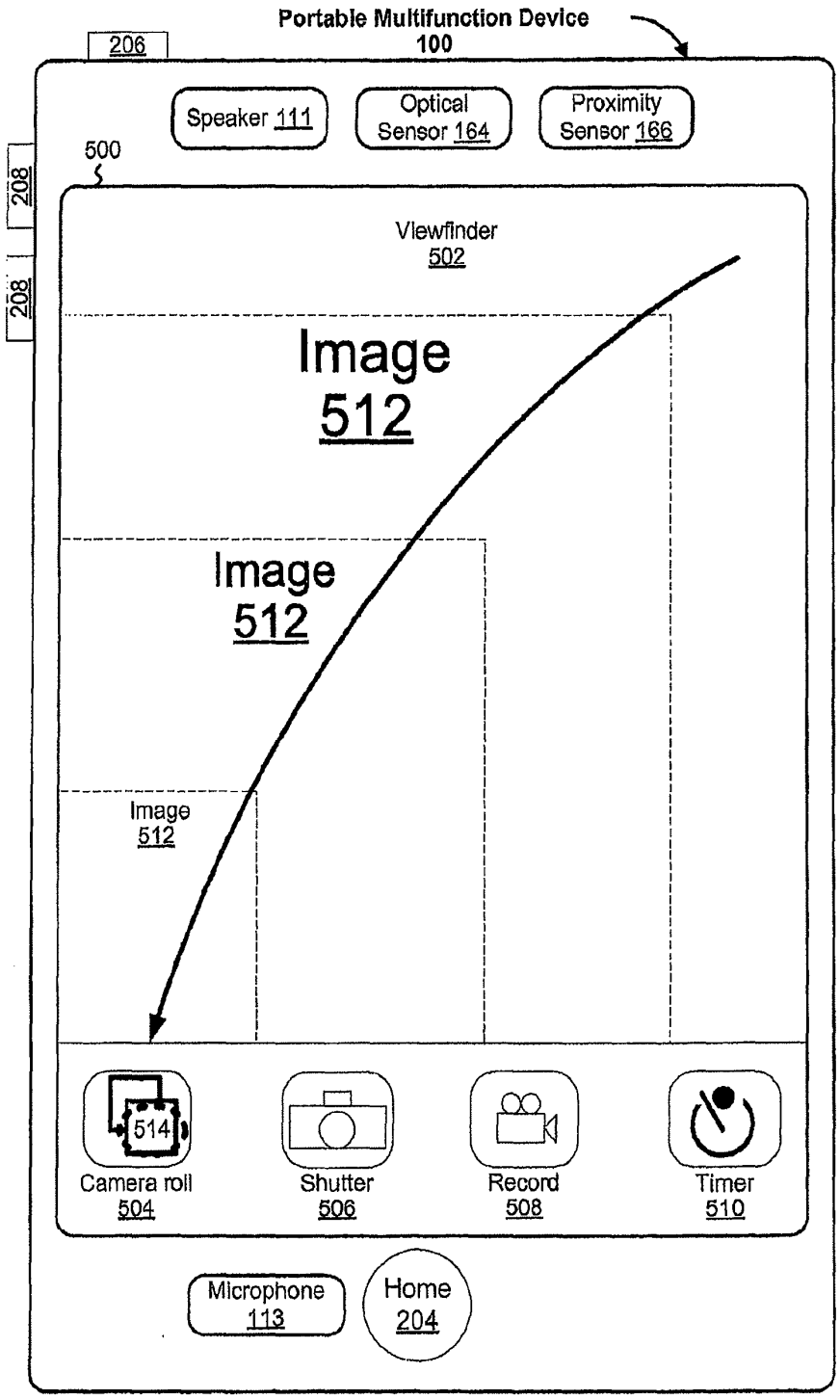


Figure 5

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000364

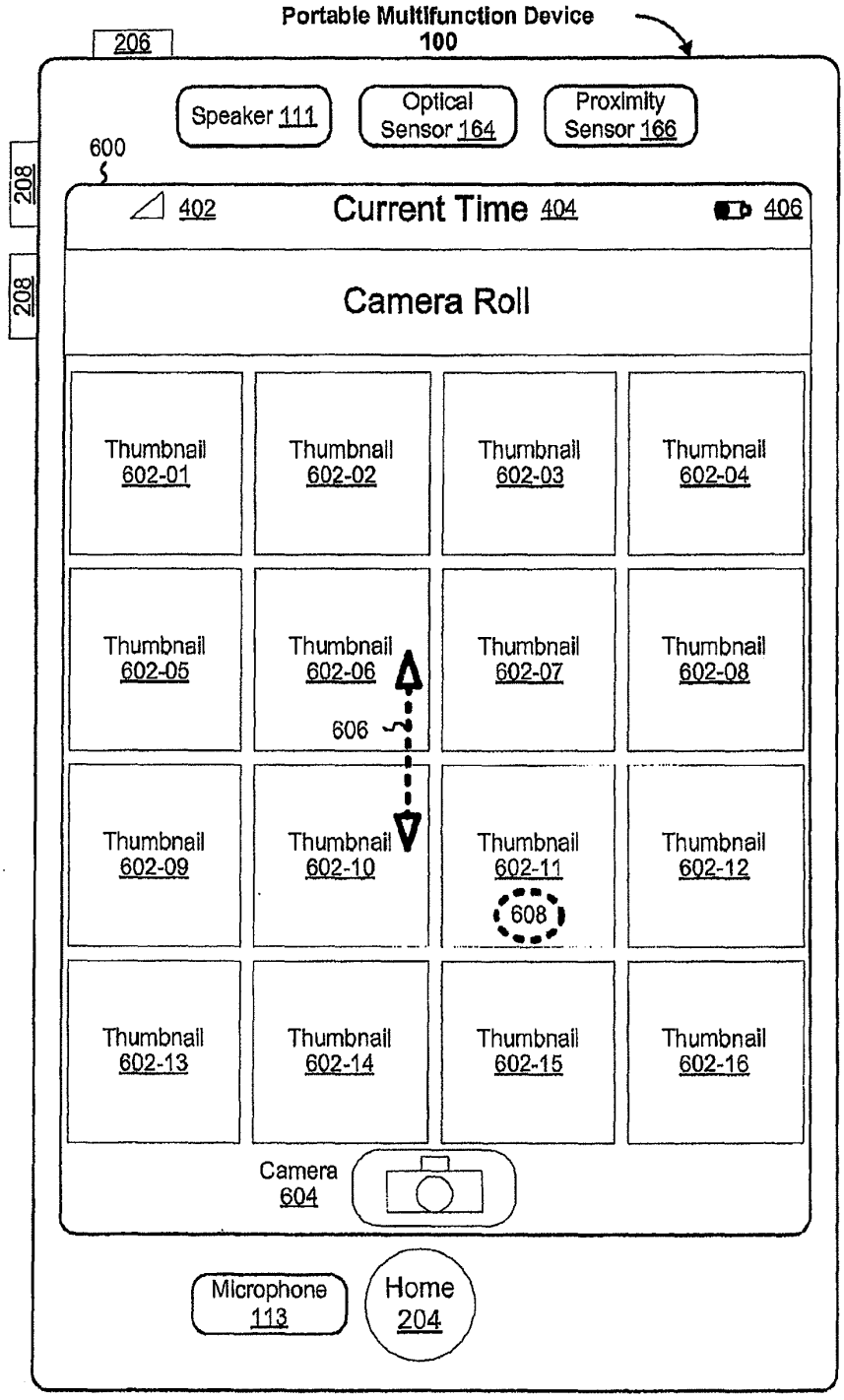


Figure 6

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000365

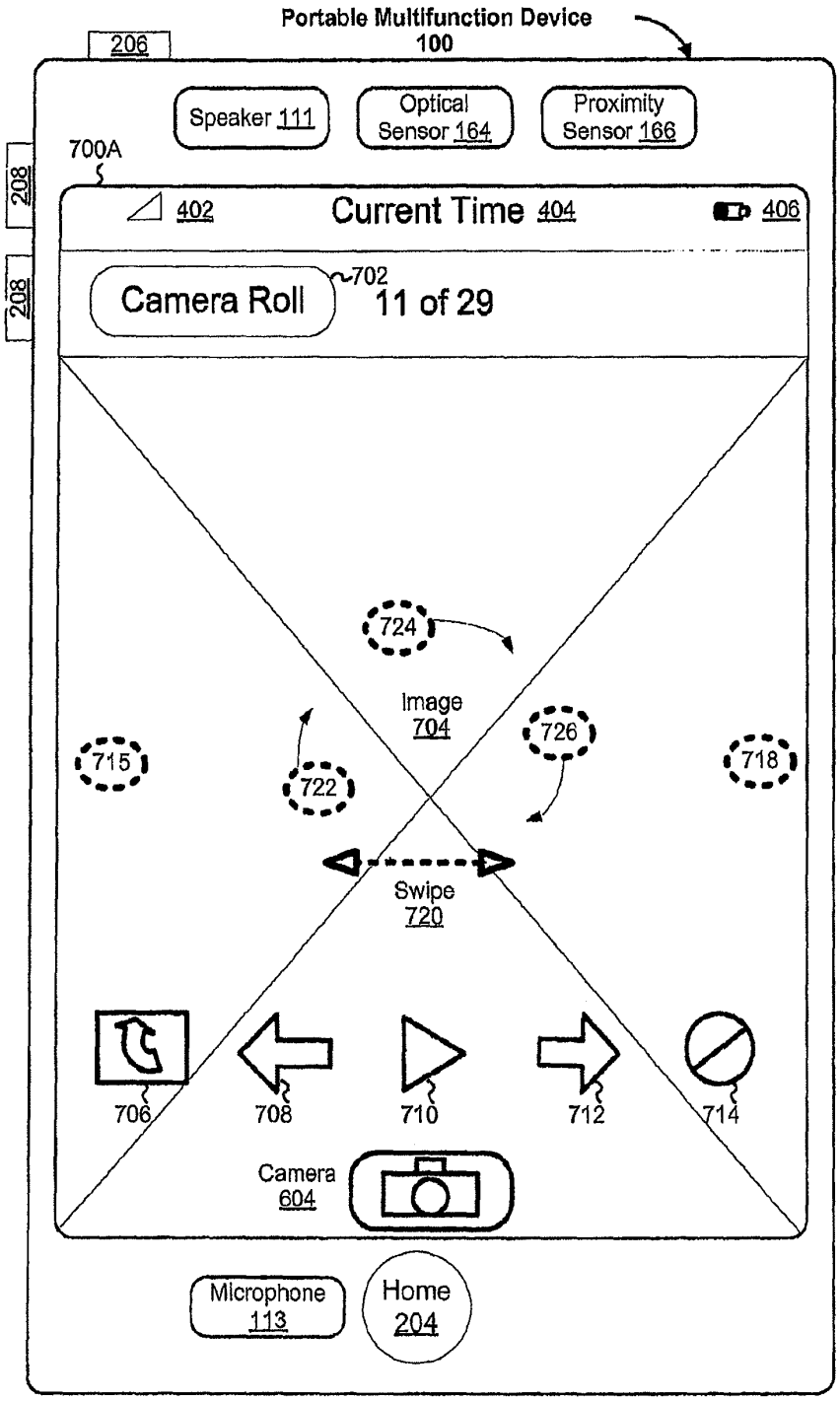


Figure 7A

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000366

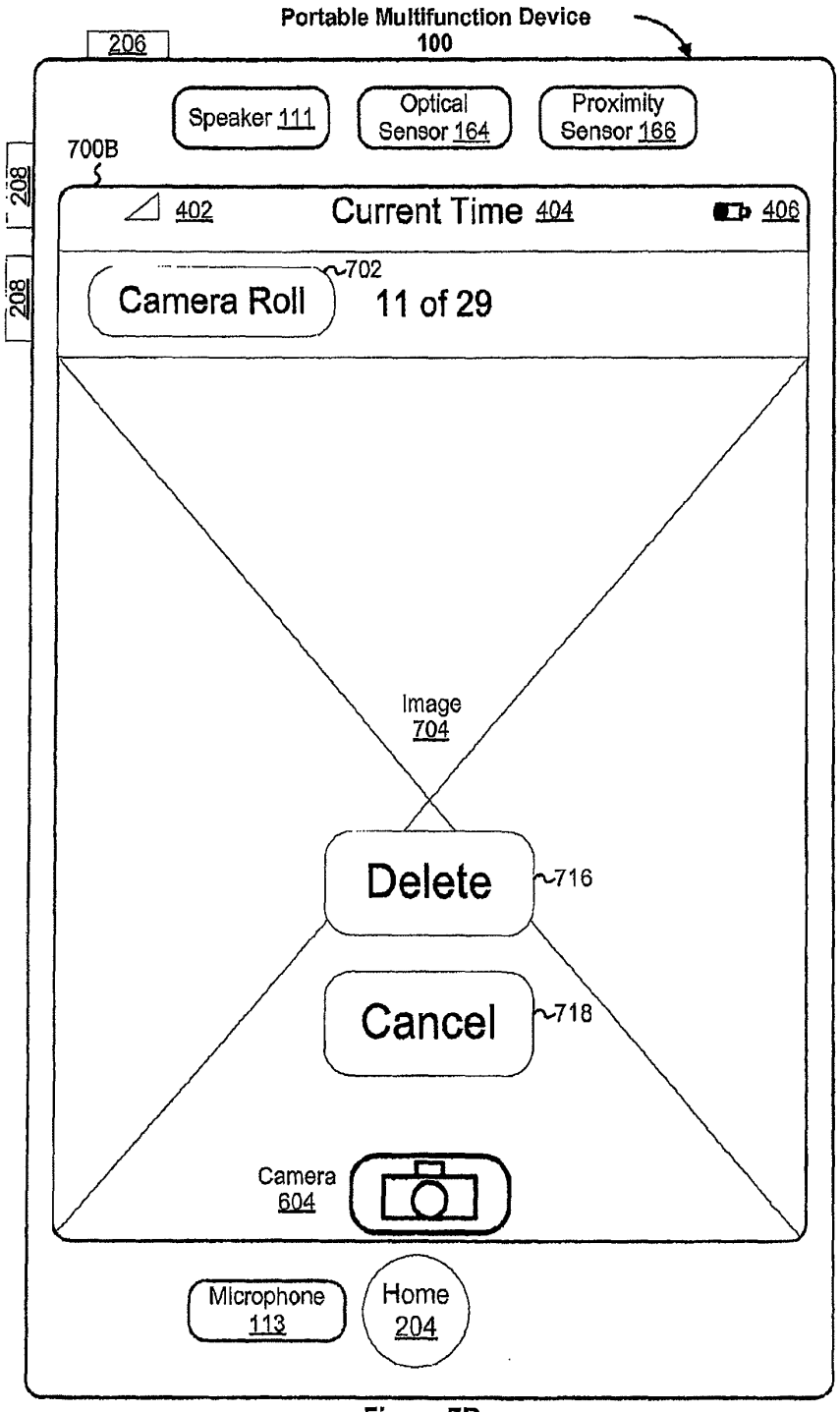


Figure 7B

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000367

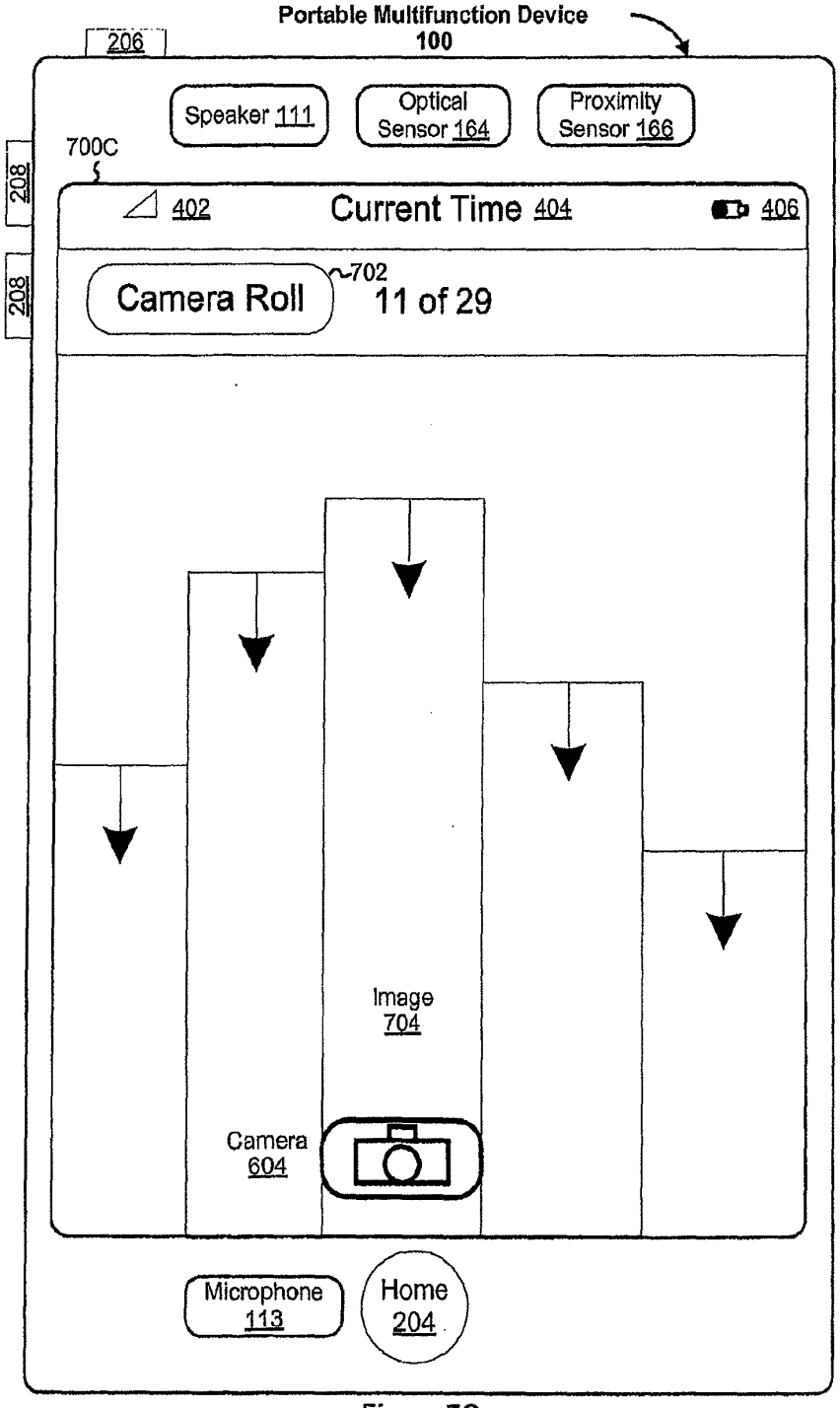


Figure 7C

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000368

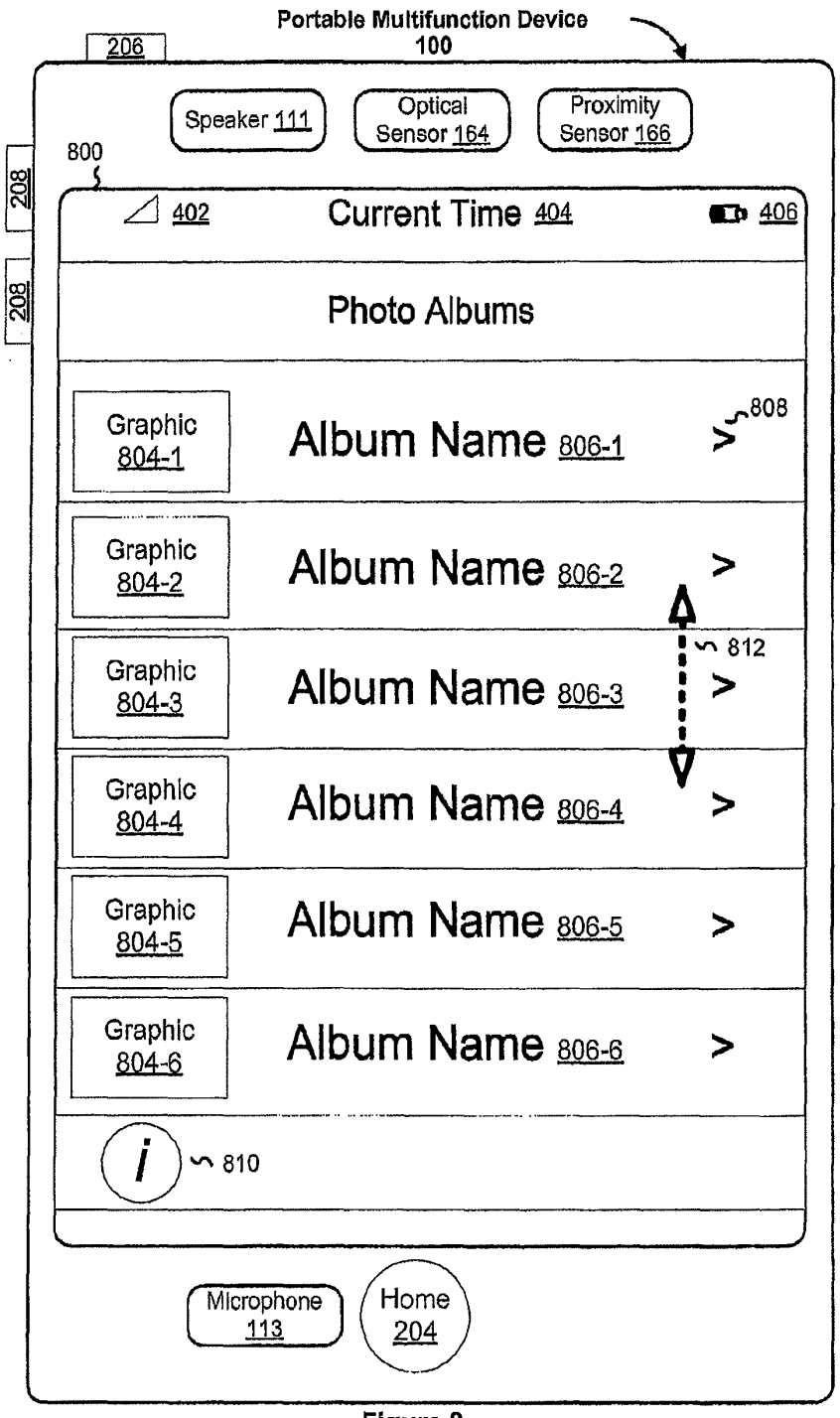


Figure 8

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000369

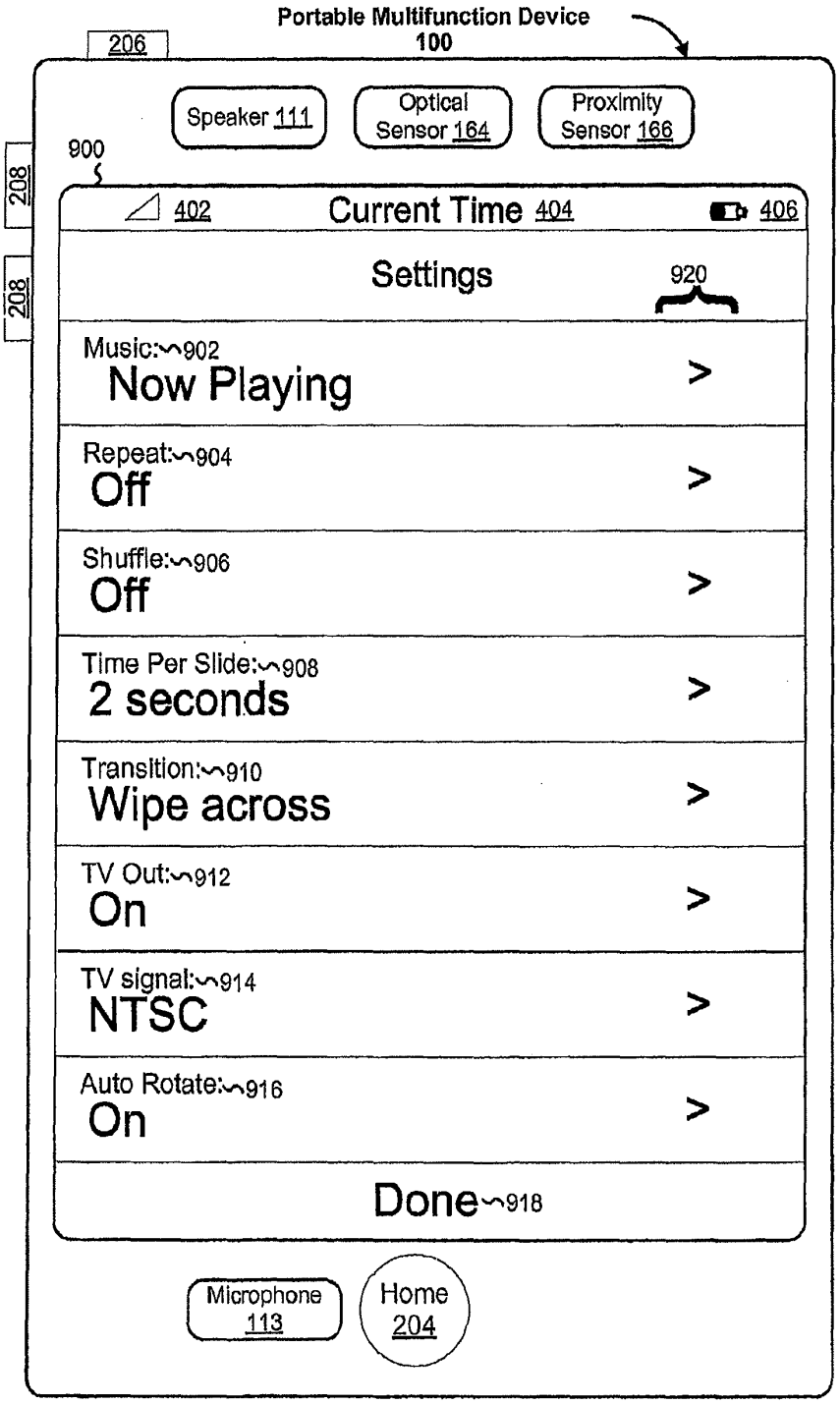


Figure 9

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000370

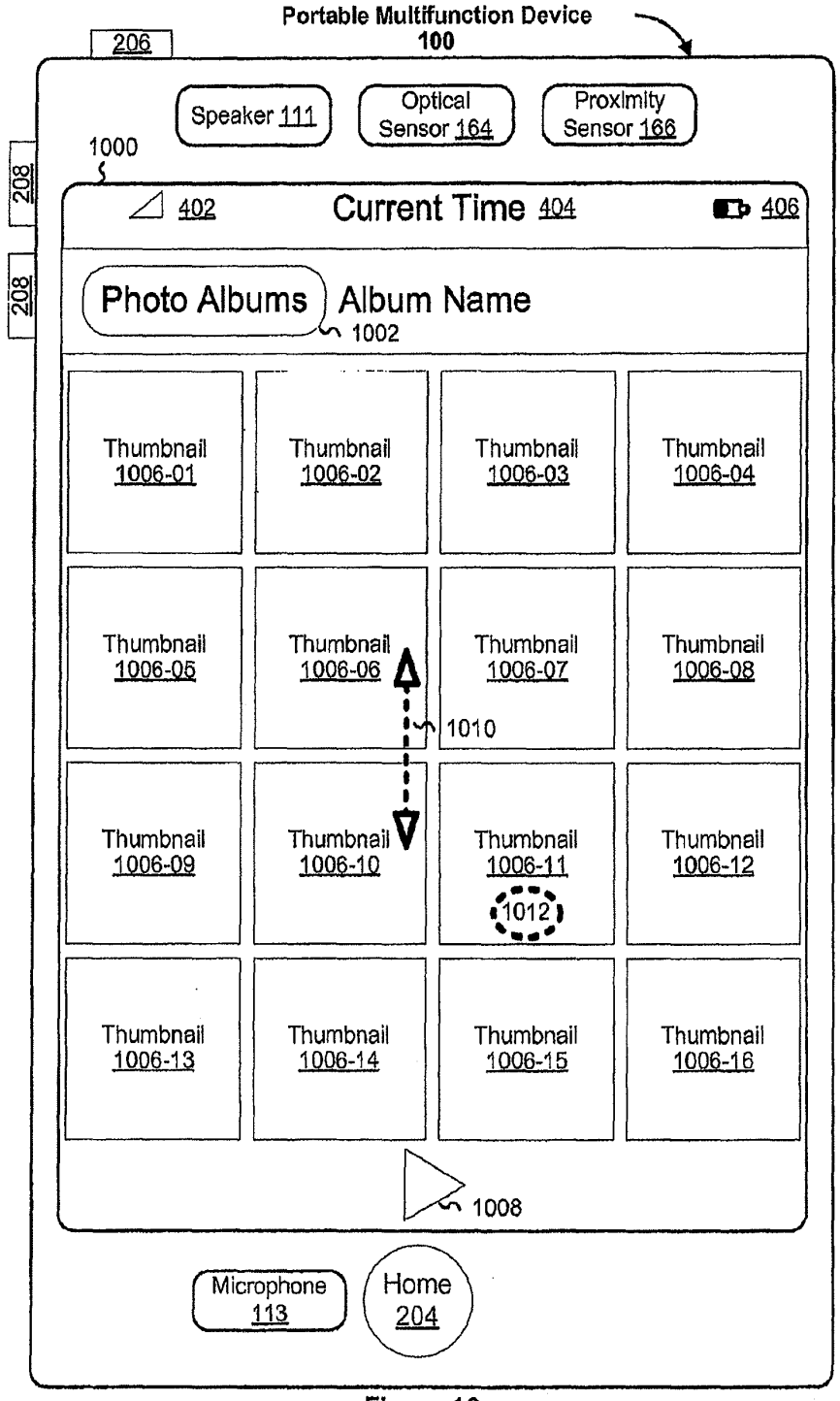


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Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000371

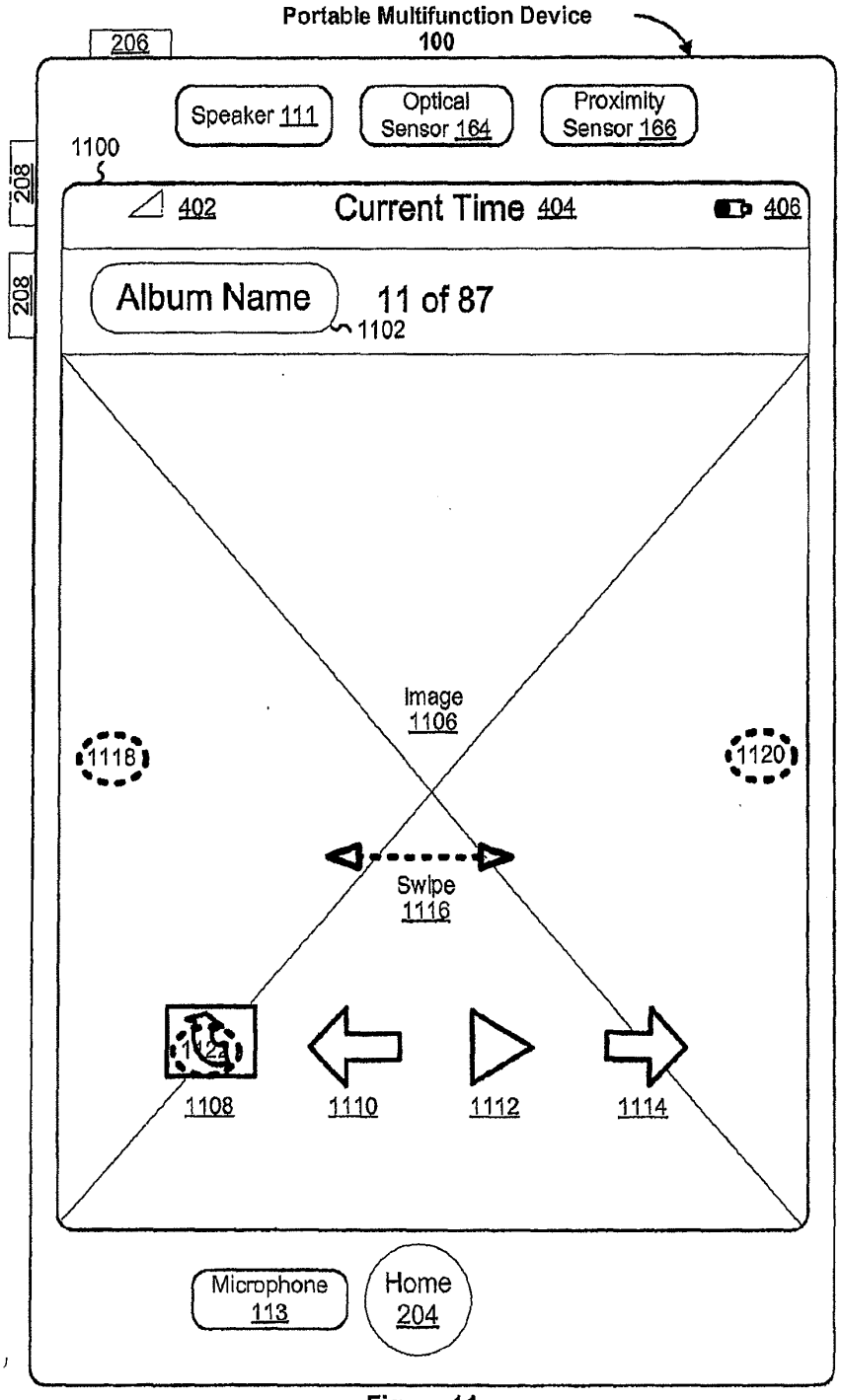


Figure 11

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000372

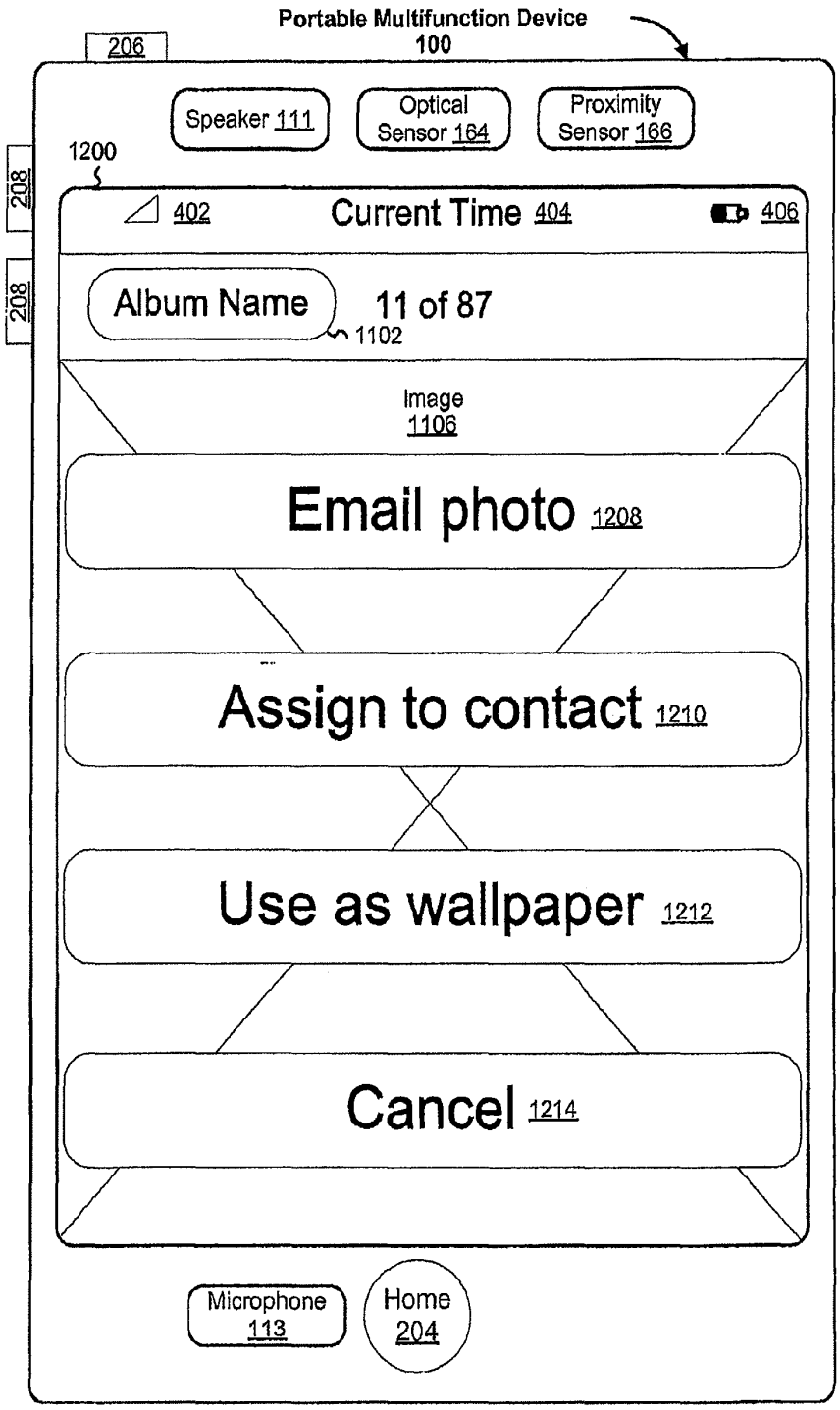


Figure 12

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000373

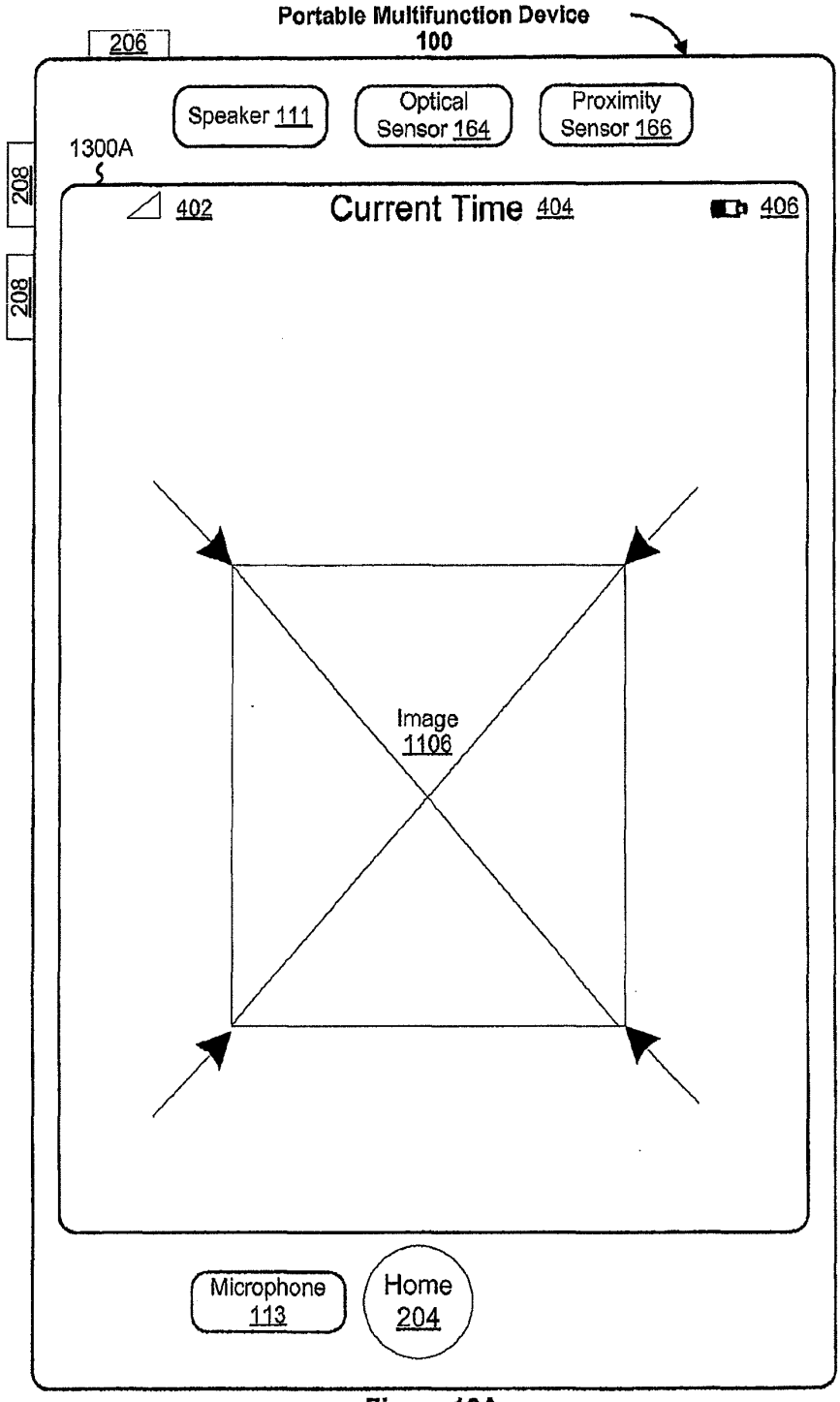


Figure 13A

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000374

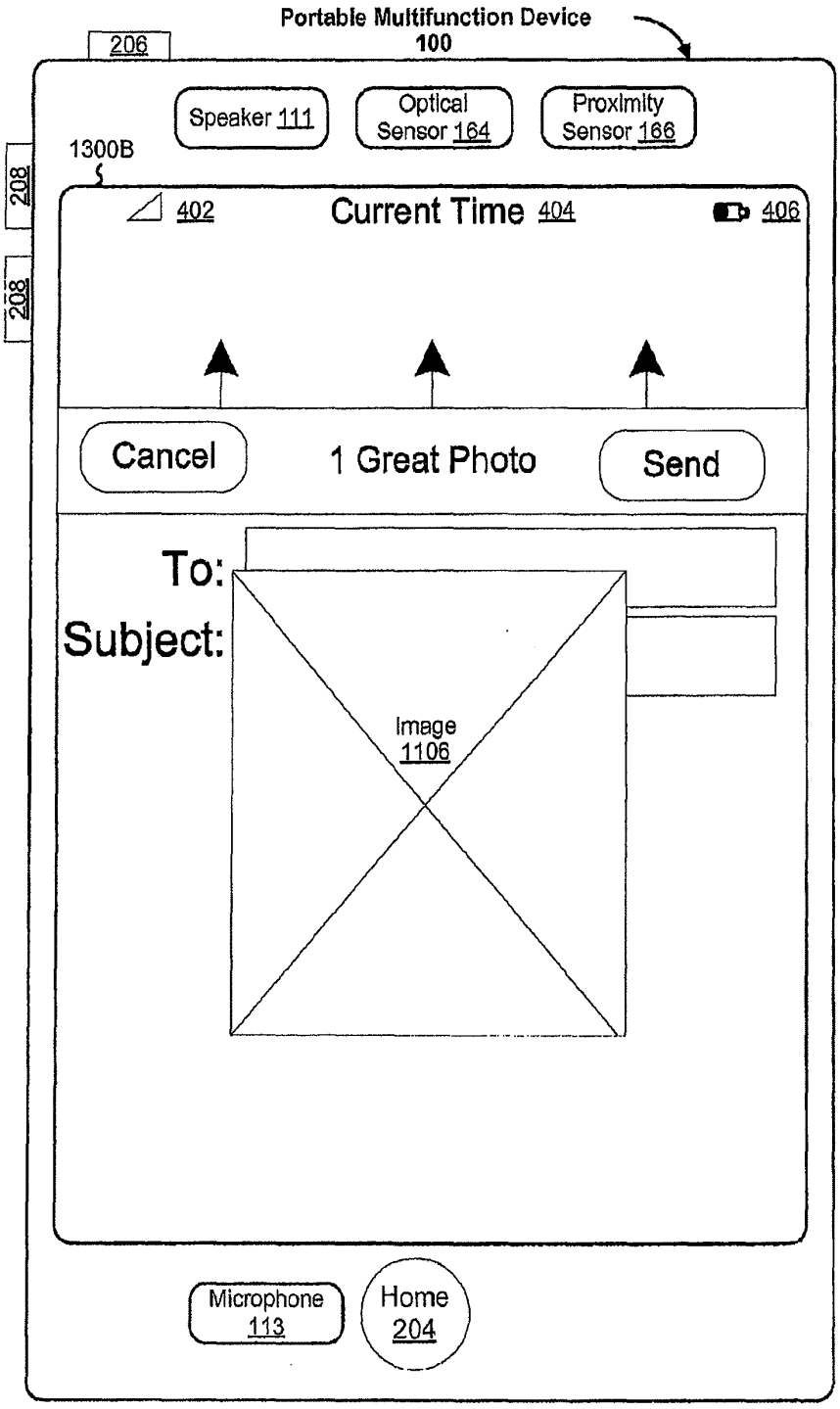


Figure 13B

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000375

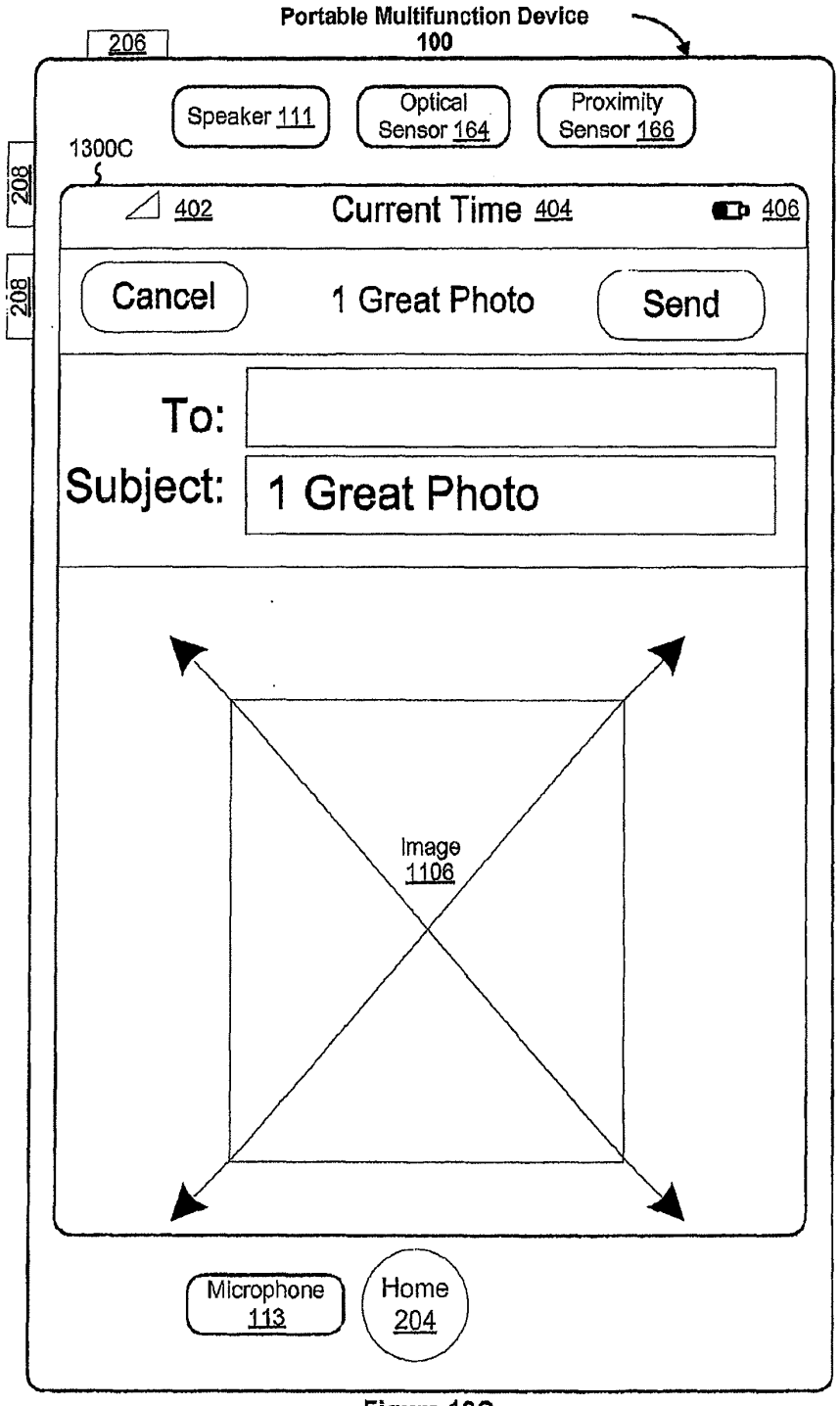


Figure 13C

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000376

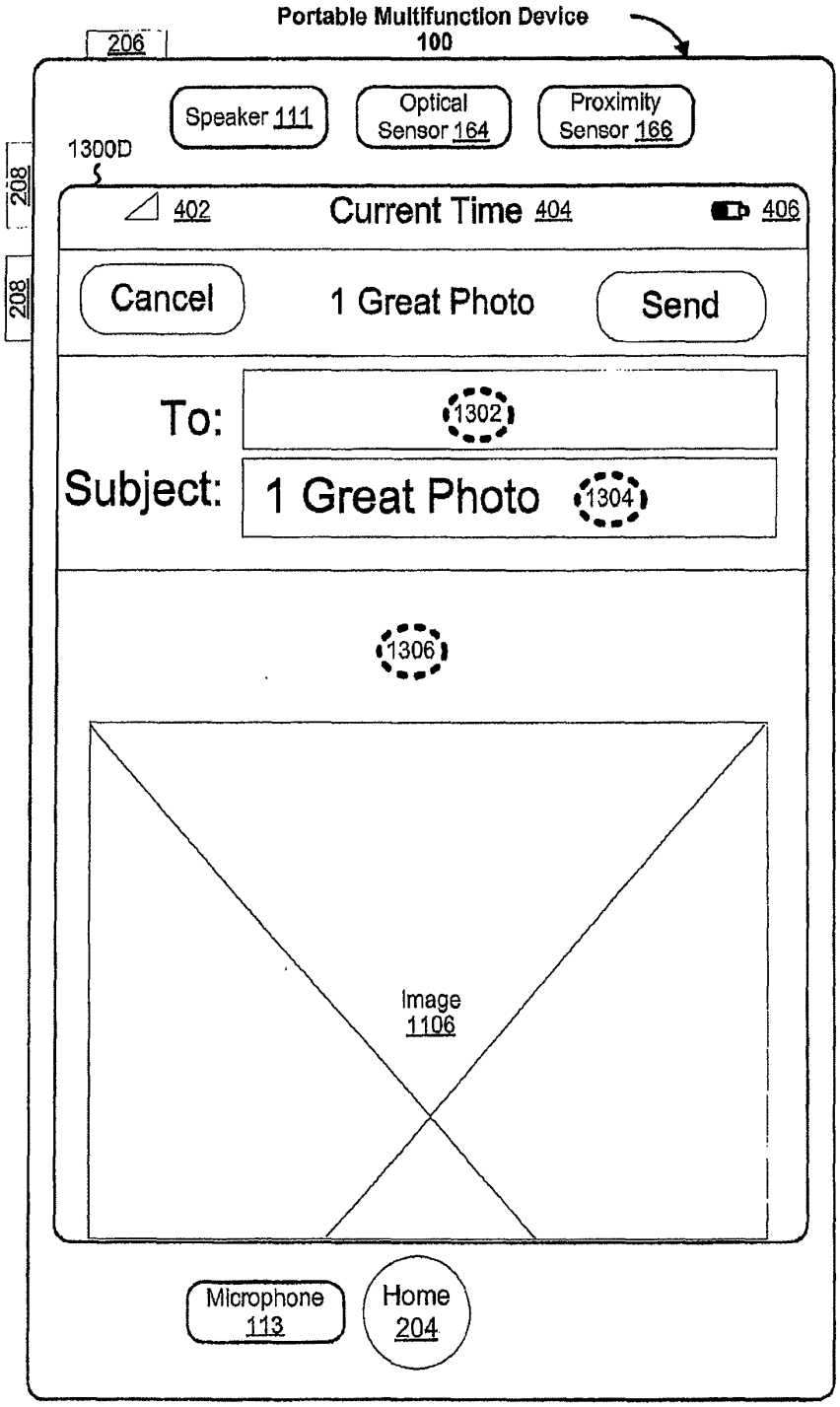


Figure 13D

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000377

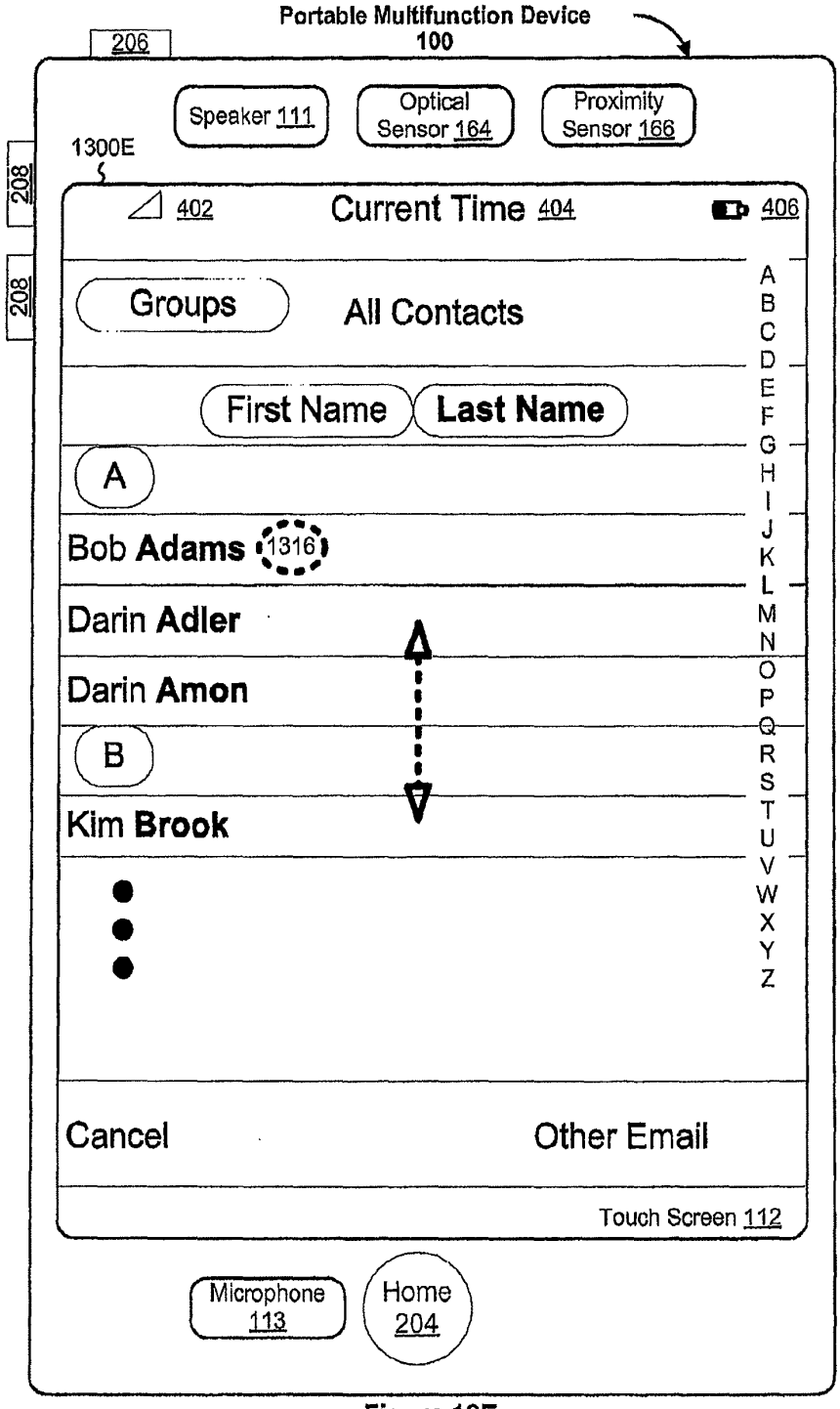


Figure 13E

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000378

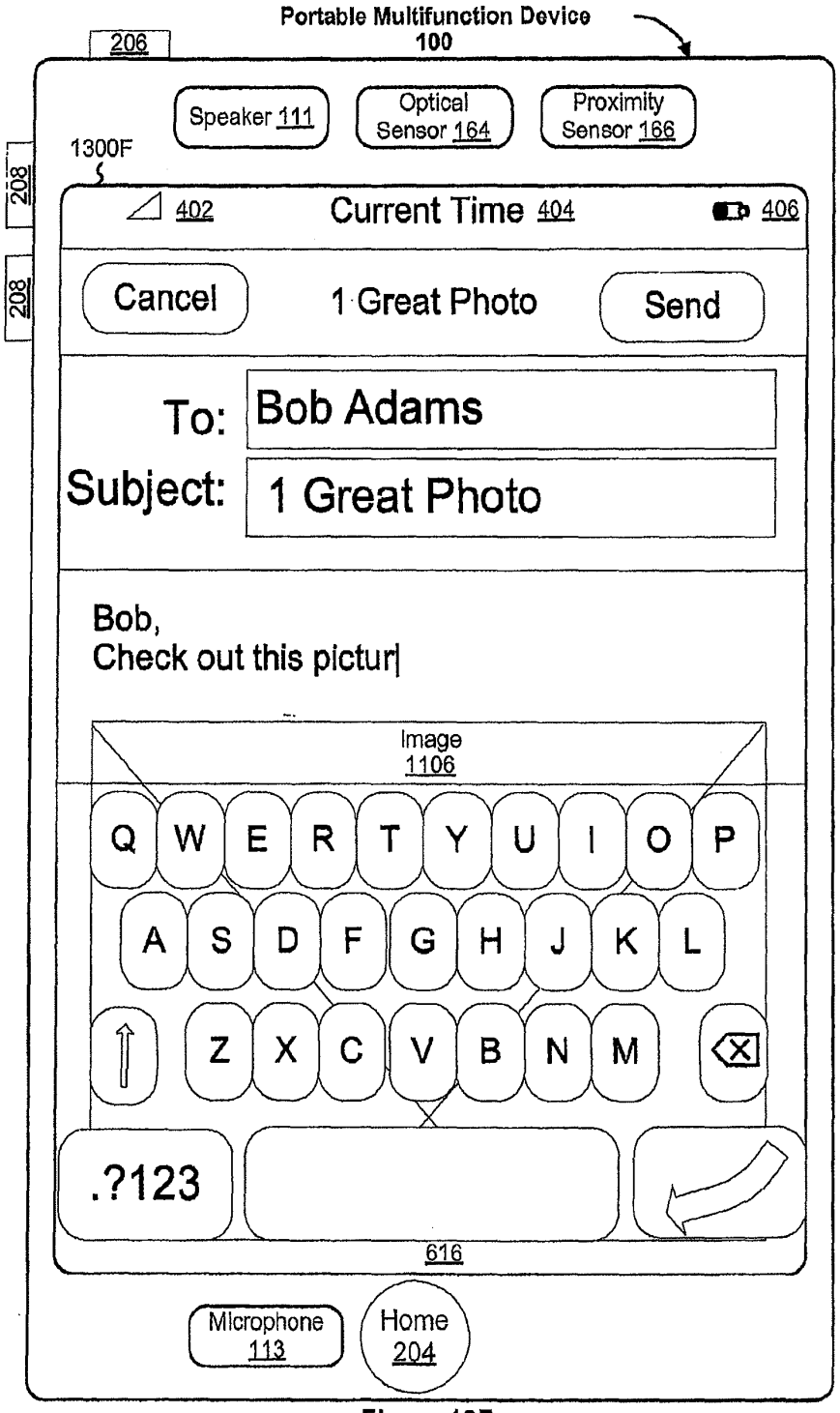


Figure 13F

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000379

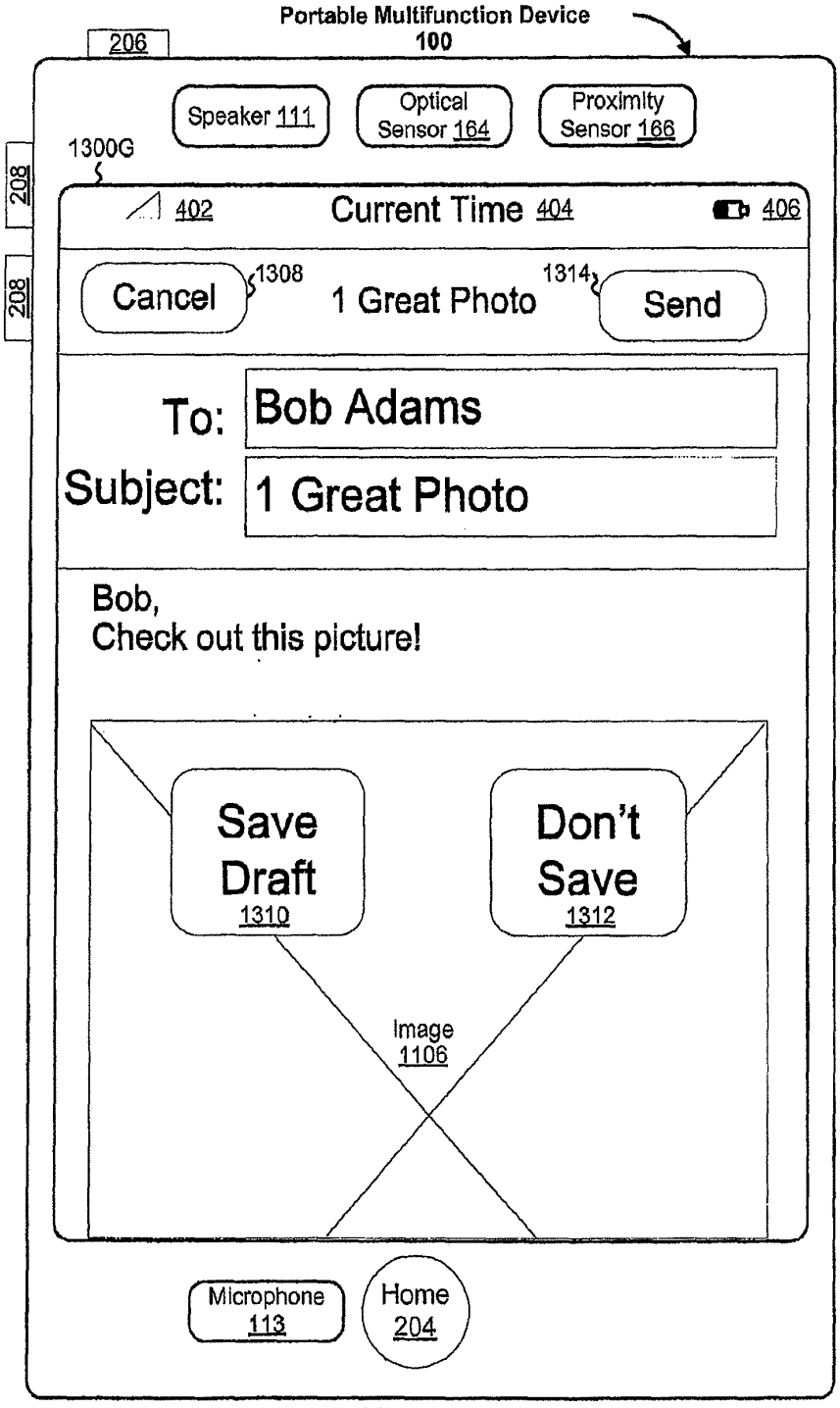


Figure 13G

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000380

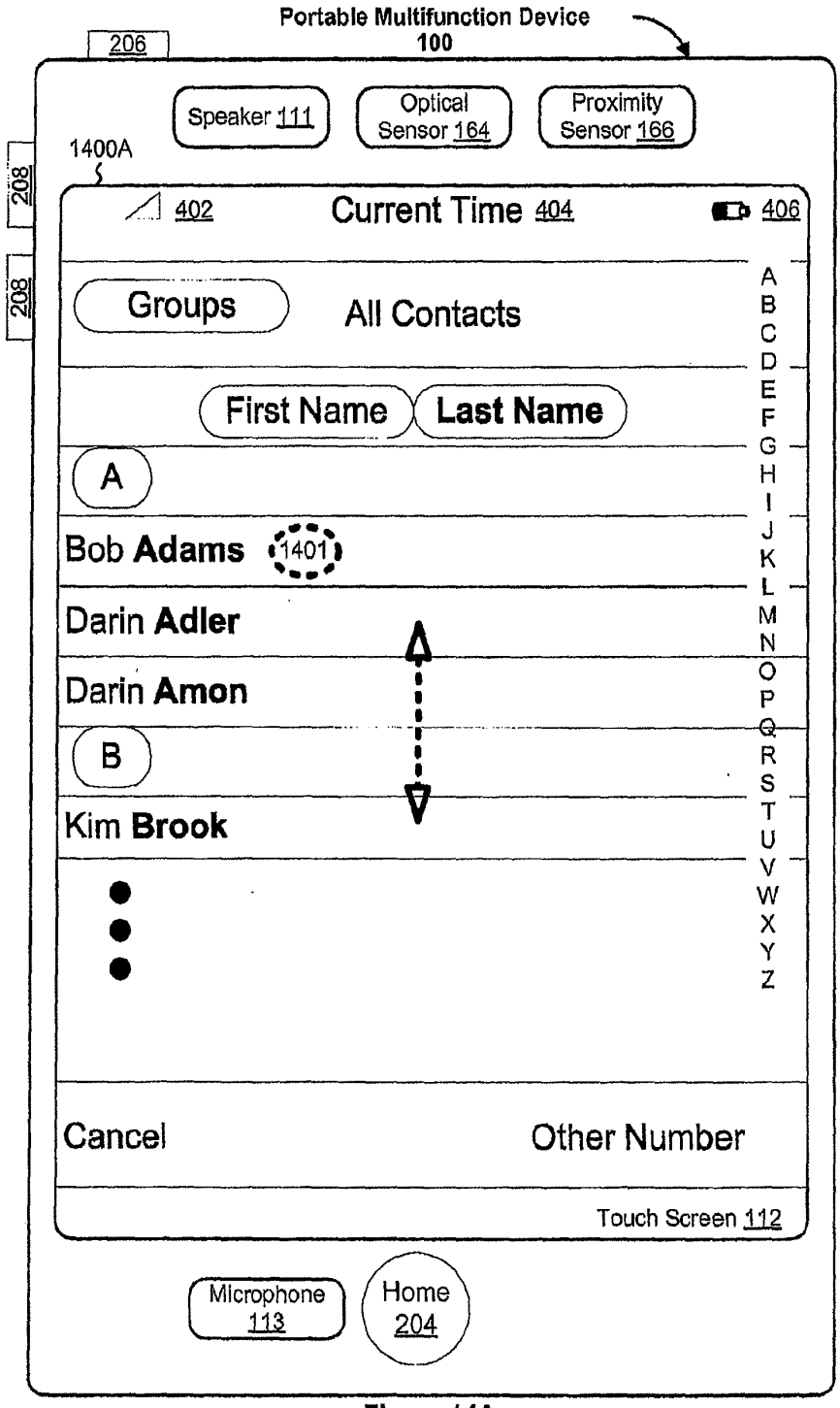


Figure 14A

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000381

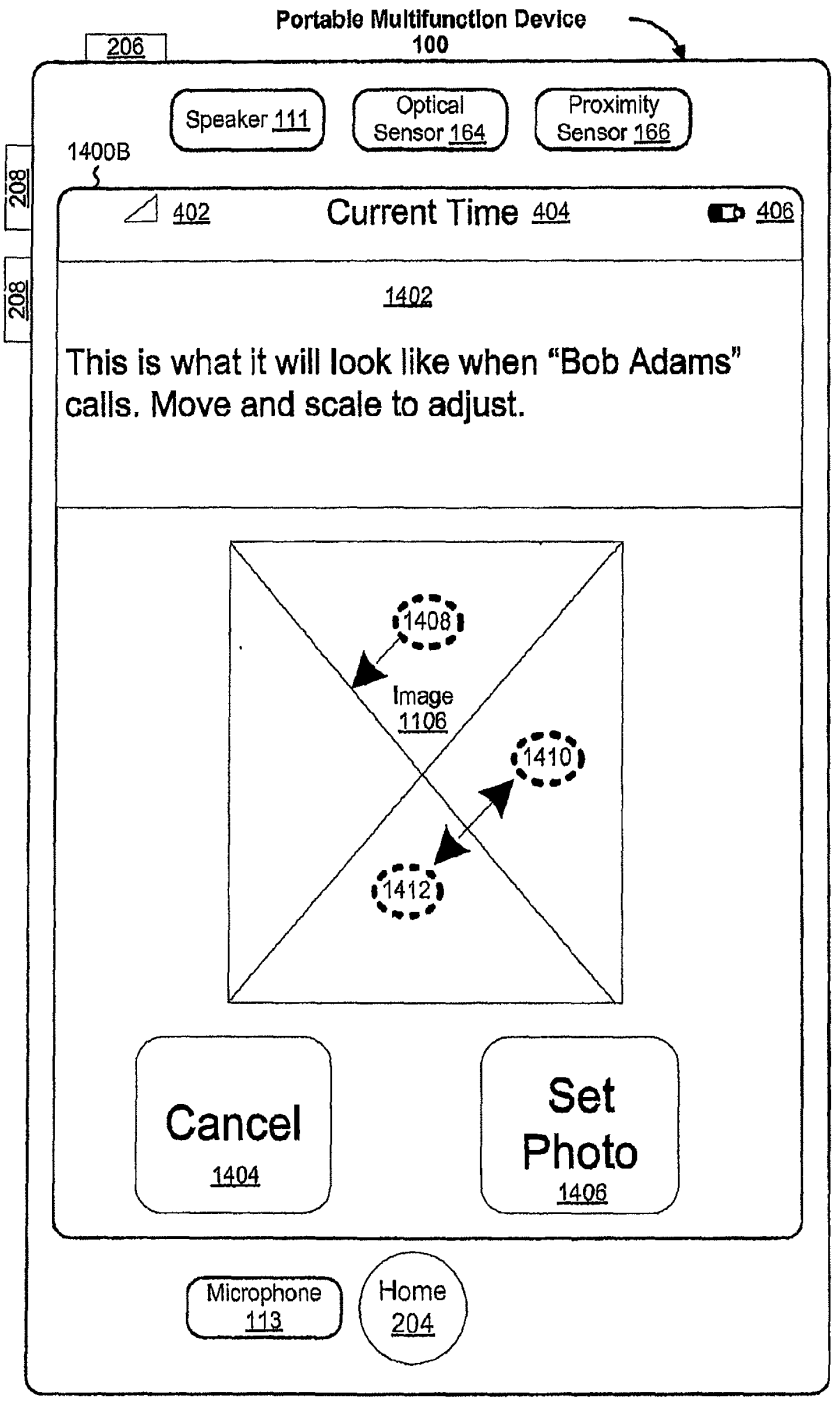


Figure 14B

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000382

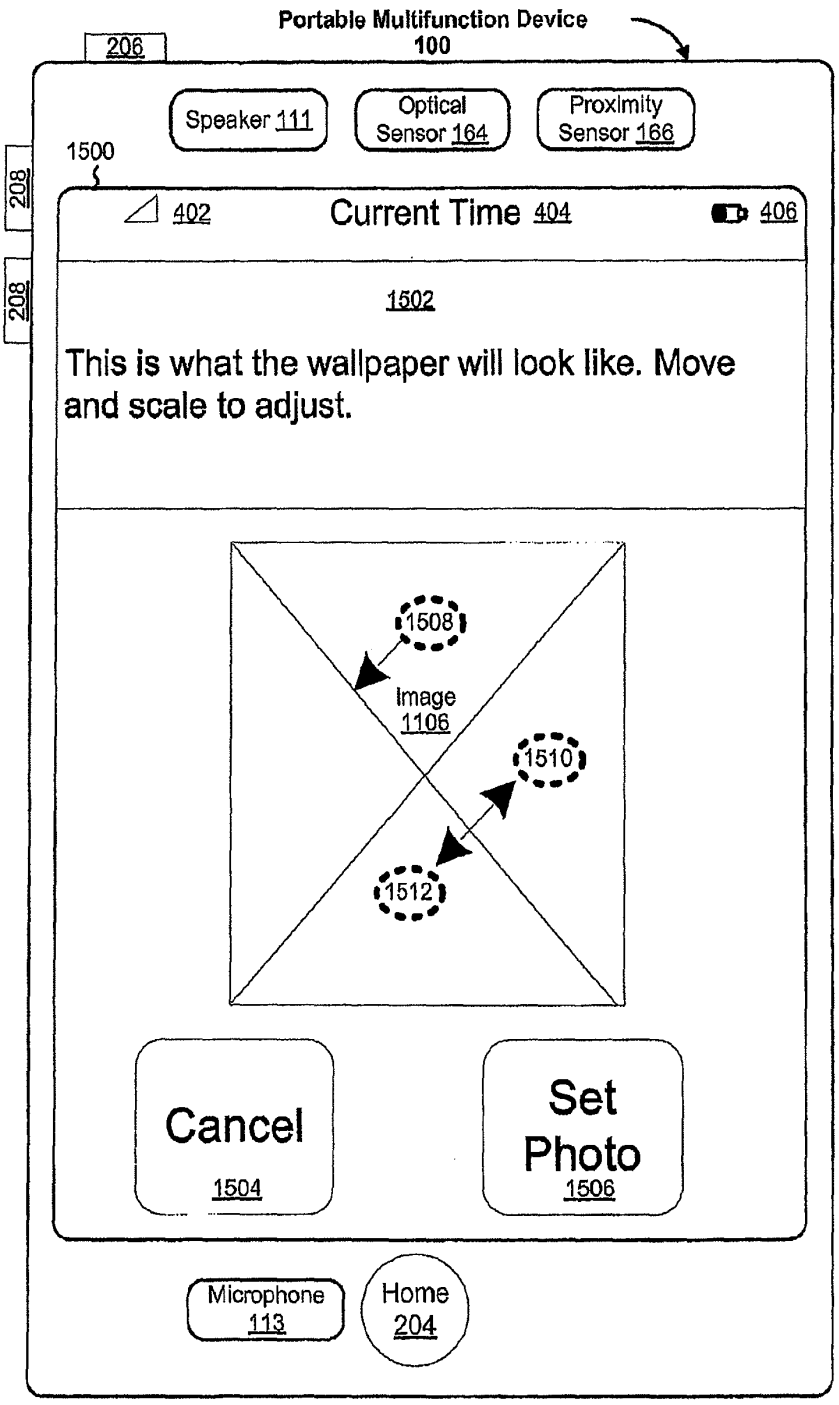


Figure 15

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000383

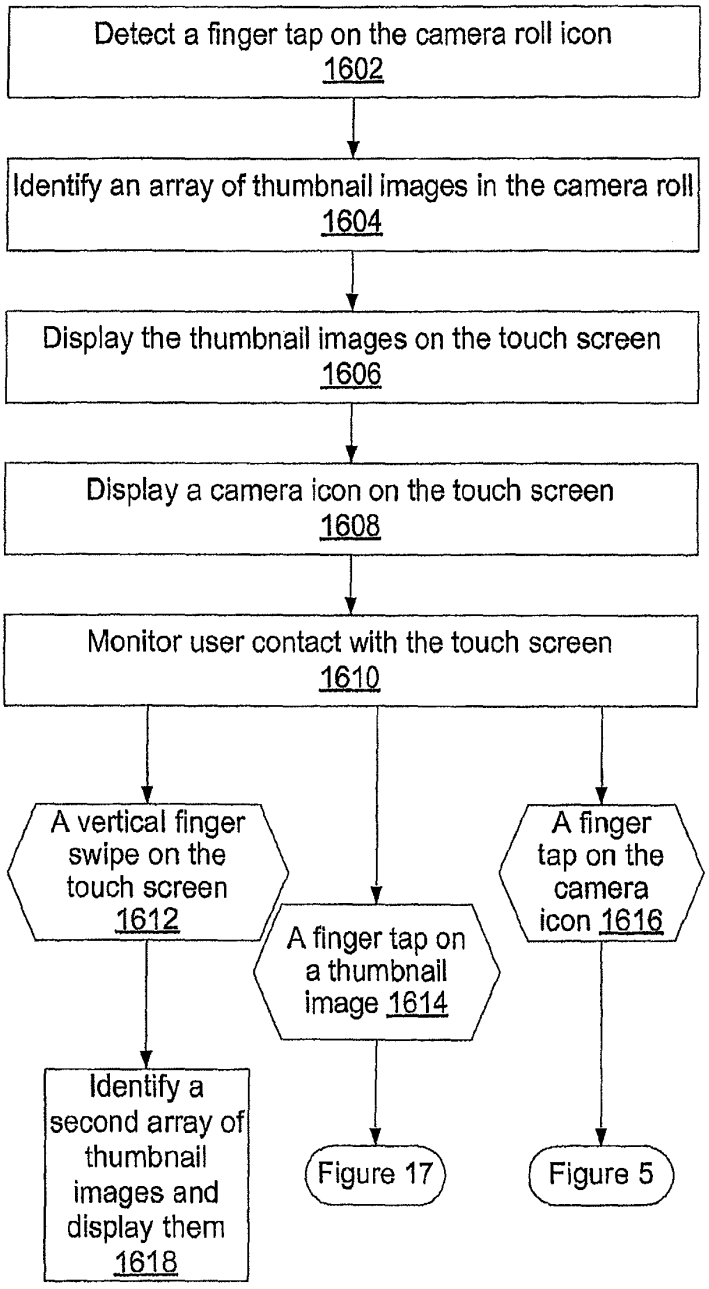


Figure 16

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000384

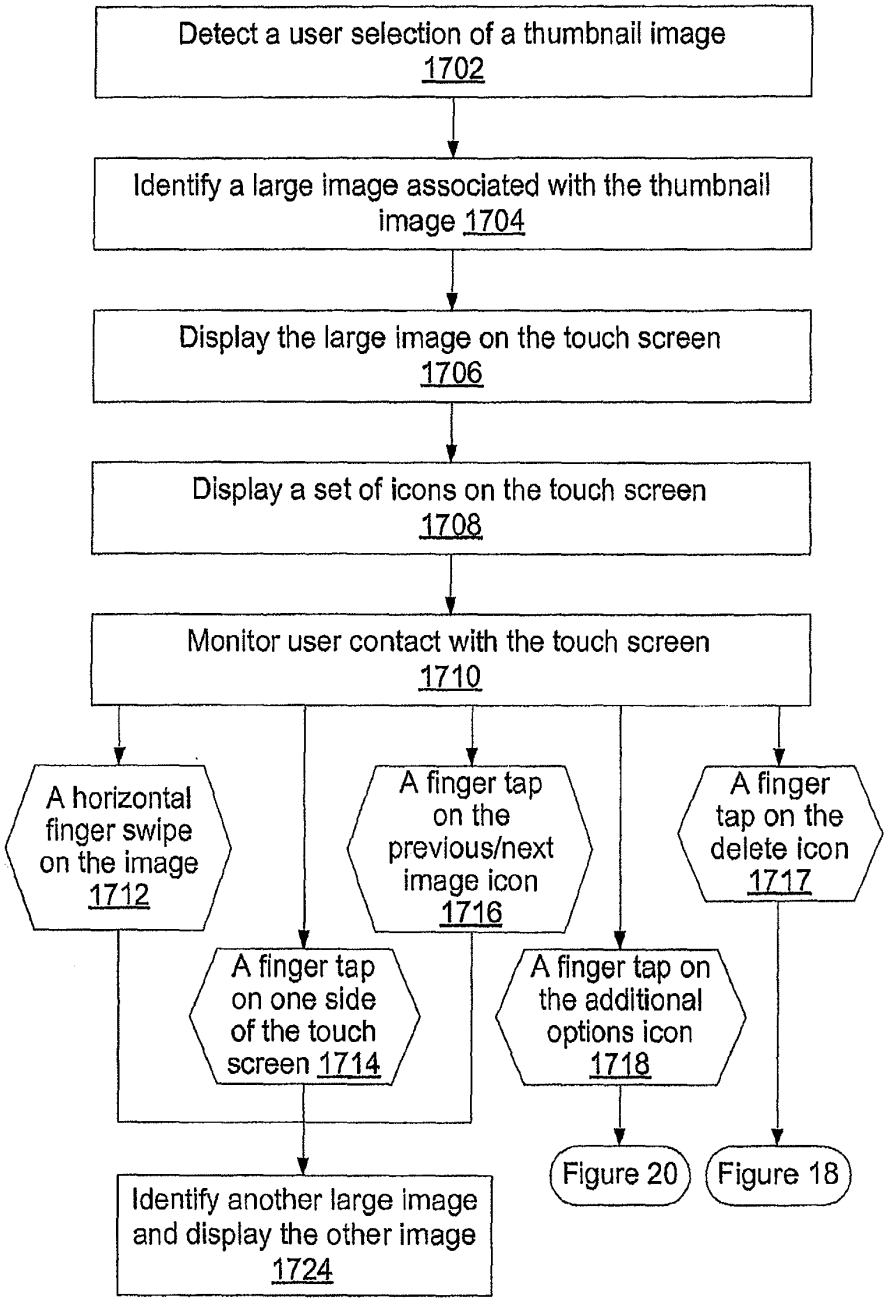


Figure 17

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000385

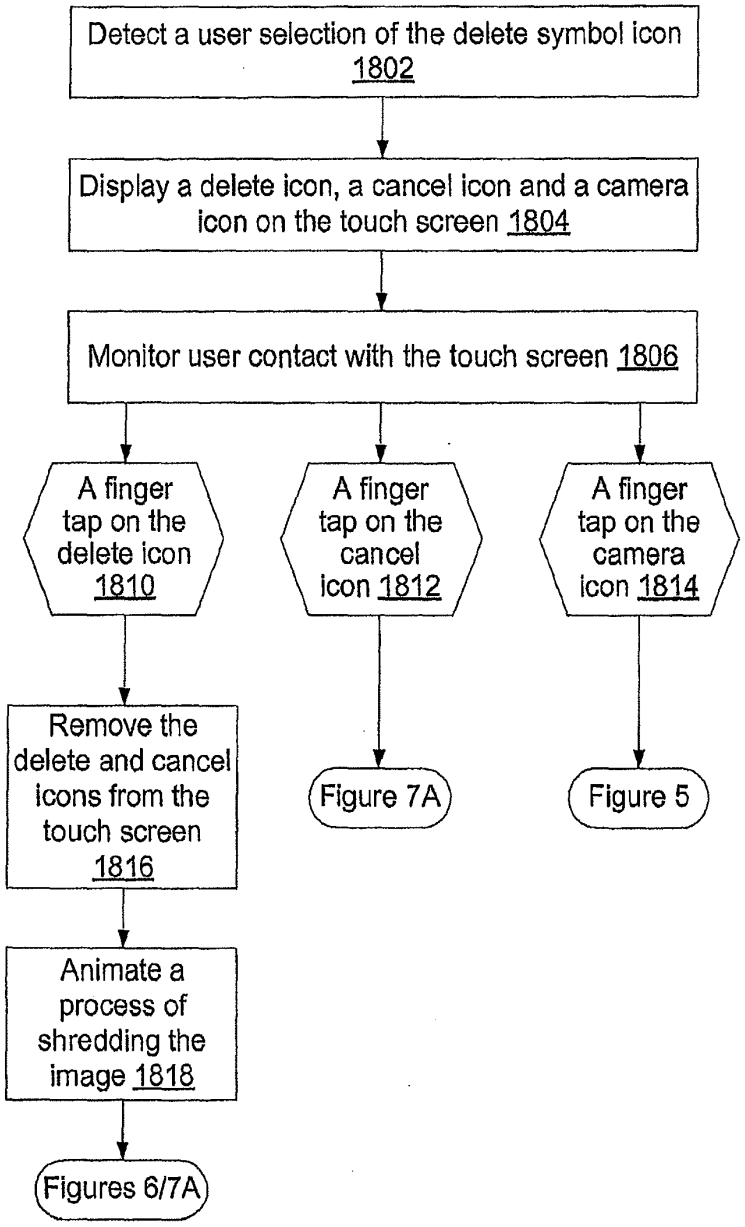


Figure 18

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000386

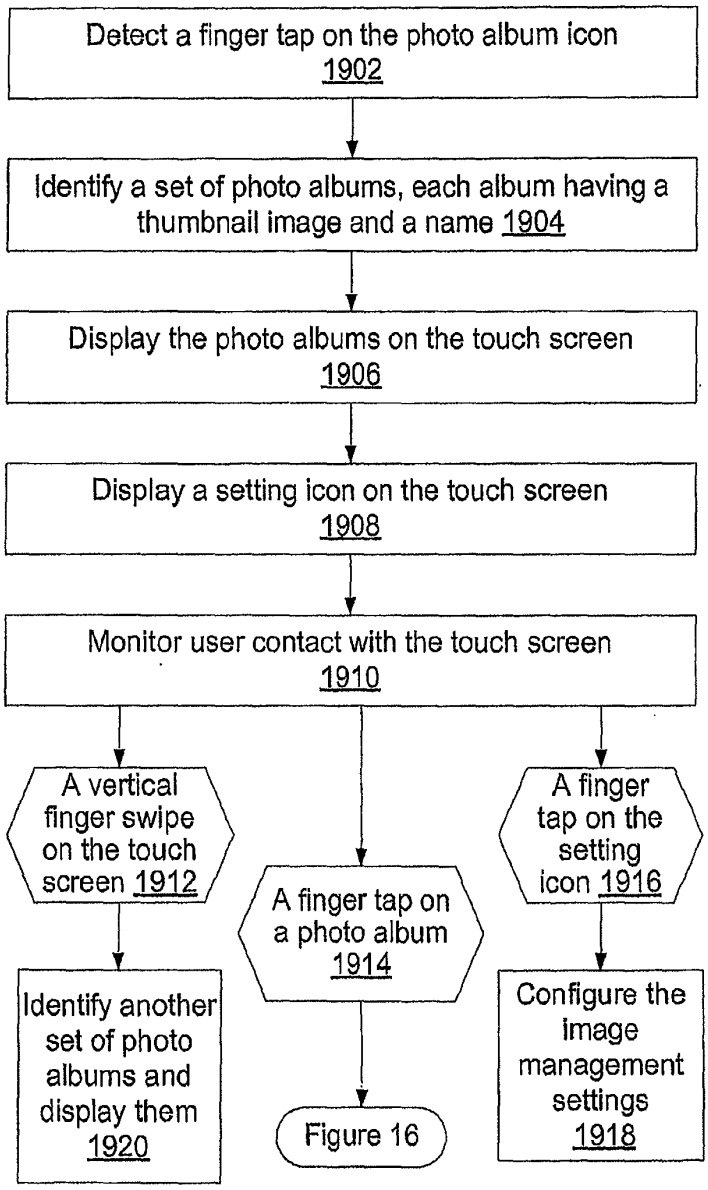


Figure 19

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000387

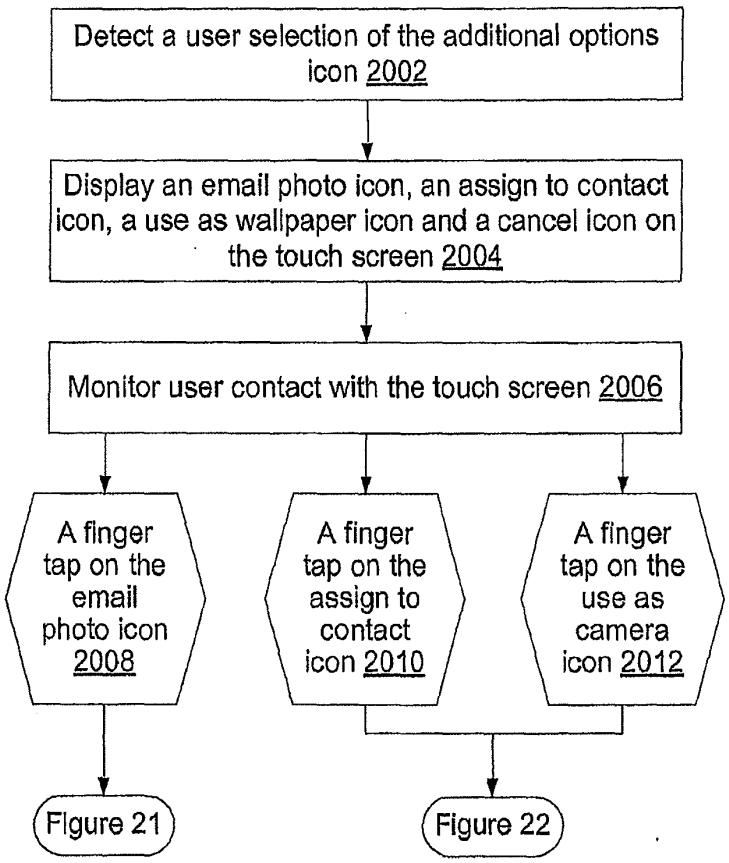


Figure 20

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000388

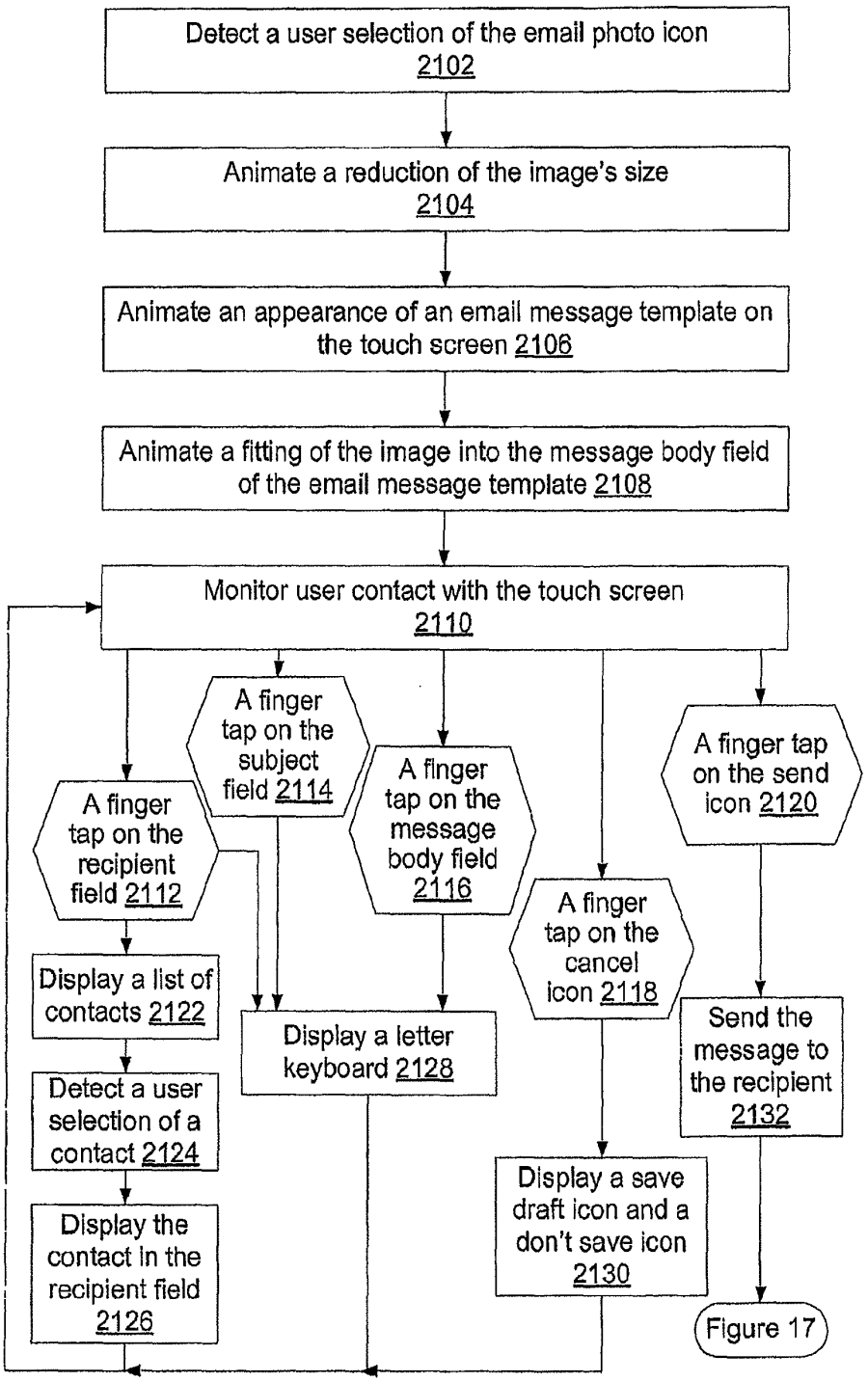


Figure 21

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000389

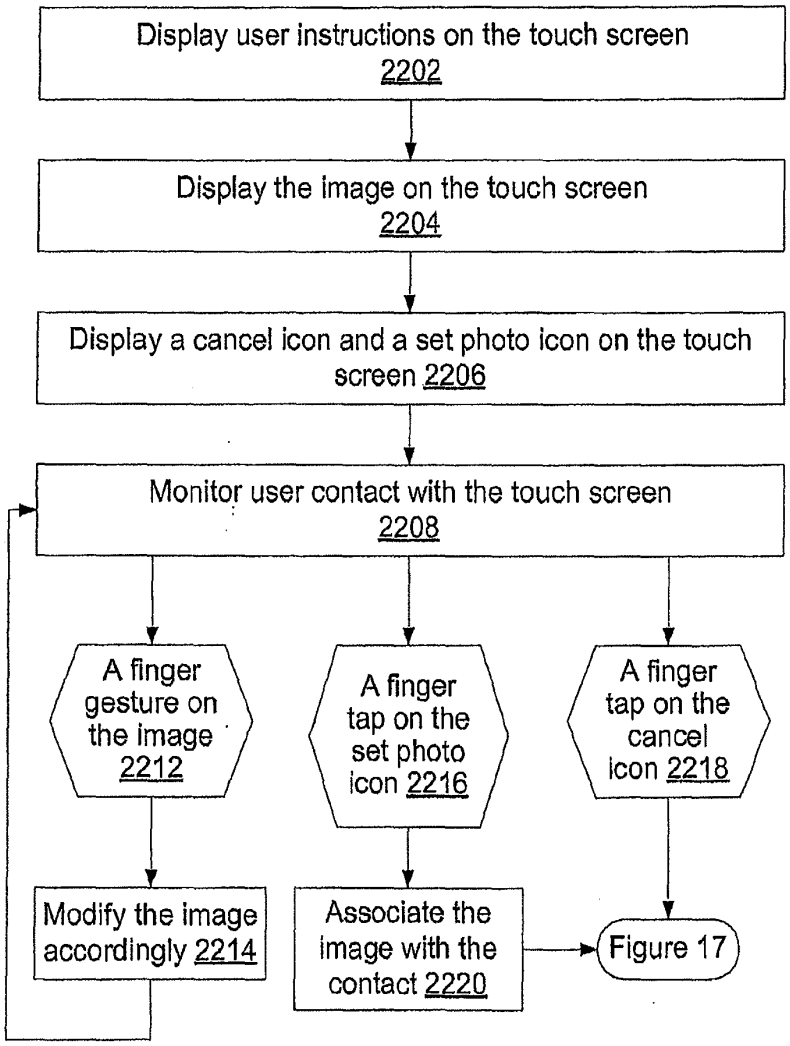


Figure 22

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000390

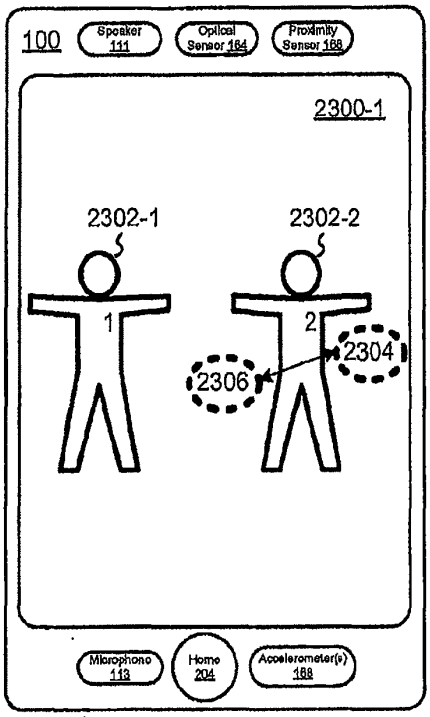


Figure 23A

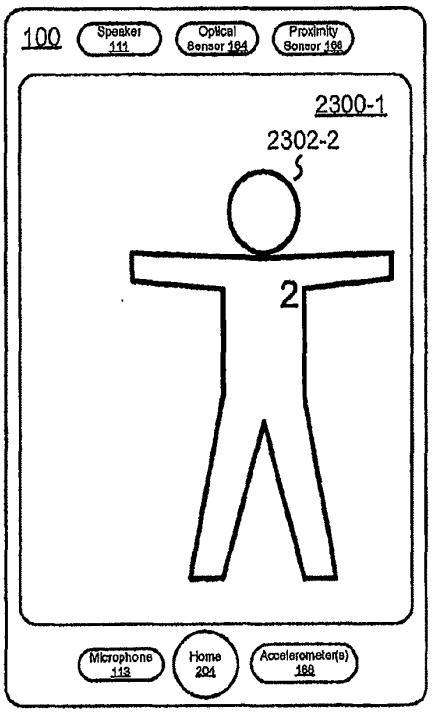


Figure 23B

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000391

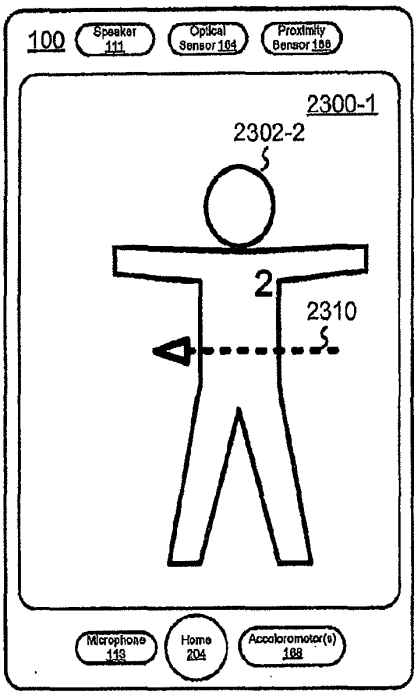


Figure 23C

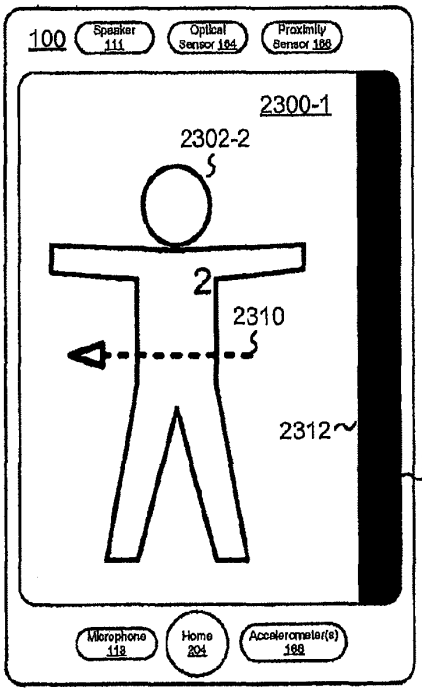


Figure 23D

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000392

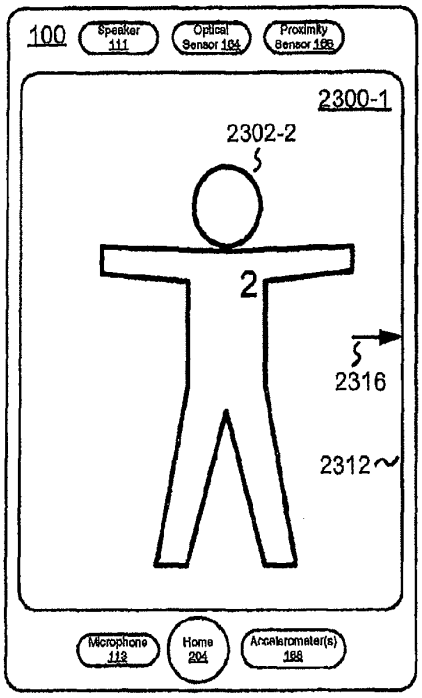


Figure 23E

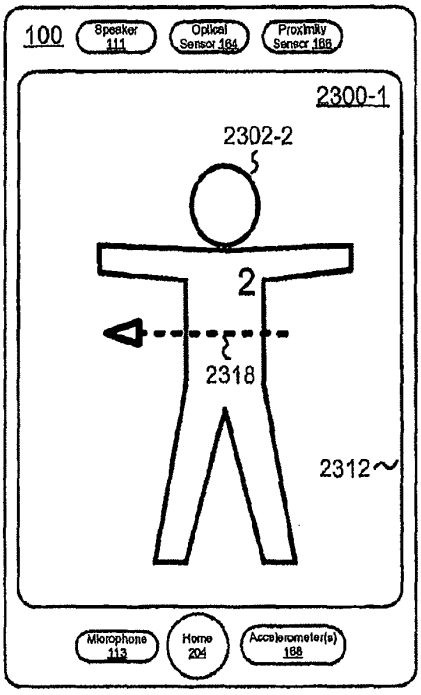


Figure 23F

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000393

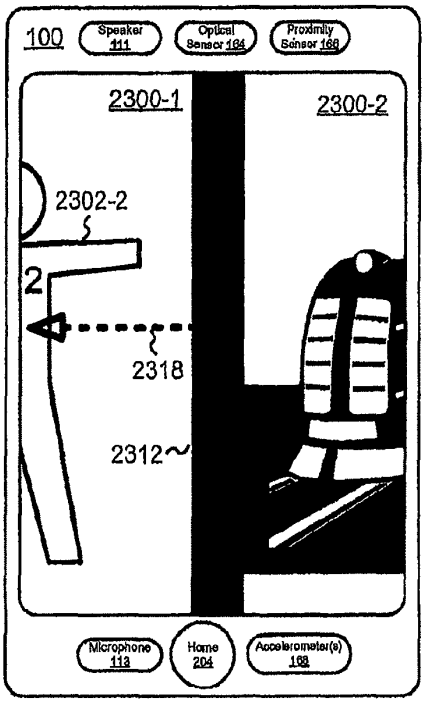


Figure 23G

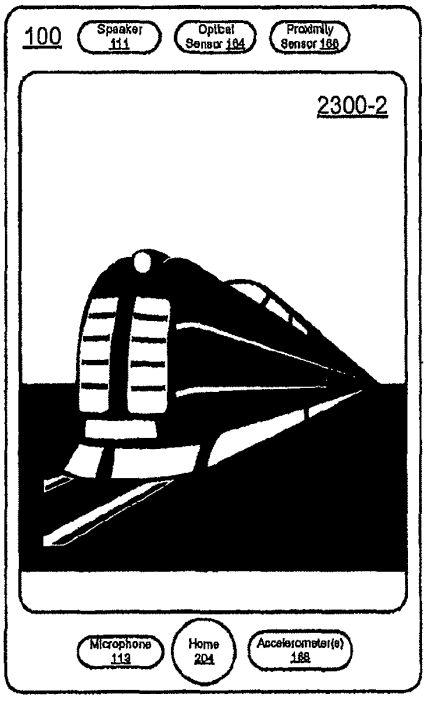


Figure 23H

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000394

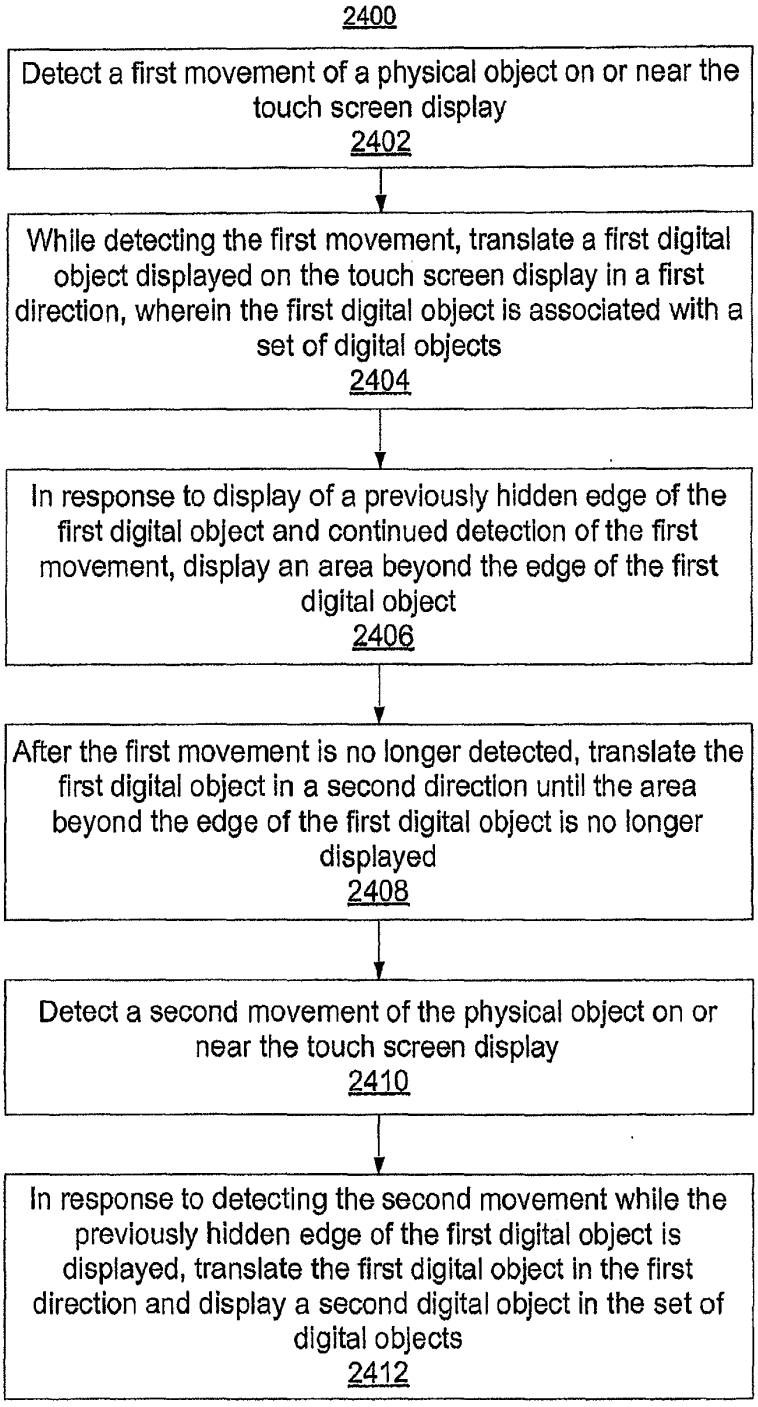


Figure 24

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000395

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European Patent Office
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EUROPEAN SEARCH REPORT

Application Number
EP 10 17 2417

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	WO 03/023593 A1 (MYORIGO OY [FI]; METSAEVAINIO JUKKA-PEKKA [FI]; HARTOJOKI ANNA-LEENA [) 20 March 2003 (2003-03-20) * the whole document *	1-17	INV. G06F17/30
Y	WO 2005/103863 A2 (FUJITSU LTD [JP]; MARVIT DAVID L [US]; ADLER B THOMAS [US]; MATSUMOTO) 3 November 2005 (2005-11-03) * the whole document *	1-17	
A	US 2002/018582 A1 (HAGIWARA YASUJI [JP] ET AL) 14 February 2002 (2002-02-14) * the whole document *	1-17	
A	US 2005/104848 A1 (YAMAGUCHI OSAMU [JP] ET AL) 19 May 2005 (2005-05-19) * the whole document *	1-17	
			TECHNICAL FIELDS SEARCHED (IPC) G06F H04L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	24 December 2010	Rudolph, Stefan

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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1

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Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000396

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 10 17 2417

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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24-12-2010

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EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000397

REFERENCES CITED IN THE DESCRIPTION

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Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000398

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 284 646 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
16.02.2011 Bulletin 2011/07

(51) Int Cl.:
G06F 1/16 *(2006.01)* ***G06F 3/033*** *(2006.01)*

(21) Application number: **10010075.9**

(22) Date of filing: **03.03.2006**

(84) Designated Contracting States:
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(30) Priority: **04.03.2005 US 658777 P**
16.03.2005 US 663345 P

(62) Document number(s) of the earlier application(s) in accordance with Art. 76 EPC:
06737515.4 / 1 877 889

(71) Applicant: **Apple Inc.**
Cupertino, CA 95014 (US)

(72) Inventor: **Hotelling Steven Porter**
Cupertino, CA 95014 (US)

(74) Representative: **Lang, Johannes**
Bardehle Pagenberg
Postfach 86 06 20
81633 München (DE)

Remarks:
This application was filed on 21-09-2010 as a divisional application to the application mentioned under INID code 62.

(54) Multi-functional hand-held device

(57) Disclosed herein is a multi-functional hand-held device capable of configuring user inputs based on how the device is to be used. Preferably, the multifunctional hand-held device has at most only a few physical buttons, keys, or switches so that its display size can be substantially increased. The multifunctional hand-held device also incorporates a variety of input mechanisms, including touch sensitive screens, touch sensitive housings, display actuators, audio input, etc. The device also incorporates a user-configurable GUI for each of the multiple functions of the devices.

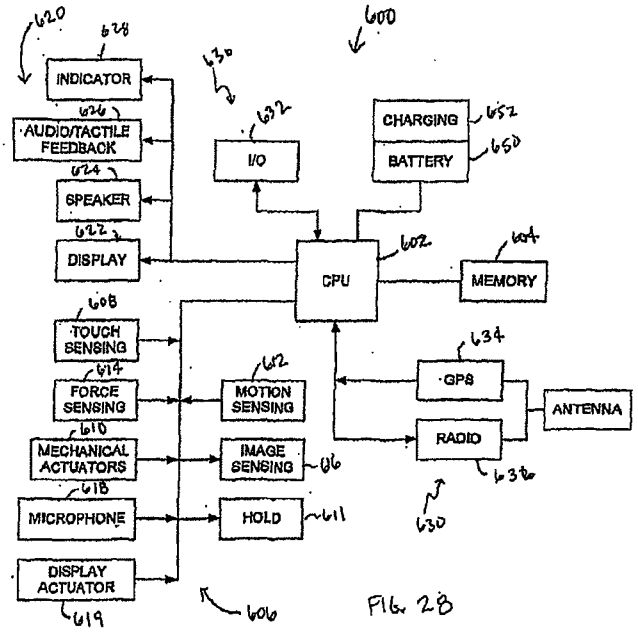


FIG. 28

EP 2 284 646 A1

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000399

Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is related to and claims the benefit of: (1) U.S. Provisional Patent Application No.: 60/658,777, titled "Multi-Functional Hand- Held Device," filed March 4, 2005 and (2) U.S. Provisional Patent Application No.: 60/663,345, titled "Multi-Functional Hand-Held Device/' filed March 16, 2005, each of which is hereby incorporated by reference. [0002] This application is related to the following applications, which are all herein incorporated by reference: (1) U.S. Patent Application No.: 10/188,182, titled "Touch Pad for Handheld Device," filed on July 1, 2002; (2) U.S. Patent Application No.: 10/722,948, titled "Touch Pad for Handheld Device," filed on November 25, 2003; (3) U.S. Patent Application No.: 10/643,256, titled "Movable Touch Pad with Added Functionality," filed on August 18, 2003; (4) U.S. Patent Application No.: 10/654,108, titled "Ambidextrous Mouse," filed on September 2, 2003; (5) U.S. Patent Application No.: 10/840,862, titled "Multipoint Touch Screen," filed on May 6, 2004; (6) U.S. Patent Application No: 10/903,964, titled "Gestures for Touch Sensitive Input Devices," filed on July 30, 2004; (7) U.S. Patent Application No.: 11/038,590, titled "Mode-Based Graphical User Interfaces for Touch Sensitive Input Devices," filed on January 18, 2005; and (8) U.S. Patent Application No.: 11/057,050, titled "Display Actuator," filed on February 11, 2005, (9) U.S. Patent Application 11/115,539, titled "Hand-Held Electronic Device with Multiple Touch Sensing Devices," filed April 26,2005.

BACKGROUND

[0002] There exist today many types of hand-held electronic devices, each of which utilizes some sort of user interface. The user interface typically includes an output device in the form of a display, such as a Liquid Crystal Display (LCD), and one or more input devices, which can be mechanically actuated (e.g., switches, buttons, keys, dials, joysticks, joy pads) or electrically activated {e.g., touch pads or touch screens). The display is typically configured to present visual information such as text and graphics, and the input devices are typically configured perform operations such as issuing commands, making selections or moving a cursor or selector in the electronic device. Each of these well known devices has considerations such as size and shape limitations, costs, functionality, complexity, etc. that must be taken into account when designing the hand-held electronic device. In most cases, the user interface is positioned on the front face (or front surface) of the hand-held device for easy viewing of the display and easy manipulation of the input devices.

[0003] Figs. 1A-1F are diagrams of various hand-held electronic devices including for example a telephone 1OA (Fig. IA), a PDA 1OB (Fig. IB), a media player 1OC (Fig. 1C), a remote control 1OD (Fig. ID), a camera 1OE (Fig. IE), and a GPS module 1OF (Fig. IF). In each of these devices 10, a display 12, which is secured inside the housing of the device 10 and which can be seen through an opening in the housing, is typically positioned in a first region of the electronic device 10. Each of these devices also include one or more input devices 14, which are typically positioned in a second region of the electronic device 10 next to the display 12.

[0004] To elaborate, the telephone 1OA typically includes a display 12 such as a character or graphical display, and input devices 14 such as a number pad and in some cases a navigation pad. The PDA 1OB typically includes a display 12 such as a graphical display, and input devices 14 such as a stylus based resistive touch screen and buttons. The media player 1OC typically includes a display 12 such as a character or graphic display and input devices 14 such as buttons or wheels. The iPod (R) media player manufactured by Apple Computer, Inc. of Cupertino, California is one example of a media player that includes both a display and input devices disposed next to the display. The remote control 1OD typically includes an input device 14 such as a keypad and may or may not have a character display 12. The camera 1OE typically includes a display 12 such as a graphic display and input devices 14 such as buttons. The GPS module 1OF typically includes a display 12 such as graphic display and input devices 14 such as buttons, and in some cases a joy pad.

[0005] Recently, traditionally separate hand-held electronic devices have begun to be combined in limited ways. For example, the telephone 1OA has been combined with the PDA 1OB. One problem that has been encountered is in the way inputs are made into the device. Each of these devices has a particular set of input mechanisms for providing inputs into the device. Some of these input mechanisms are generic to all the devices {e.g., power button) while others are not. The ones that are not generic are typically dedicated to a particular functionality of the device. By way of example, PDAs typically include four dedicated buttons while cell phones typically include a numeric keypad and at least two dedicated buttons. [0007] Thus it is a challenge to design a merged device with limited input devices without adversely affecting the dedicated inputs for each device. As will be appreciated, it is preferable, not to overload the hand-held devices with a large number of input mechanisms as this tends to confuse the user and take up valuable space, i.e., "real estate." In the case of hand-held devices, space is at a premium because of their small size. At some point there is not enough space on the device to house all the necessary buttons and switches, etc. This is especially true when considering that all these devices need a display that typically takes up a large amount of space on its own. To increase the number of input devices beyond some level, designers would have to decrease the size of the display. However, this will often leave a negative impression on the user because the user typically desires the

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000400

largest display possible. Alternatively, to accommodate more input devices designers may opt to increase the size of the device. This, too, will often leave a negative impression on a user because it would make one-handed operations difficult, and at some point, the size of the device becomes so large that it is no longer considered a hand-held device. [0008] Therefore what is needed in the art is an improved user interface that works for multi-functional hand-held devices.

SUMMARY

[0006] Disclosed herein is a multi-functional hand-held device capable of configuring user inputs based on how the device is to be used. Preferable, the multi-functional hand-held device has at most only a few physical buttons, keys, or switches so that its display size can be substantially increased. In other words, by eliminating physical buttons, keys, or switches from a front surface of an electronic device, additional surface area becomes available for a larger display. Ultimately this strategy would allow a substantially full screen display. As used herein, a full screen display is a display that consumes, or at least dominates, a surface (e.g., front surface) of an electronic device.

[0007] Various embodiments of a multi-functional hand-held device are discussed below with reference to Figs. 2-28. However, those skilled in the art will appreciate that the detailed description given herein with respect to these figures is exemplary and not exhaustive and that many variations on these embodiments are possible.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The invention may best be understood by reference to the following description taken in conjunction with the accompanying drawings in which:

Figs. 1A-1F are diagrams of various electronic devices. [0013] Fig. 2 is a simplified diagram of a multi-functional hand-held device.

Fig. 3 is a perspective view of a substantially full screen handheld device with a limited number of limited buttons.

Fig. 4 is a front view of a hand-held device with at least one button.

Fig. 5 is a diagram of a GUI separated into a standard region and a control region.

Fig. 6 is a diagram of a GUI separated into a standard region and a control region.

Fig. 7 is a diagram of a GUI separated into a standard region and a control region.

Fig. 8 is a diagram of a GUI separated into a standard region and a control region.

Fig. 9 illustrates an exemplary a GUI for a PDA.

Fig. 10 illustrates an exemplary GUI for a cell phone.

Fig. 11 illustrates an exemplary GUI for a media player.

Fig. 12 illustrates an exemplary GUI for a video player.

Fig. 13 illustrates an exemplary GUI for a game player.

Fig. 14 illustrates an exemplary GUI for a camera.

Fig. 15 illustrates an exemplary GUI for a GPS.

Fig. 16 illustrates an exemplary GUI for a remote control.

Fig. 17 illustrates an exemplary GUI for a hand top.

Fig. 18 illustrates an exemplary GUI for a main menu of a multifunctional hand held device.

Fig. 19 is a side elevation view, in cross section, of a hand-held device incorporating a force sensitive display.

Fig. 20 illustrates an input device that combines touch sensing and force sensing devices to provide x, y and z components when touched.

Fig. 21 is a side elevation view of an I/O device that combines a display with touch screen and a force sensing mechanism.

Fig. 22 is a side elevation view of an input device.

Fig. 23 is a side view, in cross section, of a hand-held device that incorporates a squeeze feature.

Fig. 24 is a side view, in cross section, of a hand-held electronic device.

Fig. 25 is a block diagram of a touch sensing method.

Fig. 26 is a block diagram of touch sensing method.

Figs. 27A-E are tables representing one example of a touch vocabulary associated with a music player.

Fig. 28 is a block diagram of an exemplary multi-functional hand-held device.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000401

DETAILED DESCRIPTION

I. MULTI-FUNCTIONALITY

[0009] Electronic device manufacturers have discovered the advantages of combining separate hand-held electronic devices to form multi-function devices. By having a single multi-function device, a user is not burdened with carrying, purchasing, and maintaining multiple devices. Further, the user is not limited in the operations that can be performed, i.e., the user can perform different operations with a single device that would have otherwise required the use of a different devices.

[0010] As used herein, the term "multi-functional" is used to define a device that has the capabilities of two or more traditional devices in a single device. The multi-functional device may, for example, include two or more of the following device functionalities: PDA, cell phone, music player, video player, game player, digital camera, handtop, Internet terminal, GPS or remote control. For each new device functionality that is added to a single device, the complexity and size of the device tends to increase. Therefore, with hand-held devices, there is typically a trade-off between beeping the footprint small and complexity low while still maximizing the functionality of the device.

[0011] In some cases, combing devices may result in redundant hardware components, which allows components to be used for multiple different, device functionalities. In other cases, certain hardware components are distinct to each device and therefore additional space and connectivity must be made available. Furthermore, each device functionality typically has its own programming or application software and, therefore, the multi-function device must be designed with enough memory to accommodate all the various software components.

[0012] A personal digital assistant (PDA) is a mobile hand-held device that provides computing and information storage and retrieval capabilities for personal and/or business use. PDAs are severally capable of tracking names, addresses, phone numbers and appointments. They are also often capable of taking notes, performing calculations, paging, data messaging, and electronic mail. PDAs may also include functionality for playing simple games, music, and other media files. Examples of PDAs include the Palm Pilot and Blackberry.

[0013] Like most hand-held devices, PDAs typically include a display and various input devices. The input devices may include a stylus and touch screen that work in combination with a handwriting recognition program, keypads, mini-keyboards, navigation pads, and/or soft or fixed function buttons.

[0014] Cell phones are mobile telephones that allow a user to connect to other telephones using a cellular network. Cell phones typically include a transceiver for transmitting and receiving telephone calls, controls such as a navigation pad for traversing through a display, a keypad for making numeric entries (and in some cases alphabetic entries), and soft or fixed function buttons. For example, in many cell phones one fixed function button is used for starting a call and another fixed function button is used for ending a call.

[0015] Media players come in a variety of forms. Music players are generally configured to store, process and output music. Music players can be based on the MP3 or AAC format, which is a compression system for music. Music Players typically include a microprocessor, memory, display, audio jack, data port and playback controls. The playback controls typically include features such as menu, play/pause, next, previous, volume up, and volume down. Video players are similar to music players in most respects. In some cases, they may include a data storage device for receiving a removable storage medium such as a DVD. The iPod(R) media player manufactured by Apple Computer, Inc. of Cupertino, California is one example of a media player.

[0016] Handtops are general purpose computers similar to laptops, but in a smaller form factor. Handtops typically include a display and a full keyboard.

[0017] Fig. 2 is a simplified diagram of a multi-functional hand-held device 100. The multi-functional hand-held device 100 integrates at least two devices 102 into a single device. Each device 102 includes both hardware and software components 104 and 106, which are integrated into multifunctional hand-held device 100. It should be pointed out that the multifunctional hand-held device 100 is not limited to only two devices, and may in fact integrate any number of devices.

[0018] Multi-functional device 100 also includes switch 110, which that allows multi-functional device 100 to be switched from one device operating mode to another device operating mode. For example, switch 110 may allow a user to cycle through cell phone, media player, and PDA modes of operation. Once a particular operating mode is selected, the multi-functional device 100 operates as the selected device. For example, the programming related to the selected device is activated for use by the multi-functional hand-held device. The programming may include reconfiguring the UI based on the selected device so that the inputs made by the user correlate to the device in use. For example, the functions of any physical buttons, switches or dials as well as soft buttons, switches or dials can be reconfigured to correspond to the selected device.

[0019] However, the operating modes of multi-functional hand-held device 100 need not completely independent. In many cases, it will be desirable to allow the multiple functionalities to interact with each other. For Example, a user may look up a telephone number of a contact in the PDA and pass this number to the phone to be dialed.

II. FORM FACTOR

[0020] The form factor of a hand-held device is generally a device that can easily be held in one hand. A typical

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hand-held device includes a small display in an upper portion of the front surface of the device and input controls in a lower portion of the front surface of the device. The device may additionally include controls and ports on the top, bottom, and side surfaces. Prior art hand-held devices have typically had small displays which causes some dissatisfaction for users of these devices. It is generally preferred to have larger displays so that more information can be displayed or the information being displayed can be more easily viewable (e.g., larger text). In the case of video players and game players in particular, larger displays are much preferred over smaller ones.

[0021] However, the use of large displays has been limited in the past because the required input controls often take up substantial portions of the available space. Furthermore, as device functionality converges, the number of controls on the device typically increases as each device includes its own dedicated controls. Therefore devices must be made larger or the displays must be smaller to accommodate all the new controls. Both of these outcomes are unsatisfactory. Larger devices are bulky and hard to use, and smaller screens are difficult to utilize for both relaying information and reading information from the screen.

A. ONE-HANDED VS. TWO-HANDED OPERATION

[0022] A hand-held electronic device may be directed at one-handed operation or two-handed operation. In one-handed operation, a single hand is used to both support the device as well as to perform operations with the user interface during use. Cellular phones and media players are examples of hand-held devices are generally intended to can be operated solely with one hand. In the case of a cell phone, for example, a user may grasp the phone in one hand between the fingers and the palm and use the thumb to make entries using keys, buttons or a # joy pad.

[0023] In two-handed operation, one hand is used to support the device while the other hand performs operations with a user interface during use or, alternatively, both hands support the device as well as perform operations during use. PDA's and game players are examples of hand-held device that are typically operated with two hands. In the case of a PDA, for example, the user may grasp the device with one hand and make entries using the other hand, for example, using a stylus. In the case of a game player, the user typically grasps the device in both hands and make entries using either or both hands while holding the device.

B. FOOTPRINT/SIZE

[0024] Hand-held devices may have a variety different footprints or sizes. The footprint is typically associated with how the device is going to be used. Devices such as PDAs are typically used with both hands and thus they tend to be larger. Alternatively, cell phone handsets are typically used with only one hand, and thus they tend to be smaller. When integrating multiple devices, it is important task to determine the appropriate footprint of the device. For example, some believe that PDAs are too large for phone use while cell phones are too small for PDA use. Designers generally must consider the primary use of the device and gear the footprint towards that use. Although there are different footprints, there are typically minimum and maximum footprints. If the footprint is too large or too small, the device may be difficult to use.

[0025] Because of their size, the smaller devices are typically placed in a pocket while the larger devices are not. A media player is one example of a hand-held device that is sized for placement into a pocket of the user. By being pocket-sized, the user does not have to directly carry the device and therefore the device can be taken almost anywhere the user travels (e.g., the user is not limited by carrying a large, bulky and often heavy device, as in a laptop or notebook computer). Generally it is preferred, although not necessary, that hand-held devices of the type disclosed herein have dimensions of about 5 in x 3 in x 1 in and perhaps about 4.1 in x 2.4 in x 0.75 in.

C. FULL SCREEN DISPLAY

[0026] Because the footprint of a multifunctional hand-held device is substantially fixed by the intended primary use of the device, it becomes important for designers to determine an appropriate layout for the UI. For example, some devices may work better with a limited number of buttons and a large display while others may work better with a large number of buttons or a complete keyboard and a small display.

[0027] A preferred multi-functional hand-held device may be configured with a full screen display or a near full screen display. A full screen display consumes substantially the entire front surface of the device. The display may extend edge to edge or may fit within a small bezel of the housing at the edge of the device. The full screen display may consumes 90% or more of a front surface of a housing for a hand-held electronic device.

[0028] The full screen display may have a variety of different configurations depending on the overall footprint of the device. If the device is wide, the full screen display may have a traditional aspect ratio of about 4:3. If the device is elongated, the full screen display may have an aspect ratio that is more panoramic such as 16:9.

D. LIMITED NUMBER OF MECHANICAL ACTUATORS

[0029] To accommodate a full screen display, the multi-functional hand-held device is preferably configured with a limited number of physical buttons. Because a limited number of physical buttons are provided, the hand-held device preferably uses a touch screen as the primary input device. Touch screens are transparent touch sensing devices that are positioned over displays. They typically work in conjunction with a GUI presented on the

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000403

display. For example, the GUI may present an on-screen button, and the touch screen may detect when a user presses the on-screen button {e.g., places their finger or stylus over the on-screen button). Touch screens and GUI's are described in greater detail below.

[0030] The hand-held device may be constructed with only cross- functional physical buttons, i.e., there are no buttons dedicated to individual devices. These type of buttons may include power buttons and hold switches. In another embodiment, the hand-held device may not include any physical buttons at all. In some embodiments, the physical buttons are limited to only the sides and back surface of the hand-held device. In other embodiments, the physical buttons of the hand-held device are limited to the upper and lower portion of the sides so that there are no buttons in the regions of the sides where a user would physically support the device {i.e., holding region). In still other embodiments, the physical buttons may be located on the front surface, but only in the bezel region surrounding the display. In some embodiments, the buttons may be located on only the top and bottom surfaces of the device.

[0031] Fig. 3 is a perspective view of a substantially full screen multifunctional hand-held device 120 with a limited number of buttons. There are no physical buttons on the front and side surfaces 124 and 126. The front surface is used entirely for the display 122. Further, because the sides 126 are used for grasping the device 120 it may be preferred to leave the sides free from buttons to prevent accidental actions in the event a user inadvertently presses a button while supporting the device. Although the top surface 128 and bottom surface 13 O would not typically be used to hold the device, these surfaces are not ideal locations for buttons that are often actuated because it would be awkward to reach these buttons when operating the device with one hand.

[0032] The top surface 128 may be reserved for buttons that have limited action and generic functions that are cross-functional, for example, power and hold switches. The top and bottom surfaces 128 and 130 are also well suited for placement of I/O and communication ports. The top surface 128 may, for example, include a headset/microphone jack and an antenna, and the bottom surface 130 may include power and data ports. [0065] In some cases, it may be desirable to place buttons in the upper or lower regions of the side surfaces 126 out of the way of the grasping hand. This may be particularly well suited for elongated devices that are larger than the width of the grasping hand. As shown in Fig. 4, the hand-held device 120 includes a button 140 in the upper region on the side surface 126 of the hand-held device 120. Because the button 140 is in the upper region, it tends to be out of the way of the grasping hand and therefore accidental activation is substantially eliminated. The upper button may be configured to switch the functionality of the multi-functional device i.e., button 140 may be switch 110 of Fig.2. For example, by pressing the button 140, a new device functionality is activated, and the current device functionality is deactivated. Although the term button is used, it should be appreciated that the button 140 may correspond to a dial, wheel, switch and/or the like.

[0033] Generally it would be preferred, although not required, to limit the number of physical buttons to eight or fewer, and perhaps five or fewer. in. ADAPTABL[Pi] [Upsilon]

[0034] To limit the number of physical controls on the device (thereby maximizing the display area), the multi-functional hand-held device is preferable adaptable, i.e., the device is capable of changing its UI based on how the device is to be used. For example, if a cell phone functionality of the multi-functional device is to be used, the UI changes to accommodate the cell phone. Alternatively, if the PDA aspect of the multi-functional device is to be used, the UI changes to accommodate the PDA, etc. In essence, the multifunctional device is capable of reconfiguring its user interface based on the state or mode of the device.

[0035] Adaptability may be accomplished by reassigning the functions of the limited number of physical buttons for each device functionality. For example, a button may perform one function when a first device is activated and another when another device is activated. While this may work, it suffers from physical limitations {i.e., the number of buttons) and can be confusing to the user (who must keep track of different button meanings).

[0036] Alternatively adaptability may be accomplished by virtually incorporating the physical inputs for each functionality into the GUI in conjunction with a touch screen. This allows the GUI to adapt to whatever device is selected, and the touch screen can receive inputs corresponding to the GUI. With a GUI for each functionality, the UI for the hand-held device adapts such that the multi-function device, in effect, becomes a particular device. For example, if the cell phone functionality is selected, the GUI presents a set of virtual or soft controls that look similar to the physical controls typically used on a cell phone, such as a keypad, function buttons and possibly a navigation pad, for example.

[0037] The entire display may be used to present this information, or only a portion of the display may be used for the GUI controls. In the later case, referring to Figs. 5-8, the GUI 150 may be separated into a standard region 152 and a control region 154. The standard region 152 represents what would normally be displayed on the display 122 when using a particular device. That is, the standard GUI screens associated with the selected device are displayed in the standard region. For example, in the case of the PDA, a main menu (window with a set of icons), calendar, address book or date book may be displayed in the standard region 152. The control region 154, on the other hand, virtually represents the physical controls that would normally be physically placed on a particular device. That is, the virtual controls that mimic the physical controls are displayed in the control region 154. For example, in the case of the PDA, the control

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000404

region 154 may include virtual representations of a hand writing recognition area, a navigation pad and the standard function buttons.

[0038] The standard and control regions 152 and 154 can be positioned at any position on the display 122 (top, bottom, sides, center, etc.). For example, as shown in Fig. 5, they may be positioned vertically relative to one another (one on top of the other) or as shown in Fig. 6, they may be positioned horizontally relative to one another (side by side). These configurations can be used in either portrait or landscape modes. By way of example, in cases where the device is operated in landscape mode, thestandard region 152 may be placed on one side and the control region may be placed on the opposite side. Landscape orientation may, for example, facilitate one handed operation. In some cases, the side on which the controls are displayed is based on the handedness of the user. For example, the controls may be place on the right side for right-handed users, and the controls may be placed on the left side for left-handed users. Alternatively, the controls may be placed on both sides as shown in Fig. 7. This arrangement is particularly well suited for game playing. Furthermore, the amount of area dedicated to each portion may be widely varied. For example, the screen may be divided equally and in other cases one or the other portion constitutes a greater amount of the display. In some cases, the standard region 154 is maximized to increase the normal viewing area of the display.

[0039] When a particular functionality is selected for use, the hand-held device loads the software for the selected functionality and configures the GUI 150 including the standard region 152 and the control region 154. The controls in the control region 154 can therefore be used to control whatever is being shown in the standard region 152. In some cases, the control region 154 may even change in accordance with the needs of each displayed window for the particular device.

[0040] Alternatively, as shown in Fig. 8, virtual controls 160 may be overlaid on top of the standard region 152 so that the standard region 152 can fully utilize the entire display 122. In fact, the virtual controls 160 may appear and disappear as needed. For example, the user may touch the screen and this may drive the device to display the controls over a portion of the display including whatever is already displayed. Examples of virtual controls that operate in this manner can be found in U.S. Patent Application No.: 11/038,590, titled "Mode-Based Graphical User Interfaces for Touch Sensitive Input Devices," filed on January 18, 2005.

A. GUI BASED ON FUNCTIONALITY

[0041] Figs. 9-17 illustrate various examples of GUIs for different states or modes of the multi-functional device.

[0042] Fig. 9 is a diagram of a GUI 170 that is used in a PDA mode. As shown, the GUI is divided into a standard region 152 and a control region 154. Located inside the control region 154 are a virtual handwriting pad 172, four virtual buttons 174 and a virtual navigation pad 176.

[0076] Fig. 10 is a diagram of a GUI 180 that is used in a cell phone mode. As shown, the GUI 180 is divided into a standard region 152 and a control region 154. Located inside the control region 154 are a virtual keypad 182, a virtual navigation pad 184 and two virtual buttons 186.

[0043] Fig. 11 is a diagram of a GUI 190 that is used in a music player mode. As shown, the GUI 190 is divided into a standard region 152 and a control region 154. Located inside the control region 154 are a virtual scroll wheel 192 and five virtual buttons 194. Additional details on a virtual scroll wheel are provided in U.S. Patent Application No.: 11/038,590, titled "Mode- Based Graphical User Interfaces for Touch Sensitive Input Devices," filed on January 18, 2005.

[0044] Fig. 12 is a diagram of a GUI 200 that is used in a video player mode. As shown, the GUI 200 is divided into a standard region 152 and a control region 154. Located inside the control region 154 are a plurality of virtual buttons 202. Alternatively, the controls may appears and disappears as needed since the video player is primarily used in conjunction with a full screen viewing mode.

[0045] Fig. 13 is a diagram of a GUI 210 that is used in a game player mode. As shown, the GUI 210 is divided into a standard region 152 and two control regions 154A and 154B on the sides of the standard region 152. The left side control region 154A includes a navigation or directional pad 212, and the right side control region includes four virtual buttons 214 (or vice versa depending on the users particular needs, left or right handed).

[0046] Fig. 14 is a diagram of a GUI 220 that is used in a camera mode. As shown, the GUI 220 is divided into a standard region 152 and a control region 154. The standard region 152 may represent the view finder. Located inside the control region 154 are various buttons 222 including for example picture click, zoom, flash, etc. A navigation pad 224 may also be included so that the pictures can be scrolled through or for menu navigation.

[0047] Fig. 15 is a diagram of a GUI 230 that is used in a GPS receiver mode. As shown, the GUI 230 is divided into a standard region 152 and a control region 154. Located inside the control region 154 are various buttons 222 including for example zoom, pan, etc. A navigation pad 224 may also be included.

[0048] Fig. 16 is a diagram of a GUI 240 that is used in a hand top mode. As shown, the GUI 240 is divided into a standard region 152 and a control region 154. Located inside the control region 154 is a virtual keyboard 242.

[0049] Fig. 17 is a diagram of a GUI 250 that is used in a remote control mode. As shown, the GUI 250 is divided into a standard region 152 and a control region 154. Located inside the control region 154 are various keys and buttons 252 associated with controlling a remote device such as a TV, DVD player, A/V amplifier, VHS, CD player, etc.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000405

B. SWITCHING BETWEEN DEVICES (GUI)

[0050] Before a particular device functionality can be used, it typically must be selected for use. The selection can come in a variety of forms. For example, the selection may be made via a main menu that includes soft buttons or icons that, when selected, activate the device functionality associated with the soft button. During activation, the GUI for that particular device is brought into view on the display (see Figs. 9-17) and the software associated with the device is installed, loaded or activated. From that point on, the multi-functional device operates like the selected device.

[0051] Fig. 18 illustrated an exemplary main menu GUI 260 of a multifunctional device. As shown, the GUI 260 includes icons/buttons 262 for launching each of the various device functionalities. In this particular example, the main menu page 260 includes a PDA button 262A, a cell phone button 262B, a music player button 262C, a game player button 262D, a video player button 262E, a GPS button 262F, a remote control button 262G, a camera button 262H and a handtop button 2621. The various buttons 262 are virtual buttons. When a button is pressed, the main page for the selected functionally {e.g., as shown in Figs. 9-17) is brought into view on the display. To select another device, the user simply selects a soft home button 264 located in the GUI of each device to return to the main menu page 260, and thereafter selects the desired functionality in the main menu page 260. [0086] The selection of alternative functionalities may also be accomplished by flipping (or scrolling) through the various GUIs until the desired GUI is found. For example, the different GUIs may be incrementally brought into view page after page (or frame after frame) when a next (flip) command signal is generated (e.g., slide show effect). The transition between pages may be widely varied. The transition may be from side to side, top to bottom or center to center. The transition may also include fading in and out, popping in and out, or enlarging and reducing. The command signal may be generated by a physical or virtual button or wheel. Using a button, each press may cause a new page to be displayed. Using a wheel, a predetermined amount of rotation may cause a new page to be displayed.

[0052] The command signal may also be generated in a variety of other ways. For example, the command signal may also be generated by gestures initiated on the touch screen. For example, sliding a finger (or stylus) across the display may cause a new page to be displayed. If slid to the right, the next page may be displayed. If slid to the left, the previous page may be displayed. The command signal may also be generated by 3D device gestures created when the entire hand-held device is moved spatially. By way of example, shaking the device may cause a new page to be displayed.

[0053] The command signal may also be generated by forces that are applied to the device. By way of example, squeezing the device may cause a new page to be displayed. The command signal may also be generated by sensing the orientation of the device either relative to the ground, as sensed by accelerometers, or relative to a compass direction indicated by an internal compass. For example, if the device is at 0 degrees, a first page is displayed, at 90 degrees a second page is displayed, at 180 degrees a third page is displayed and at 270 degrees a fourth page is displayed. [0089] . The command signal may also be generated by monitoring a user's voice {i.e., voice recognition). If the user calls out "PHONE," the page associated with the phone is displayed, if the user calls out "PDA," the page associated with the PDA is displayed.

[0054] The command signal may also be generated by monitoring incoming signals from other systems (whether transmitted wirelessly or via a cable). For example, if a call is received, the device may automatically configure the system as a phone. Alternatively, it may only present a control panel for taking or passing on the call.

[0055] As an alternative to integrating functionalities, the device may be configured to keep the various modes separate. That is, the device does not merge the functionality together (integrated layers and GUIs), but instead keeps them distinct from one another. In some cases, by keeping different functionalities distinct, user confusion may be reduced.

C. OPERATING AT LEAST TWO FUNCTIONALITIES SIMULTANEOUSLY

[0056] Preferably, the user may be able to activate two or more device functionalities simultaneously. In such a case, the software for the multiple functionalities is activated simultaneously and the display operates in a split screen mode where the screen is parsed into different sections, each section including a particular device GUI. Generally this would require the GUI for each functionality to fit on the screen. The multi-function mode may be selected in a variety of ways. In one implementation, when the user simultaneously touches two or more device icons, the device activates the multiple device functionalities and brings the appropriate GUIs into view on the screen.

D. CONFIGURABLE GUI (USER PREFERENCES)

[0057] The GUI control panels for each device functionality may be configurable by the user. For example, the user may design or customize his own UI for each device, and assign functions to the various elements of the UL The functions may include initiating commands, selecting an item, opening a file or document, launching a program, executing instructions, viewing a menu on the display screen, etc. The parameters configurable by the user may include selecting the number and type of GUI elements (buttons) as well as the location of the GUI elements on the page. In some cases, the system may

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include a design palette that allows a user to review and/or customize the UI layout, i.e., the user may quickly and conveniently review preconfigured or default layout and make changes thereto. Once changed, the modified layout will be automatically saved and thereby employed to handle future events.

IV. INPUT DEVICES

[0058] There are a number of problems with current input devices for hand-held computers. For example, there is no realistic way to fit all the dedicated physical buttons that are needed for each device because more and more buttons must be fit into a small space. A related problem arises in that as more physical buttons are incorporated into the device, the buttons must get closer together thereby challenging the dexterity of the user. Furthermore, because physical buttons stick out they are often accidentally activated during normal use or while the device is transported e.g., in a user's pocket. Finally, large numbers of small physical buttons can be confusing to the user as well as aesthetically unpleasing.

[0059] To overcome these and other problems a variety of alternative inputs arrangements are proposed (in addition to or in place of physical buttons, switches, etc.). The basic idea is to reduce the number of physical and mechanical input mechanisms (and therefore the amount of dedicated space needed on the surface of the device) and/or eliminate the physical and mechanical input mechanisms altogether. By reducing or eliminating the physical input devices, the display of the electronic device can be maximized, or alternatively the size of the electronic device can be minimized. Furthermore, such a device is more aesthetically pleasing. In some cases, the hand-held device can be configured so that it appears to only have a display and no dedicated physical input devices.

[0060] The alternative input means may also be hidden from view such~ that they are not visible to the user. As a result, the hand-held electronic device may appear to only have a display with no visible buttons, switches, etc. Such a device is more aesthetically pleasing (e.g., may comprise smooth surfaces with no breaks gaps or lines), and, in many cases, can be made smaller without sacrificing screen size and input functionality.

A. TOUCH SCREEN

[0061] One particularly suitable input arrangement is a touch screen. A touch screen in conjunction with GUI may be configured as the primary input arrangement for a hand-held device. A touch screen is basically a transparent input panel positioned in front of the display. A touch screen generates input signals when an object such as a finger or stylus touches or is moved across the surface of the touch screen. In most cases, touch screens allow a user to make selections and initiate movements in a GUI by simply touching the display screen via a finger. For example, a user may make a selection by pointing directly to a graphical object displayed on the display screen. Corresponding to an on-screen button for performing specific actions in the hand-held electronic device. In general, the touch screen recognizes the touch and position of the touch on the display and a controller of the handheld electronic device interprets the touch and thereafter performs an action based on the touch event. There are several types of touch screen technologies including resistive, capacitive, infrared and surface acoustic wave.

[0062] A preferred touch screen for a multi-functional hand-held computer is a multipoint capacitive touch screen. Such a touch screen comprises several independent and spatially distinct sensing points, nodes, or regions that are positioned throughout the touch screen. The sensing points are dispersed about the touch screen with each sensing point representing a different position on the surface of the touch screen. The sensing points may be positioned in a grid or a pixel array where each sensing point is capable of generating a signal. A signal is produced each time an object is positioned over a sensing point. When an object is placed over multiple sensing points or when the object is moved between or over multiple sensing point, multiple signals can be generated. The sensing points generally map the touch screen plane into a coordinate system such as a Cartesian coordinate system or polar coordinate system. One example of such a touch screen is disclosed in U.S. Patent Application No.: 10/840,862, titled "Multipoint Touch Screen" filed on May 6, 2004.

B. TOUCH SENSITIVE HOUSING

[0063] A hand-held electronic device may also incorporate one or more include a touch sensitive surfaces of the device housing itself that provide either a larger surface for tracking touch inputs or smaller dedicated areas such as touch buttons for performing dedicated functions. Such surfaces may be located on any surface of the housing, any side of the housing, any portion of any side of the housing or at dedicated locations on the surface of the housing. For example, the touch regions may be located on the sides or back surface of the housing, and may even be located at the bezel located at the front surface of the housing, In all of these cases, a large portion of the front surface of the housing is saved for the display so that the viewing area of the hand-held electronic device can be maximized. The touch sensitive surfaces of the housing may take the form of one or more touch panels that are positioned within the housing. The touch sensitive surface may be alternatively or additionally be provided directly by the housing. That is, the touch sensing components may be integrated or incorporated into or disposed underneath the housing such that the housing itself is the touch sensing device (rather than using a separate touch panel). Similarly to a touch screen, a touch sensitive housing recognizes the touch

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and position of a touch on the surface and a controller of the hand-held electronic device interprets the touch and thereafter performs an action based on the touch event. Touch surfaces are constructed in basically the same manner as a touch screen, except the surfaces need not be substantially transparent. [0100] By way of example, the touch sensitive housing may generally correspond to the touch sensitive housing described in greater detail U. S. Patent Application 11/115,539, titled "Hand-Held Electronic Device with Multiple Touch Sensing Devices," filed April 26, 2005.

C. DISPLAY ACTUATOR

[0064] A hand-held multi-functional electronic device may also include a display actuator, which is an input device that mechanically uses the display of the hand-held device to provide inputs into the device (rather than electrically as with a touch screen). The display actuator may be used separately or in combination with the touch screen. The display actuator may include a movable display that causes one or more input signals to be generated when moved. The input signals then can be used to initiate commands, make selections, or control motion in a display.

[0065] The movable display may be configured to translate, slide, pivot, and/or rotate relative to the frame. The display is typically movable relative to a frame or housing that movably supports the display in its various positions. In some cases, the display is movably coupled to the frame, and in other cases the frame movably restrains a floating display.

[0066] The input signals may be generated by movement indicator(s) that monitor the movements of the display and produces signals indicative of such movements. The detection mechanism may, for example, one or more switches, sensors, encoders, and/or the like. Any suitable mechanical, electrical and/or optical switch, sensor or encoder may be used. For example, tact switches, force sensitive resistors, pressure sensors, proximity sensors, infrared sensors, mechanical or optical encoders and/or the like may be used. The movement indicators may be placed underneath the display or at the sides of the display as appropriate. Alternatively or additionally, these movement indicators may be attached to the display or some component of the display. [0104] An exemplary display actuator is disclosed in U.S. Patent Application No. 11/057,050, titled "Display Actuator," filed on February 11, 2005.

D. PRESSURE OR FORCE SENSING DEVICES

[0067] The multi-functional hand-held electronic device described above may further include force or pressure sensing devices such as a force sensing display or housing.

1. Force Sensitive Display

[0068] A force sensitive display causes one or more input signals to be generated when pressure is exerted on the display screen of the device. The input signals can be used to initiate commands, make selections, or control motion in a display. Such displays generally provide a slight amount of flex (unnoticeable to the user) so, that any forces exerted thereon can be measured by a force detection arrangement generally provided underneath the display. The force detection arrangement monitors the forces exerted on the display and produces signals indicative thereof. The force detection arrangement may include one or more force sensors such as force sensitive resistors, force sensitive capacitors, load cells, pressure plates, piezoelectric transducers, strain gauges, etc. The force sensors may be attached to the back of the display or to a structural platform located within the housing of the device. When a force is applied to the display, it is transmitted through the display to the force sensor located underneath the display. [0107] Fig. 19 is a side elevation view, in cross section, of a hand-held device 300 incorporating a force sensitive display 302. The force sensitive display 302 includes a display 308 and one or more force sensors 310 disposed underneath the display 308 (between the display and a structural platform 306). In most cases, the force sensitive display 302 includes a plurality of sensors 310 that are laid out in an array. For example, the sensors 310 may be positioned side by side in rows and columns. The force sensors 310 measure the amount of force being applied to the display and when a desired force threshold is reached a control signal is generated. In some cases, an elastomer 312 is placed between the display and the structural platform to help transmit the force being exerted on the surface of the display to the force sensors disposed below the display.

[0069] Force sensing may be provided in conjunction with a touch screen to differentiate between light and hard touches. The determination of whether a touch is a light touch or a hard touch may be made by monitoring the force with the force sensors and comparing the force to a predetermined threshold. When the force threshold is not exceeded, the touch is considered a light touch. When the force threshold is exceeded, the touch is considered a hard touch. Each type of touch may be used to control different aspects of the device. Light touches may be associated with passive events such as navigation {e.g., cursor control scrolling, panning, zoom, rotation, etc.) and hard touches may be associated with active events such as selections or commands {e.g., button click).

[0070] Fig. 20 illustrates an input device 320 that combines touch sensing and force sensing devices to provide x, y and z components when touched. The touch sensing device provides position sensing in the x and y directions, and the force sensing device provides force sensing in the z direction. These devices cooperate to output x, y

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000408

location and z pressure information whenever there is a touch on the touch surface.

[0071] Fig. 21 is a side elevation view of an I/O device 330 that combines a display 332 with touch screen 334 and a force sensing mechanism 336. The touch screen 334 provides high resolution touch locations, and the force sensing mechanism 336 provides a measure of where the force is coming from as well the total force. Touch screen 334 is disposed over the display 332, and the force sensing mechanism 336 is disposed below the display 332 although other arrangements are possible.

[0072] Force sensing mechanism 336 may also be widely varied. In the illustrated embodiment, the force sensing mechanism 336 is based on capacitance, and more particularly, self capacitance. The illustrated force sensing mechanism 336 is formed from various layers including an electrode layer 338, an elastomer layer 340 and a conductive layer 342.

[0073] Electrode layer 338 includes a plurality of spatially separated electrodes 339 that are positioned across the bottom of the display 332. Electrodes 339 are typically positioned in an array of rows and columns although often configuring are possible. Any number of electrodes may be used.

[0074] Elastomer layer 340 includes one or more elastic members 341 positioned between the electrode layer 338 and the conductive layer 342. Elastic members 341 allow the display 332 to move inwardly with a limited amount of displacement. In one implementation, elastic members 441 are silicone patches with a thickness of about 0.2 mm.

[0075] Conductive layer 342 typically takes the form of a grounded metal plate 343. A capacitive circuit is formed between each of the electrodes 339 and the grounded metal plate 343. When a user pushes down on the display 332, the force being exerted thereon causes the display 332 to displace inwardly against the elastic members 341 compressing the elastic members. This causes a change in the capacitance between the electrodes 339 and the metal plate 343. This change in capacitance is sensed by a control circuit operatively coupled to each of the electrodes 339. Capacitance sensing circuits are disclosed in the various incorporated references.

[0076] Fig. 22 is a side elevation view of an input device 350 that may be positioned over a display. The input device 350 combines touch sensing and force sensing into a single device. In this embodiment, both the touch sensing and force sensing is provided by mutual capacitance. As shown, the input device 350 is formed from various layers including a top drive layer 352, a middle sense layer 354, and a bottom drive layer 356. Furthermore, the middle sense layer 354 is positioned on an elastomer layer 358 disposed between the middle sense layer 354 and the bottom drive layer 356. The top and bottom drive layers 353 and 356 include a plurality of spatially separated lines in rows and the middle sense layer 354 includes a plurality of spatially separated lines in columns. The top and middle layers 352 and 354 therefore form a grid, and the bottom and middle layers 356 and 354 form a grid.

[0077] During operation, the lines on the top layer 352 are scanned, and thereafter the lines on the bottom layer 356 are scanned (or vice versa). When there is a touch, the mutual capacitance measured between the top drive layer 352 and the middle sense layer 354 provide the x and y location of the touch. In addition, the mutual capacitance measured between the bottom drive layer 356 and the middle sense layer 354 provide the amount of force of the touch. This particular arrangement provides a full image of force superimposed on a full image of touch. The input device including the touch layers and the force layers may be operated similarly to the methods described in U.S. Patent Application No.: 10/840,862, titled "Multipoint Touch Screen," filed on May 6, 2004.

2. Force Sensitive Housing

[0078] The hand-held device may also include a force sensitive housing. The force sensitive housing provides inputs when forces are applied to the housing of the hand-held device. A force sensitive housing is similar to a force sensitive screen in that. The housing provides a slight amount of flex (possibly unnoticeable to the user) so that any forces exerted thereon can be distributed to a force detection arrangement located within the housing. The force detection arrangement monitors the forces on the housing and produces signals indicative thereof. As with the force sensitive display discussed above, the force detection mechanism may include one or more force sensors disposed with in the housing such as force sensitive resistors, force sensitive capacitors, load cells, pressure plates, piezoelectric transducers, strain gauges and/or the like. When a force is applied to the housing (squeezing or pushing on the housing), it is transmitted through the housing to the force sensor located within the housing.

[0079] The force sensitive portions of the housing may be located on any surface of the housing, any side of the housing, any portion of any side of the housing or at dedicated locations on the surface of the housing. The sides of the housing are ideal places for implementing a squeeze feature. This is because the users fingers are typically positioned on one side of the device and thumb on the other and therefore the hand may easily squeeze the sides via a pinching action. Because it is so convenient to activate the squeeze feature, special care must be taken when designing the squeeze feature so that it will not be accidentally activate during normal use. Thus the device needs to be able to differentiate between light and hard squeezes. If the squeeze feature is implemented using force sensitive resistors (FSRs) which exhibit, a decrease in resistance with an increase in force applied to the active surface a comparator circuit can be used to output a signal to indicate activation when a preset force threshold is reached.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000409

[0080] Fig. 23 is a side view, in cross section, of a hand-held device 370 that incorporates a squeeze feature. As shown, the device 370 includes a housing 372 and a support platform 374 inside the housing 372. Between the support platform 374 and the inner surface of the housing 372 are a pair of force sensors 376. When a force is applied to the housing 372 as for example by the pinching nature of the hand, the housing 372 flexes inwardly under the pressure. This causes the force sensors 376 to be sandwiched between the housing 372 and the support platform 374. The force sensors 376 measure the amount of force being exerted and when a desired force threshold is reached, the force sensors 376 generate a control signal. For example, as a result of being sandwiched, a force resistive sensor may exhibit a reduced resistance and when a desired threshold is reached, a control signal is generated.

[0081] The force sensitive housing may be is provided in conjunction with a touch sensitive housing as discussed above.

E. MOTION ACTUATED INPUT DEVICE

[0082] The hand-held electronic device may also include a motion actuated input device. The motion actuated input device provides inputs when the hand-held device is in motion or is placed in a certain orientation. A motion actuated input device typically includes a motion sensor, such as an accelerometer, that monitors the motion of the device along the x, y, and/or z axis and produces signals indicative thereof. The motion sensor may, for example, include an accelerometer. Alternatively, the motion sensor could be an orientation sensor, such as an electronic compass, that allows the device to determine its orientation in a generally horizontal plane. The motion sensors may be attached to the housing or to some other structural component located within the housing of the device. When motion is applied to the device (gesturing, shaking, hand waving, etc.), it is transmitted through the housing to the motion sensor.

[0083] Because motion sensors typically measure all motion, not just intended motion, the intended motion information typically must be separated from the other motion information to produce an accurate command signal. For example, large scale movements such as shaking the device will produce primarily low frequency information. Conversely, small scale movements, such as vibrations, primarily produce high frequency information. The high frequency information can be filtered out thereby leaving only low frequency information indicative of the large scale movements (e.g., shaking). The filtered information can then be converted into a control signal.

[0084] Fig. 24 is a side view, in cross section, of a hand-held electronic device 380. The hand-held device 380 includes an accelerometer 382 that is attached to a housing 384 of the hand-held device 380. When the device 380 is moved about by the user, the accelerometer 382 recognizes the motion and a controller of the handheld electronic device 380 interprets the motion and thereafter performs an action based on the motion event.

F. MECHANICAL ACTUATORS

[0085] While one would like to eliminate all surface mounted actuators such as buttons and wheels, it is sometimes impractical. Therefore the handheld device may include some number of surface mounted actuators. Preferably, these actuators are generic to each of the integrated devices. That is, their meaning is the same regardless of what device functionality is activated. It is also preferred that the surface mounted actuators be placed on surfaces other than the front surface, which houses the viewing region of the display, although this is not required.

[0086] One particularly useful mechanical actuator is a hold switch. The hold switch may be configured to activate and deactivate the primary input means, e.g., the touch screen. This permits a user to prevent unwanted entries, for example, when the device is stored inside a user's pocket. In one implementation, the hold switch may be placed on the top surface out of the way of the grasping hand, but in a position for easy access (as opposed to the bottom surface). The hold switch can not only deactivate the touch screen but also mechanical actuators and other input and other input devices.

[0087] Another particularly useful mechanical actuator is a power switch. When the power switch is turned on, the device is powered up and ready to go. When the power switch is turned off, the device is shut down. In one implementation, the power switch may be placed on the top surface out of the way of the grasping hand, but in a position for easy access (as opposed to the bottom surface).

[0088] Another useful mechanical actuator is a navigation pad. The navigation pad is typically included with many hand-held devices. The functionality of the navigation pad may be changed according to the current operating mode of the device. In the case of a music player, for example, the directional keys may be assigned, play/pause, next, previous, and volume up and down. Other assignable buttons may also be included on the device.

[0089] Still another useful mechanical actuator is a switching actuator. The switching actuator may be configured to change the functionality of the device, i.e., by activating the switching actuator the functionality or state of the device switches from one mode to another. The switching actuator may be widely varied.

[0090] For example, the switching actuator may be a dial or wheel. By incrementally rotating the wheel, the device is incrementally switched from one device to the other (generally in some predetermined order). A full rotation of each device generally cycles through the entire group of integrated devices. The wheel or dial may for example operate like a scroll wheel. Although the placement may be widely varied, the switching wheel may be placed in the upper region of the sides of the device. By

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placing the wheel here, a users thumb may be used to easily rotate the wheel. For example, the users thumb may be extended from the grasping action so that the wheel can be rotated.

[0091] Alternatively, the switching actuator may be a button. By repetitively pressing on the button, the device is switched from one device to another (generally in some predetermined order). Although the placement may be widely varied, the switching button may be placed in the upper region of the sides of the device. By placing the button here, a users thumb or index finger may be used to easily press the button.

[0092] The hand-held device may also include any commercially available touch pad. Several examples of touch pads may be found in U.S. Patent Application No.: 10/188,182, titled "Touch Pad for Handheld Device," filed on July 1, 2002, U.S. Patent Application No.: 10/722,948, titled "Touch Pad for Handheld Device," filed on November 25, 2003, and U.S. Patent Application No.: 10/643,256, titled "Movable Touch Pad with Added Functionality," filed on August 18, 2003.

[0093] In another embodiment, the hand-held device may include a scroll wheel. Scroll wheels can be used in each functionality to scroll through a window.

G. MICROPHONE

[0094] The hand-held device may also include a microphone that picks- up audio sounds. The microphone may be used in conjunction with a cell phone to transmit sounds, such as the user's voice. The microphone may also be used to record sounds or enter voice commands into the hand-held device. For example, using voice recognition software, the hand-held device may be able to recognize voice commands and generated control signals associated therewith. The microphone may be placed in the bottom surface of the hand-held device or possible in the front lower bezel. This particular configuration is well suited for picking up a user's voice during a phone call.

H. IMAGE SENSOR

[0095] A hand-held electronic device may also include an image sensor and lens related components so that the hand-held device can operate like a camera. The image sensor may, for example, include a charge coupled device (CCD) camera.

I. INPUT DEVICE FUNCTIONALITY

1. TOUCH GESTURES

[0096] A hand-held electronic device may be designed to recognize touch gestures applied to a touch screen and/or touch sensitive surface of the housing and thereby control aspects of the hand-held electronic device. Gestures are a stylized interaction with an input device that is mapped to one or more specific computing operations. The gestures may be made through various hand and finger motions. Gestures generally comprise a contact chord e.g., one or more fingers, and a motion associated with the chord. Alternatively or additionally, the gestures may be made with a stylus. In all of these cases, the input device i.e., touch screen and/or touch sensitive surface) receive the gestures and a controller of the hand-held electronic device executes instructions to carry out operations associated with the gestures. The hand-held electronic device may include a touch gesture operational program, which may be part of the operating system or a separate application. The gesture operation program generally includes a set of instructions that recognizes the occurrence of gestures and informs one or more software agents of the gestures and/or what action(s) to take in response to the gestures. For example, gestures that can be used are disclosed in greater detail in U.S. Patent Application No: 10/903,964, titled "Gestures for Touch Sensitive Input Devices," filed on July 30, 2004, and U.S. Patent Application No.: 11/038,590, titled "Mode-Based Graphical User Interfaces for Touch Sensitive Input Devices," filed on January 18, 2005. 2. 3-D SPATIAL GESTURES.

[0097] In accordance with one embodiment, the hand-held electronic device may be designed to recognize 3-D spatial gestures measured by an accelerometer and to control aspects of the hand-held electronic device based on the 3-D spatial gestures. Spatial gestures are stylized motions of the device itself that are mapped to one or more specific computing operations. The 3-D spatial gestures may be made through various hand and arm motions, such as for example shaking, waving and the like. The accelerometer measures the motion related to the 3-D spatial gestures and a controller recognizes the motion as a 3-D spatial gesture and thereafter executes instructions to carry out operations associated with the 3-D spatial gestures. The hand-held electronic device may include a 3-D spatial gesture operational program, which may be part of the operating system or a separate application. The gesture operation, program generally includes a set of instructions that recognizes the occurrence of gestures and informs one or more software agents of the gestures and/or what action(s) to take in response to the gestures.

[0098] One exemplary 3-D gesture is shaking the device. Shaking can cause the handheld device causes the device to shift between modes or states. Alternatively, shaking the hand-held device can cause a selection event to occur. For example, in the case of a media player, shaking the device may cause the device to randomly select a picture or song in group of pictures or songs. Alternatively, shaking the device may cause the device to select the next picture or song in a sequence of songs.

[0138] Other gestures may include translating or rotating the device. Translating the hand-held device (while it is face up) from side to side may be used to initiate panning or scrolling in the device, or moving the device up and

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down (while it is face up) may be used to initiate zooming. Rotating the device may be used to cause the device to change modes or states. In some cases, for example, the orientation of the device may correspond to a particular mode. For example, a first mode may be associated with 0 degrees, a second mode may be associated with 90 degrees, a third mode may be associated with 180 degrees and a fourth mode may be associated with 270 degrees. In all these cases, the device can be configured to keep the displayed portion upright as the device is turned. That is, it maintains an upright image no matter what orientation the device is in.

[0099] The 3-D spatial gestures may even be based on more complex motions such as sign language, writing motions, etc.

3. PERFORM ACTION BASED ON MULTIPLE INPUTS

[0100] Because the device may have multiple input modes, the handheld device may be configured to receive simultaneous inputs from different inputs devices, and perform actions based on the multiple simultaneous inputs. The inputs that may be combined to produce new commands may be selected from voice, 2-D touch gestures, 3-D spatial gestures, actuators, etc. For example, this feature may be helpful when making calls via voice selection. A caller may verbalize "TOM," which causes the device to dial "TOM" phone number. If "TOM" has multiple phone numbers, a user may combine the verbal command "TOM" with a 3-D spatial gesture such as shaking to select Tom's second phone number. Various other possibilities will be appreciated by those skilled in the art.

4. DIFFERENTIATING BETWEEN LIGHT AND HARD TOUCHES

[0101] As noted above, force sensing in conjunction with touch sensing facilitates two distinct types of interactions, light touches and hard touches. Light touches may be used to perform passive actions such as navigating through content and content manipulation generally without causing a major event to occur. Examples of passive events include moving a cursor, scrolling, panning, etc. Hard touch interactions may be used to select on screen buttons or initiate commands (e.g., causes a significant change to occur).

[0102] Fig. 25 is a diagram of a touch method 400for implementing this technique. The method 400 begins at block 402 where one or more touches are detected. The touches include not only x any y components but also z components. The x and y components may be supplied by a touch sensing device such as touch screen, touch pad, or touch housing. The z component may be provided by force sensors or display actuators located behind the touch surface of the touch sensing device.

[0103] Following block 402, the method proceeds to block 404 where a determination is made as to whether the touch is a light or hard touch. The determination is generally based on the force or pressure of the touch (z component). For example, if the force of the touch is smaller than a predetermined threshold then the touch is considered a light touch and if the force of the touch is larger than the predetermined threshold then the touch is considered a hard touch. If it is determined that the touch is a light touch, the method proceeds to block 406 where a passive action associated with the touch is initiated. If it is determined that the touch is hard touch, an active action associated with the touch is performed (block 408).

[0104] The touch method may additionally include a block where the one or more touches are classified as a primary touch or a secondary touch. Primary touches are touches that are intended to cause an action while secondary touches are touches that are not intended to cause an action. Gestures are examples of primary touches while a thumb positioned over the touch area to hold the device is an example of a secondary touch. Once the touches are classified as primary or secondary, the secondary touches are filtered out, and the determination of whether a touch is a light or hard touch is made with the primary touches.

5. EXAMPLE OF A NEW TOUCH VOCABULARY

[0105] The z pressure exerted on a touch sensing device can be combined with the x and y locations of the touch to form a new touch vocabulary. As should be appreciated, up to this point touch vocabularies have only included x and y locations, not z pressure. A proposed touch vocabulary includes variety of variables including the UI mode, the force of the touch (e.g., light or hard), the number of fingers used, whether or not there is any movement during the touch, the duration of the touch, and the touch location, all or some of which can be combined to form a variety of behaviors and user feedback.

[0106] The UI mode is generally related to the mode or state of the device. Each device includes a variety of states and each state may require a different UI mode. A media player (a mode) may, for example, include a set of hierarchal layers (states) with each layer requiring a different UI.

[0107] As noted above, the force of the touch may, for example, be described as light or hard. A light touch may occur when a user lightly touches the surface of the touch surface, i.e., the finger hovers on top of the surface and is primarily moved in the x and y directions. A hard touch may occur when a user presses on the touch surface with a certain amount of force, i.e., the finger is primarily moved in the z direction against the touch surface.

[0108] Motion during the touch is used to describe whether the finger has remained stationary during a touch event or has substantially moved in the X-Y plane (e.g., translation, rotation, etc.). The motion may be described as none at all or a swipe or twist in some particular direction. By way of example, the swipe may be up, down, right, left, or some combination thereof, and the twist may

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be clockwise or counterclockwise. [0149] Duration is defined as the amount of time the finger stays at any one point. Duration may be variable or it may include states such as short and long. The touch location may be a random point or a specific location such as an onscreen button.

[0109] Fig. 26 is an additional touch method 500 implementing this technique. The method begins at block 502 when one or more touches are detected. Thereafter, in block 504, the UI mode is determined. In block 506, a determination is made as to whether the touches are light touches or hard touches. Alternatively, blocks 502 and 504 could be reversed, effectively resulting in an instance of the touch method for each mode. In block 508, the number of distinct touches {e.g., fingers) is determined. In block 510, a determination is made as to whether the touches are stationary or in motion. In block 512, the duration of the touches is determined. In block 514, the locations of the touches are determined. Following blocks 502-514, the method proceeds to block 516 where an action is performed based on the UI mode, the pressure of the touch, the number of touches, whether or not the touch is moving, the duration of the touch, and the touch location. The actions may be passive or active depending on the values of each characteristic.

[0110] One example of a touch vocabulary associated with a music player is shown in Figs. 27A-E.

V. OUTPUT DEVICES

A. DISPLAY

[0111] The principle output of a hand-held electronic device is typically a display. The display provides visual information in the form of text, characters or graphics. The display is usually a flat panel device although other types of displays may be used. The display may be a liquid crystal display (LCD) such as a character LCD that is capable of presenting text and symbols or a graphical LCD that is capable of presenting images, video, and graphical user interfaces (GUI). Alternatively, the display may correspond to a display based on organic light emitting diodes (OLED), or a display that is based on electronic inks.

[0112] Preferably, the display may be configured to substantially fill the front surface of the housing. The display may extend from one edge of the housing to the opposite edge of the housing, the housing may include a small bezel that surrounds the edges of the display. In either case, the display makes up a substantial portion of the front surface of the hand-held electronic device, thereby eliminating any space for buttons or switches associated with a conventional user interface.

[0113] As mentioned above, besides outputting visual information, the display may also act like an input device. For example, a touch screen may be positioned over the display, and/or sensors may be disposed underneath the display to sense when the device is pressed or otherwise moved. In most cases, the small form factor of hand-held devices requires central placement of the input interfaces to permit operation while being carried around and used by the hand. The display region provides a central location, which can be accessed by both the left and right hands.

[0114] The display region may be formed by more than one display. For example, the display region may be formed by a pair of displays that are side by side or one on top of the other. A first display may be used to present the standard screen and a second display may be used to present the control screen as described above with reference to Figs. 5-8. Furthermore, a first display may be a conventional display while the second display may be a display actuator. Moreover, a first display may comprise of a first type and a second display may be of a second type. For example, the first display may be an LCD while the second display may be a display based on electronic inks. [0156] The decision to use different types may be based on the fact that one of the displays may be dedicated to a standard viewing area while another may be dedicated to a control area. Because these two areas require different resolutions, a higher resolution screen may be used in the standard area while a lower resolution screen may be used in the control area. Alternatively or additionally, one of the displays may be selected to reduce battery consumption especially in the control area where lower resolution is acceptable. In some cases, although two different displays are used, the images displayed thereon may be combined to form a single unified image.

B. SPEAKER

[0115] A hand-held device may also include a speaker. Speakers are components that accept electronic signals representing audio information from an amplifier and converts them into sound waves. The speakers may be used to listen to music in conjunction with a music player functionality or to listen to an incoming call in conjunction with a cell phone functionality. The speaker may be placed on the top surface or possible on the front top bezel of the hand-held device. This arrangement works particularly well when the device is used as a cell phone.

C. INDICATOR (LED)

[0116] A hand-held device may also include one or more indicators that provide user feedback or indicate events associated with the device. The events may relate to signals, conditions or status of the device. For example, the indicators provide status of battery life or alert a user when there is an incoming call. The indicators, which include light sources such as light emitting diodes (LED), are typically illuminated when an event occurs, and not illuminated when the event is stopped. Furthermore, the indicator may turn on and off (blink) or cycle with increasing or decreasing intensity, and in some cases may even

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change colors in order to provide more detailed information about the event that is being monitored.

[0117] The indicators may be conventional indicators that typically include a small clear plastic insert, which is located in front of the LED, and which is inserted within an opening in the housing thus causing it to exist at the surface of the housing. The LED itself may also be placed in the opening in the housing rather than using an insert. Alternatively, the indicator can be configured not to break the surface of the housing. In this configuration, the light source is disposed entirely inside the housing, and is configured to illuminate a portion of the housing thereby causing the housing to change its appearance, i.e., change its color.

D. AUDIO/TACTILE FEEDBACK DEVICES

[0118] The hand-held device may include speakers or buzzers to give audio feedback to the user. These may work similarly to the indicators described above, or they may be used to enhance the feel of actuating a GUI element such as a soft button or scroll wheel. For example, the speaker may be configured to output a "clicking" noise when a user presses on a virtual button, or rotates a virtual scroll wheel. This particular feature enhances the user experience and makes the virtual UI feel more like a physical UI.

[0119] The hand-held device may also include a haptics mechanism. Haptics is the science of applying tactile sensation and control to interaction with computer applications. Haptics essentially allows a user to feel information, i.e., signals are sent to the hand. The haptics mechanisms may be widely varied. They may include motors, vibrators, electromagnets, etc., all of which are capable of providing force feedback in the form of vibration or shaking. The haptics mechanisms may work similarly to the indicators described above (alert), or they may be used to enhance the feel of actuating a GUI element such as a soft button or scroll wheel. For example, the haptics mechanism may be configured to vibrate when a user presses on a virtual button, or rotates a virtual scroll wheel. This particular feature enhances the users experience and makes the virtual UI feel more like a physical UI. Haptics may also be used simultaneously with on-screen actions. For example, during movies or game playing, the haptics mechanism can simulate the action being displayed. For example, the haptics mechanism may provide force feedback in the form of vibration when a car explodes during a movie or game.

[0120] In cases where haptics is used to enhance the feel of actuating a GUI element, such as a soft button or scroll wheel, the haptics mechanism may be located in the region of the display and further underneath the display so as to provide force feedback directly underneath the user action. In fact, multiple haptics mechanisms may be used regionally across the display to further enhance the feel. It is generally believed that the closer the vibration is to the user action, the greater the haptics effect. In one implementation, the haptics mechanisms are spaced out in an array underneath the display. That is, they are spatially separated and placed at different locations. By way of example, they may be positioned in a 2x2, 2x4, 4x4, 4x8, 8x8 array and so on underneath the display.

[0121] Audio and/or tactile feedback may be used to alert a user that a user input has been made. For example, in response to touching a virtual button on the GUI, the haptics may provide force feedback in the form of vibration and the speaker may provide audio feedback in the form of a click. The tactile audio feedback can be used in conjunction with an input event including touch events, motion events, squeeze events. The feedback may provide information so that the user knows that they actually implemented an input (simulates the audio and tactile feel of a button or switch). In one implementation, the feedback is tied to the level of force being applied to the force sensing devices. For example, when a certain force threshold is reached, the audio feedback device may create a "click" on the press and a "clock" on the release. The force threshold used may be similar to the threshold used to determine whether a touch is a light or hard touch. The "click" and "clock" may be used to simulate a button click when a hard touch is made.

VI. COMMUNICATION DEVICES

A. WIRED

[0122] The hand-held device may also include one or more connectors for receiving and transmitting data to and from the device. By way of example, the device may include one or more audio jacks, video jacks, data ports, docking ports, etc. The hand-held device may also include one or more connectors for receiving and transmitting power to and from the hand-held device.

[0123] The hand-held device may include a headphone/microphone jack and a data port. The jack is capable of receiving a speaker and/or microphone plug so that audio may be input to and output from the device. The data port is capable of receiving a data plug/cable assembly configured for transmitting and receiving data to and from a host device, such as a general purpose computer (e.g., desktop computer, portable computer). For example, the data port may be used to upload or download data to and from the hand-held device. Such data may include songs and play lists, audio books, e-books, photos, address books, documents, appointments, etc. into the hand-held device. The data port may be a PS/2 port, serial port, parallel port, network interface port, USB port, Firewire port etc. The handheld device may also include a power port that receives a power plug/cable assembly configured for delivering powering to the hand-held device. In some cases, the data port may serve as both a data and power port by employing either standard or proprietary connectors.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000414

B. WIRELESS

[0124] To send and receive data wirelessly, the device generally requires a transmitter, a receiver (or a transceiver) and some sort of antenna. The wireless communication link may correspond to Bluetooth, WiFi (802.11), IR (infrared), etc. The antenna may be fully contained within the device or they may extend outside the device. The antenna may take a variety of forms depending on the frequency to be used, etc. For example be a rugged rubber duck that consists of a coiled up element encased in rubber. Alternatively, the antenna may be printed on a circuit board within the device. [0167] The hand-held device may also include a radio transceiver for communications via a cellular network or a GPS receiver.

C. CHANGE UI BASED ON RECEIVED COMMUNICATION SIGNALS

[0125] A hand-held electronic device may be configured to actively look for signals in the surrounding environment, and change its mode based on the signal. That is, the device tries to match the mode with the signal. If the device receives a phone signal over the cellular network, the device may turn into a phone, i.e., the phone mode is activated or brought forward relative to the other modes. If a device receives an email, the device may turn into an email terminal. As another example, when a user walks into a home theater room, the device may sense signals from the media control unit and turn itself into a remote control including functionality to control the various devices of the home theater (TV, amp, DVD, lighting). In other cases, the device may sense signals, which are being broadcast in physical stores, and turn itself into a device that is well suited for that store. For example, in a bank, the device may change into a calculator or bring a money program into view, or in a grocery store, the device may turn into a money payment device or bring a grocery list into view.

VII. OTHER COMPONENTS OF HAND-HELD DEVICE

[0126] The hand held device may additionally include one or more of the following hardware components: a controller (e.g., microprocessor, DSP, A/D, D/A, converters, codes), memory (e.g., RAM, ROM, solid state (flash), hard disk (microdrive)), storage (SD card slots, mini-DVD), battery (e.g., lithium ion), etc.

VIII. OVERALL BLOCK DIAGRAM

[0127] Fig. 28 is a block diagram of an exemplary hand-held device 600. The hand-held device 600 typically includes a controller 602 (e.g., CPU) configured to execute instructions and to carry out operations associated with the hand-held device. For example, using instructions retrieved for example from memory, the controller 602 may control the reception and manipulation of input and output data between components of the hand-held device 600. The controller 602 can be implemented on a single chip, multiple chips or multiple electrical components. For example, various architectures can be used for the controller 602, including dedicated or embedded processor, single purpose processor, controller, ASIC, etc. By way of example, the controller may include microprocessors, DSP, A/D converters, D/A converters, compression, decompression, etc.

[0128] In most cases, the controller 602 together with an operating system operates to execute computer code and produce and use data. The operating system may correspond to well known operating systems such as OS/2, DOS, Unix, Linux, and Palm OS, or alternatively to special purpose operating system, such as those used for limited purpose appliance-type devices. The operating system, other computer code and data may reside within a memory block 604 that is operatively coupled to the controller 602. Memory block 604 generally provides a place to store computer code and data that are used by the hand-held device. By way of example, the memory block 604 may include read-only memory (ROM), random-access memory (RAM), hard disk drive (e.g., a micro drive), flash memory, etc. In conjunction with the memory block 604, the hand-held device may include a removable storage device such as an optical disc player that receives and plays DVDs, or card slots for receiving mediums such as memory cards (or memory sticks). Because the form factor of the hand-held device is small, the optical drive may only be configured for mini DVDs. [0172] The hand-held device 600 also includes various input devices 606 that are operatively coupled to the controller 602. The input devices 606 are configured to transfer data from the outside world into the hand-held device 600. As shown, the input devices 606 may correspond to both data entry mechanisms and data capture mechanisms. In particular, the input devices 606 may include touch sensing devices 608 such as touch screens, touch pads and touch sensing surfaces, mechanical actuators 610 such as button or wheels or hold switches (611), motion sensing devices 612 such as accelerometers, force sensing devices 614 such as force sensitive displays and housings, image sensors 616, and microphones 618. The input devices 606 may also include a clickable display actuator 619.

[0129] The hand-held device 600 also includes various output devices 620 that are operatively coupled to the controller 602. The output devices 620 are configured to transfer data from the hand-held device 600 to the outside world. The output devices 620 may include a display 622 such as an LCD, speakers or jacks 624, audio/tactile feedback devices 626, light indicators 628, and the like

[0130] The hand-held device 600 also includes various communication devices 630 that are operatively coupled to the controller 602. The communication devices 630 may, for example, include both wired and wireless connectivity selected from I/O ports 632 such as IR, USB, or Firewire ports, GPS receiver 634, and a radio receiver

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000415

636.

[0131] The hand-held device 600 also includes a battery 650 and possibly a charging system 652. The battery may be charged through a transformer and power cord or through a host device or through a docking station. In the cases of the docking station, the charging may be transmitted through electrical ports or possibly through an inductance charging means that does not require a physical electrical connection to be made. [0176] The various aspects, features, embodiments or implementations of the invention described above can be used alone or in various combinations. The methods of this invention can be implemented by software, hardware or a combination of hardware and software. The invention can also be embodied as computer readable code on a computer readable medium. The computer readable medium is any data storage device that can store data which can thereafter be read by a computer system, including both transfer and non-transfer devices as defined above. Examples of the computer readable medium include read-only memory, random access memory, CD-ROMs, flash memory cards, DVDs, magnetic tape, optical data storage devices, and carrier waves. The computer readable medium can also be distributed over network-coupled computer systems so that the computer readable code is stored and executed in a distributed fashion. [0177] While this invention has been described in terms of several preferred embodiments, there are alterations, permutations, and equivalents, which fall within the scope of this invention. It should also be noted that there are many alternative ways of implementing the methods and apparatuses of the present invention. It is therefore intended that the following appended claims be interpreted as including all such alterations, permutations, and equivalents as fall within the true spirit and scope of the present invention.

[0132] Although the invention can be defined as stated in the attached claims, it is to be understood that the present invention can alternatively also be defined as stated in the following embodiments:

1. A hand-held electronic device, comprising: a multi-touch input surface; and a processing unit operatively connected to said multi-touch input surface, said processing unit capable of receiving a plurality of concurrent touch inputs from a user via said multi-touch input surface and discriminating a user requested action from the touch inputs; and a display device operatively coupled to the processing unit and configured to present a user interface.

2. A hand-held electronic device as recited in embodiment 1, wherein said hand-held electronic device is includes two or more of the following device functionalities: PDA, mobile phone, music player, camera, video player, game player, handtop, Internet terminal, GPS receiver, and remote control.

3. A hand-held electronic device as recited in embodiment 1, wherein said hand-held electronic device is capable of reconfiguring or adapting the user interface based on the state or mode of said hand-held electronic device.

4. A hand-held electronic device as recited in embodiment 3, wherein said display device is a full screen display.

5. A hand-held electronic device as recited in embodiment 1, wherein said multi-touch input surface is integral with said display device.

6. A hand-held electronic device as recited in embodiment 5, wherein said hand-held electronic device is includes two or more of the following device functionalities: PDA, mobile phone, music player, camera, video player, game player, camera, handtop, Internet terminal, GPS receiver, and remote control.

7. A hand-held electronic device as recited in embodiment 5, wherein said multi-touch input surface serves as the primary input means necessary to interact with said hand-held electronic device.

8. A hand-held electronic device as recited in embodiment 7, wherein said hand-held electronic device includes cross-functional physical buttons.

9. A hand-held electronic device as recited in embodiment 5, wherein said the multi-touch input surface integral with the display device is a multipoint capacitive touch screen.

10. A hand-held electronic device as recited in embodiment 9, wherein said hand-held electronic device is operable to recognize touch gestures applied to said multi-touch input surface wherein the touch gestures are used to control aspects of said hand-held electronic device.

11. A hand-held electronic device as recited in embodiment 1, wherein said hand-held electronic device is operable to receive simultaneous inputs from different inputs devices and perform actions based on the simultaneous inputs.

12. A hand-held electronic device as recited in embodiment 1, wherein signals from various input devices of said hand-held electronic device have different meanings or outputs based on a mode of said hand-held electronic device.

13. A hand-held electronic device as recited in embodiment 1, wherein said user interface comprises a standard region and a control region the standard

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region being used to display data, and the control region including one or more virtual controls for user interaction.

14. A hand-held electronic device as recited in embodiment 13, wherein at least one of the standard region and the control region are user configurable.

15. A hand-held electronic device as recited in embodiment 1, wherein said display device comprises a force sensitive display, said force sensitive display producing one or more input signals to be generated when force is exerted thereon.

16. A hand-held electronic device as recited in embodiments 15, wherein said force sensitive display senses a force indication, and wherein said hand-held electronic device distinguishes the force indication into at least a first touch type and a second touch type.

17. A hand-held electronic device as recited in any of embodiment 16, wherein the first touch type corresponds to a light touch, and the second touch type corresponds to a hard touch.

18. A hand-held electronic device as recited in embodiment 1, wherein said hand-held electronic device provides audio or tactile feedback to a user based on user inputs made with respect to said hand-held electronic device.

19. A hand-held electronic device as recited in embodiment 1, wherein hand-held electronic device is configurable to actively look for signals in a surrounding environment, and change user interface or mode of operation based on the signals.

20. A hand-held computing device, comprising: a housing; a display arrangement positioned within said housing, said display arrangement including a display and a touch screen; and a device configured to generate a signal when some portion of said display arrangement is moved.

21. A hand-held electronic device, comprising: a touch screen; and a processing unit operatively connected to said touch screen, said processing unit concurrently receives a plurality of touch inputs from a user via said touch screen and discriminates a user requested action from the touch inputs, wherein said touch screen serves as the primary input means necessary to interact with said hand-held electronic device.

22. A hand-held electronic device as recited in embodiment 21, wherein said media device operates as one or more of a mobile phone, a PDA, a media player, a camera, a same player, a handtop, an Internet terminal, a GPS receiver, or a remote controller.

23. A method performed in a computing device having a display and a touch screen positioned over the display, the method comprising: detecting one or more touches; classifying the one or more touches as a primary touch or a secondary touch; filtering out the secondary touches; differentiating whether the primary touch is a light touch or a hard touch; initiating a control event if the primary touch is a light touch; and implementing a selection event if the primary touch if a hard touch.

Claims

1. A hand-held electronic device, comprising:

   a touch-sensitive input surface;
   a processing unit operatively connected to the touch-sensitive input surface, the processing unit capable of receiving indications associated with touch inputs and determining a user requested action from one or more of the indications;
   a display device operatively coupled to the processing unit and configured to present a user interface, the display device at least partially overlapping the touch-sensitive surface; and
   a physical input mechanism independent of the touch-sensitive input surface, wherein the physical input mechanism is adapted to effect a first operation

   in the electronic device and the touch sensitive input surface is adapted to simultaneously effect a second operation in the electronic device.

2. The electronic device of claim 1 wherein the processing unit is programmed to cause the electronic device to actively look for phone call signals in a surrounding environment, and, based upon the presence of phone call signals, change to a user interface or mode of operation associated with a phone.

3. The apparatus of claim 1 wherein the first operation and the second operation are independent of one and other.

4. The apparatus of claim 1 wherein the first operation is volume control and the second operation is scrolling or panning.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000417

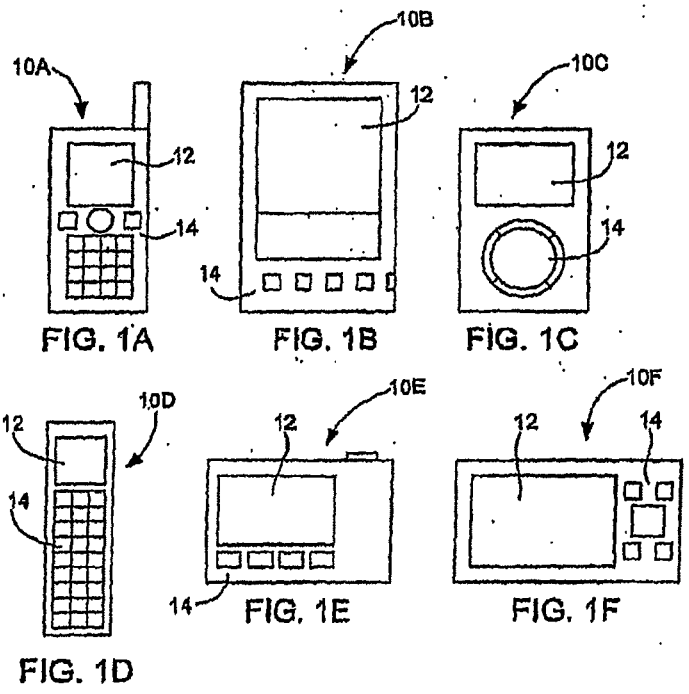


FIG. 1A FIG. 1B FIG. 1C

FIG. 1D FIG. 1E FIG. 1F

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000418

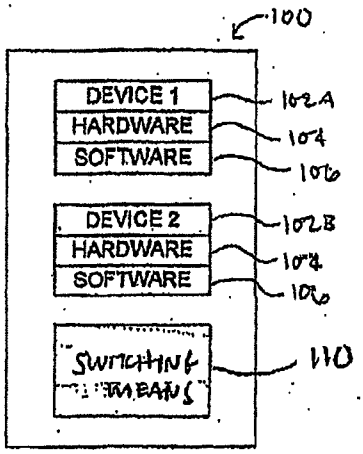


FIG. 2

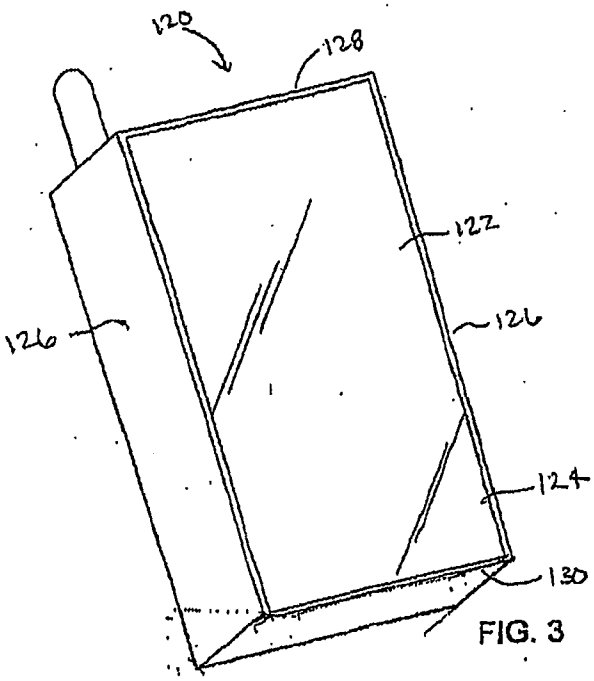


FIG. 3

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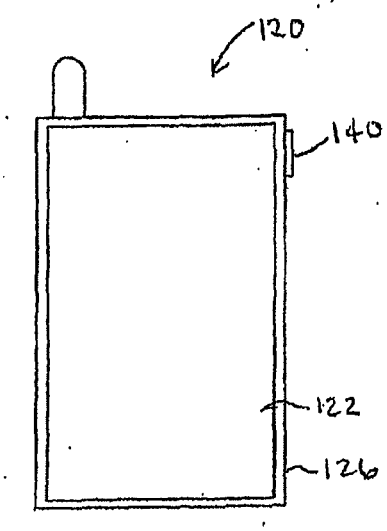


FIG. 4

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000420

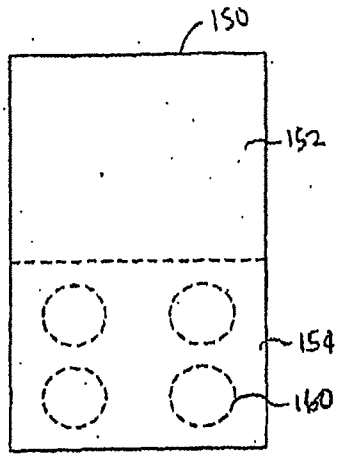


FIG. 5

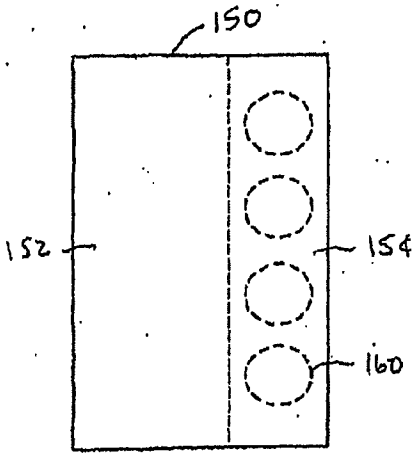


FIG. 6

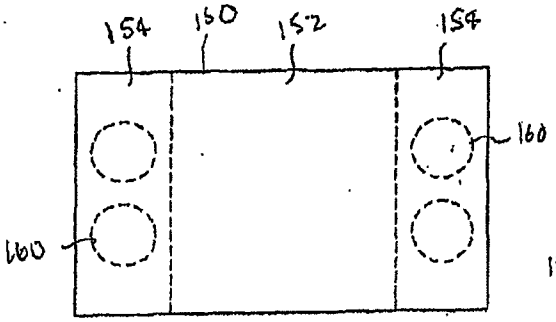


FIG. 7

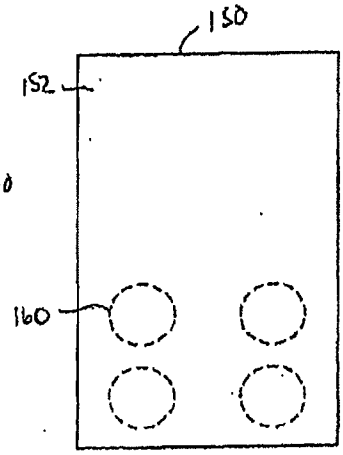


FIG. 8

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000421

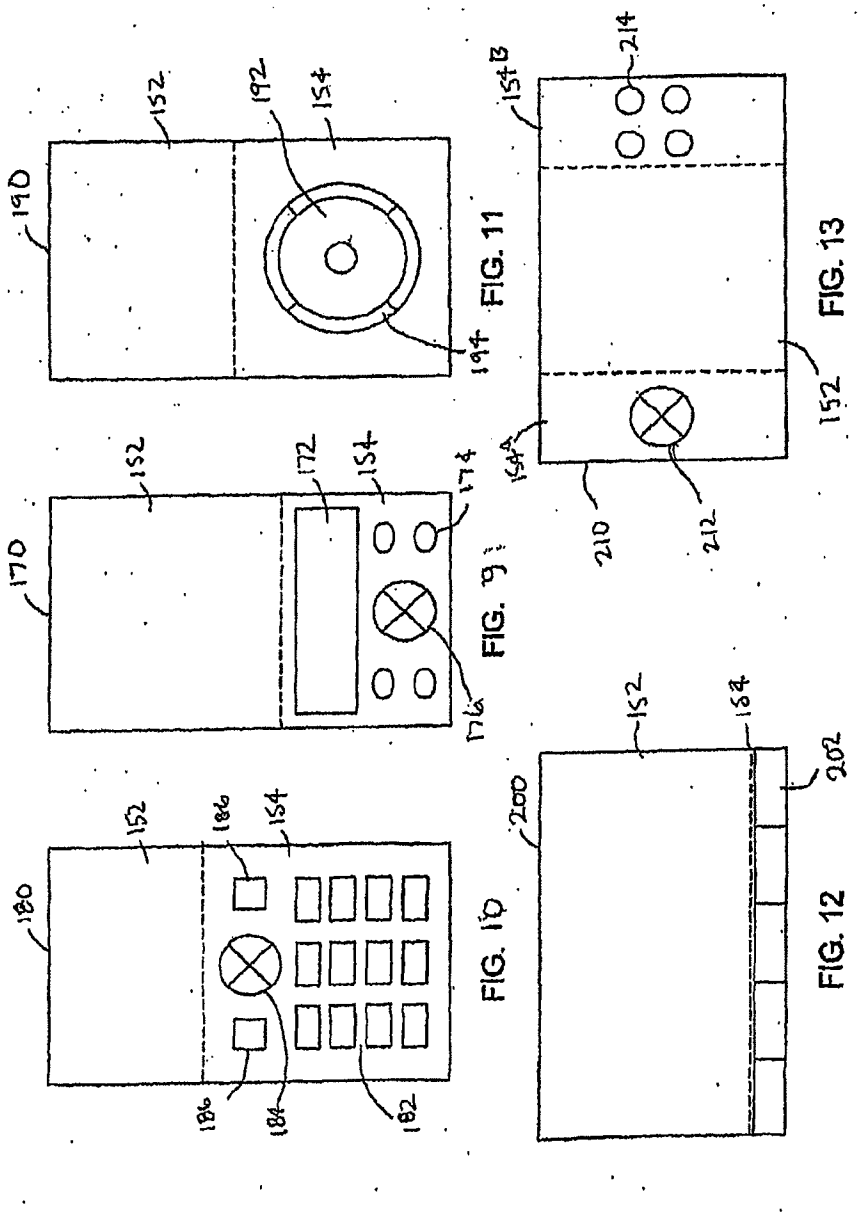


FIG. 11

FIG. 9

FIG. 10

FIG. 12

FIG. 13

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000422

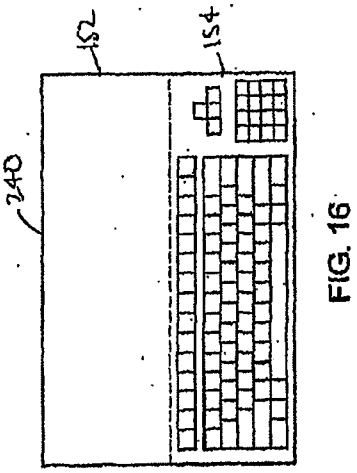


FIG. 16

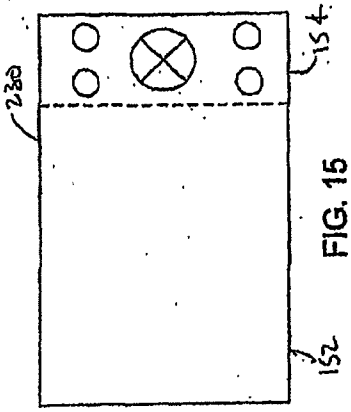


FIG. 15

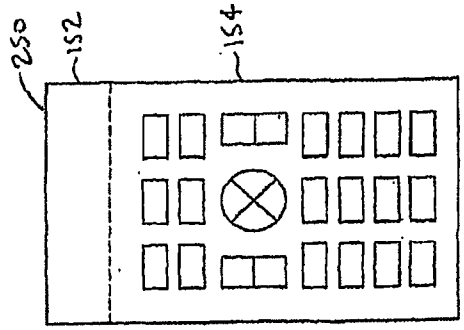


FIG. 17

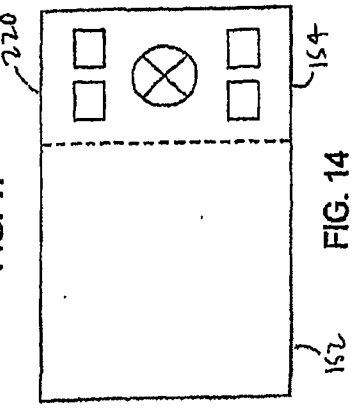


FIG. 14

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000423

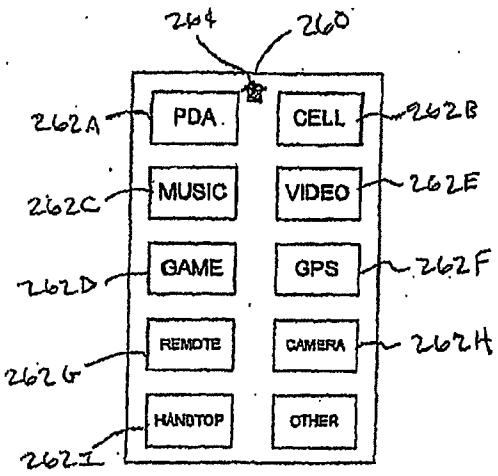


FIG. 18

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000424

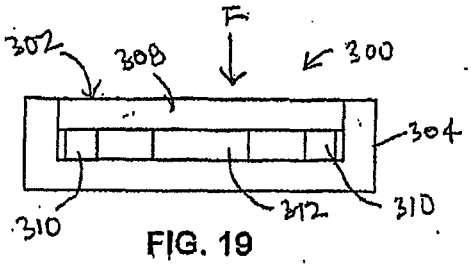


FIG. 19

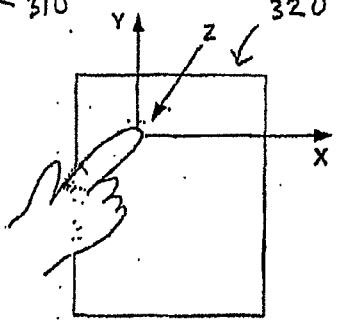


FIG. 20

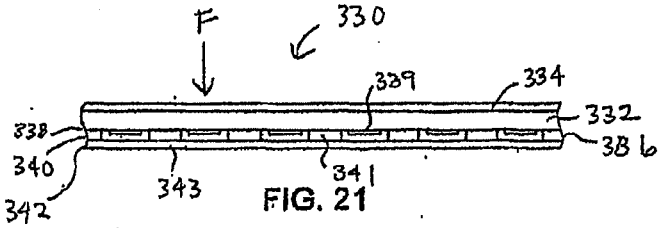


FIG. 21

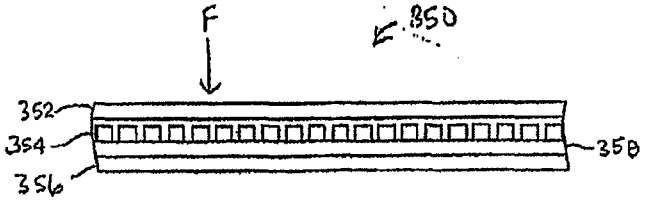


FIG. 22

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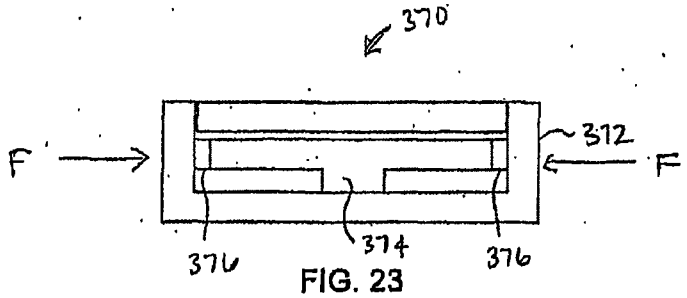


FIG. 23

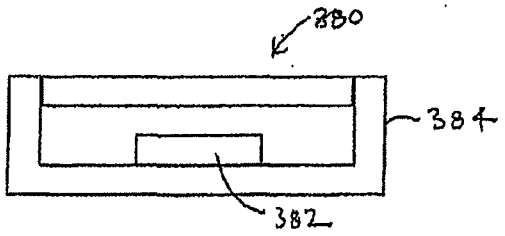


FIG. 24

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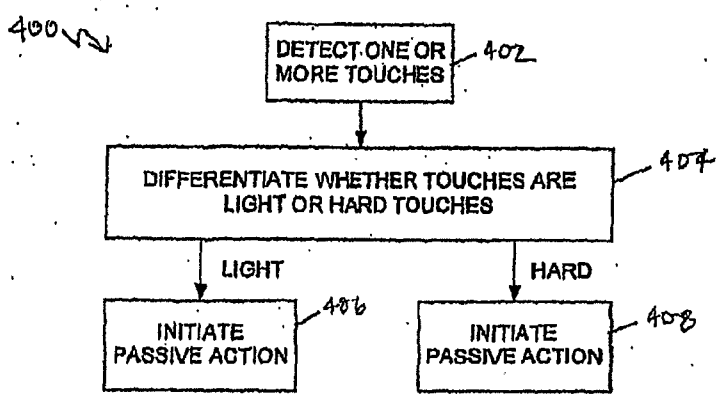


FIG. 25

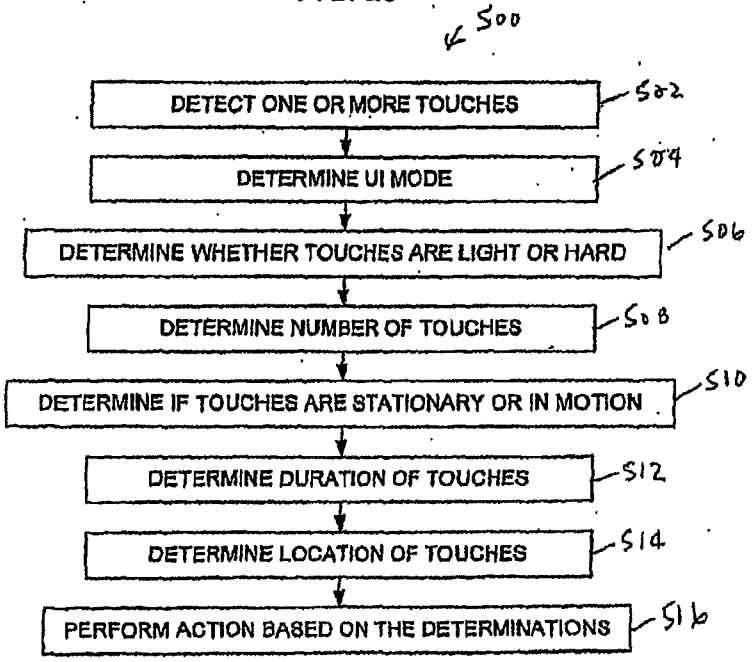


FIG. 26

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000427

#	UI Mode	Light Touch or Tactile Click	# Fingers used	Movement during touch or click	Duration	Touchdown location (Virtual button?)	Proposed Behavior	Feedback
	Basic list navigation							
	List Nav.	light	1	none	any	anywhere	On touch-down, do nothing. On lift-off, highlight item(if any) under touch	highlight item touched
	List Nav.	click	1	NONE	short	virtual button / list item	On touch-down, do nothing. On click-down highlight item under touch.(if any). On un-click, execute the item clicked	animate screen sliding RIGHT to expose new screen
	List Nav.	click	1	NONE	short	PLAY / PAUSE virtual button	On touch-down, do nothing. On click-down highlight Play/Pause icon. On un-click, PLAY/PAUSE	Change PLAY/PAUSE icon
	List Nav.	click	1	NONE	LONG	virtual button	On touch-down, do nothing. On click-down highlight item under touch (if any). After delay, bring-up context sensitive menu.	Context sensitive menu pop-up
	List Nav.	light or click	1	UP/DOWN	any	anywhere	On touch-down, do nothing: Scroll list UP/DOWN depending on UP/DOWN distance moved, use inertia & brakes, disregard LEFT/RIGHT motion during gesture. If highlighted item slides off visible screen, change highlighted item to one that is visible.	list scrolling. UP/DOWN, first few letters enlarged
	List Nav.	light or click	1	LEFT	any	anywhere	On touch-down, do nothing. On left motion, open highlighted folder or execute highlighted item (like legacy SELECT button)	animate screen sliding LEFT
	List Nav.	light or click	1	RIGHT	any	anywhere	On touch-down, do nothing. On right motion, go back out a folder (like legacy MENU function)	animate screen sliding RIGHT

Fig. 27A

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000428

#	UI Mode	Light Touch or Tactile Click	# Fingers used	Movement during touch or click	Duration	Touchdown location (virtual button?)	Proposed Behavior	Feedback
	2D photo thumnail preview / navigation							
	photo preview	light	1	none	any	anywhere	On touch-down, do nothing. On lift-off, highlight item(if any) under touch	highlight item touched
	photo preview	click	1	NONE	short	virtual button / thumbnail	On touch-down, do nothing. On click-down highlight item under touch (if any). On un-click, execute the item clicked	animate screen sliding RIGHT to expose new screen
	photo preview	click	1	NONE	short	PLAY / PAUSE virtual button	On touch-down, do nothing. On click-down highlight Play/Pause icon. On un-click, PLAY/PAUSE	Change PLAY/PAUSE icon
	photo preview	click	1	NONE	LONG	virtual button	On touch-down, do nothing. On click-down highlight item under touch (if any). After delay, bring-up context sensitive menu.	Context sensitive menu pop-up
	photo preview	light or click	1	UP/DOWN	any	anywhere	On touch-down, do nothing. Scroll list of thumbnails UP/DOWN depending on UP/DOWN distance moved, use inertia & brakes, disregard LEFT/RIGHT motion during gesture. If highlighted item slides off visible screen, change highlighted item to one that is visible.	list of thumbnails scrolling UP/DOWN
	photo preview	light or click	1	LEFT	any	anywhere	On touch-down, do nothing. On left motion, open highlighted folder or execute highlighted item (like legacy SELECT button)	animate screen sliding LEFT
	photo preview	light or click	1	RIGHT	any	anywhere	On touch-down, do nothing. On right motion, go back out a folder (like legacy MENU function)	animate screen sliding RIGHT

Fig. 27B

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000429

#	UI Mode	Light Touch or Tactile Click	# Fingers used	Movement during touch or click	Duration	Touchdown location (virtual button?)	Proposed Behavior	Feedback
Now Playing								
	Now Playing	light	1	none	any	anywhere	do nothing	n/a
	Now Playing	click	1	NONE	any	anywhere	On touch-down, do nothing. On click-down PLAY / PAUSE	change PLAY/PAUSE icon
	Now Playing	light	1	UP/DOWN	any	anywhere	do nothing	n/a
	Now Playing	light	1	LEFT	any	anywhere	do nothing	n/a
	Now Playing	light	1	RIGHT	any	anywhere	On touch-down, do nothing. On right motion, go back out a folder (like legacy MENU function)	animate screen sliding RIGHT
	Now Playing	click	1	UP/DOWN	any	anywhere	On touch-down & click-down, do nothing. On UP/DOWN motion detect, increase/decrease volume and disregard LEFT/RIGHT motion	Volume slider moves UP/DOWN
	Now Playing	click	1	LEFT	any	anywhere	On touch-down & click-down, do nothing. On left motion, go to next track (like legacy NEXT button)	animate screen sliding LEFT
	Now Playing	click	1	RIGHT	any	anywhere	On touch-down & click-down, do nothing. On right motion detect, go to prev. track (like legacy PREV button)	animate screen sliding RIGHT

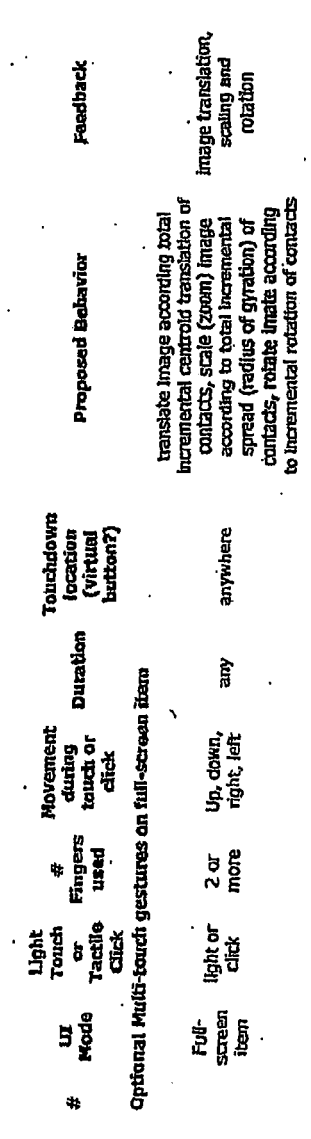
Fig. 27C

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000430

#	UI Mode	Light Touch or Tactile Click	# Fingers used	Movement during touch or click	Duration	Touchdown location (virtual button?)	Proposed Behavior	Feedback
Full-screen Item (Photo, map view, calendar day, single contact view, etc.)								
	Full-screen item	light	1	none	any	anywhere	do nothing	n/a
	Full-screen item	click	1	NONE	any	anywhere	On touch-down, do nothing. On click-down PLAY / PAUSE	change PLAY/PAUSE icon
	Full-screen item	light	1	UP/DOWN	any	anywhere	do nothing	n/a
	Full-screen item	light	1	LEFT	any	anywhere	do nothing	n/a
	Full-screen item	light	1	RIGHT	any	anywhere	On touch-down, do nothing. On right motion, go back out a folder (like legacy MENU function)	animate screen sliding RIGHT
	Full-screen item	click	1	UP/DOWN	any	anywhere	On touch-down & click-down, do nothing. On UP/DOWN motion detect, increase/decrease volume and disregard LEFT/RIGHT motion	Volume slider moves UP/DOWN
	Full-screen item	click	1	LEFT	any	anywhere	On touch-down & click-down, do nothing. On left motion, go to next item (like legacy NEXT button)	animate screen sliding LEFT
	Full-screen item	click	1	RIGHT	any	anywhere	On touch-down & click-down, do nothing. On right motion detect, go to prev. item (like legacy PREV button)	animate screen sliding RIGHT

FIG. 27D

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000431



#	UI Mode	Light Touch or Tactile Click	# Fingers used	Movement during touch or click	Duration	Touchdown location (virtual button?)	Proposed Behavior	Feedback
Optional Multi-touch gestures on full-screen item								
	Full-screen item	light or click	2 or more	Up, down, right, left	any	anywhere	translate image according total incremental centroid translation of contacts, scale (zoom) image according to total incremental spread (radius of gyration) of contacts, rotate image according to incremental rotation of contacts	image translation, scaling and rotation

Fig. 17E

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000432

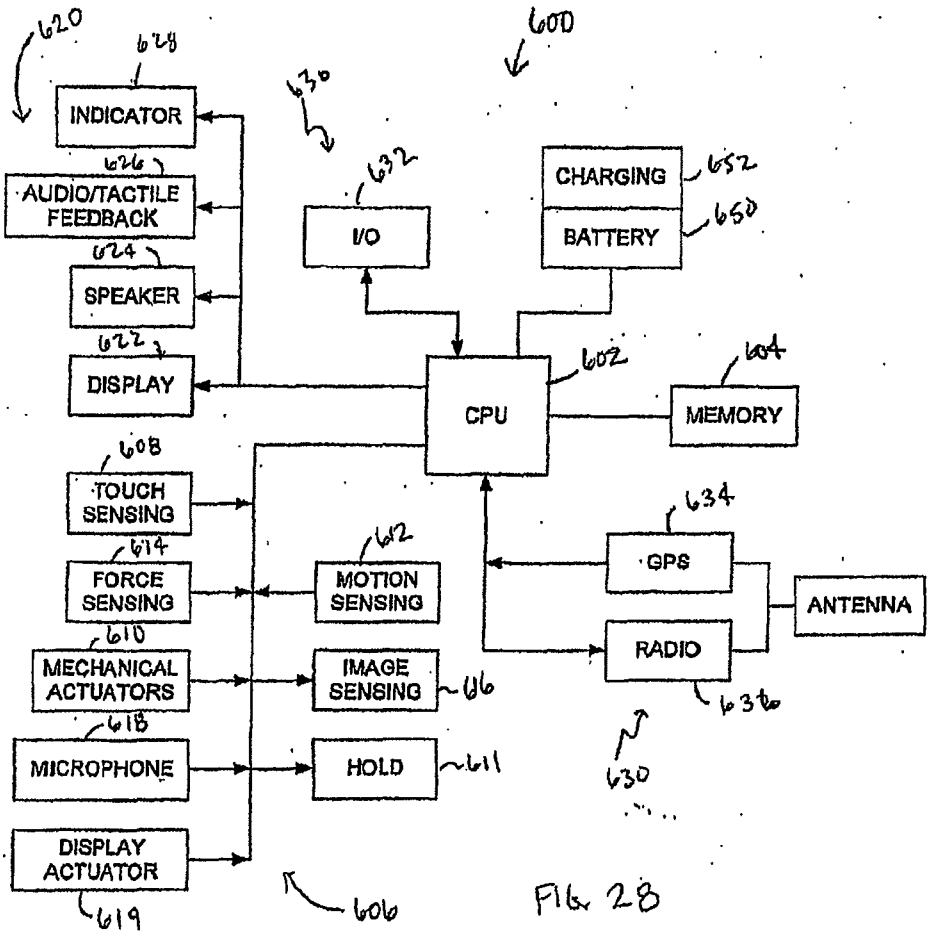


FIG. 28

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000433

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European Patent Office
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EUROPEAN SEARCH REPORT

Application Number
EP 10 01 0075

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2003/234768 A1 (REKIMOTO JUNICHI ET AL) 25 December 2003 (2003-12-25) * paragraph [0031] - paragraph [0068] * * figures *	1,2	INV. G06F1/16 G06F3/033
A	US 2003/206202 A1 (MORIYA TAKASHIRO) 6 November 2003 (2003-11-06) * paragraph [0012] * * paragraph [0022] - paragraph [0039]; figures 1-6 *	1	
A	US 2004/263484 A1 (MANTYSALO TAPIO ET AL) 30 December 2004 (2004-12-30) * paragraph [0004] - paragraph [0013] * * paragraph [0051] - paragraph [0068]; figures *	1,2	
A	US 2003/095095 A1 (PIHLAJA PEKKA JUHANA) 22 May 2003 (2003-05-22) * paragraph [0007] - paragraph [0008] * * paragraph [0020] - paragraph [0034]; figures 1,2,4,5 *	1	TECHNICAL FIELDS SEARCHED (IPC) G06F
A	US 2003/006974 A1 (CLOUGH JAMES ET AL) 9 January 2003 (2003-01-09) * paragraph [0004] - paragraph [0013] * * paragraph [0025] - paragraph [0053]; figures *	1	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	2 November 2010	Semple, Mark

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
O : non-written disclosure
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 10 01 0075

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02-11-2010

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000436

(12) UK Patent Application (19) GB (11) 2 310 567 (13) A

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(22) Date of Filing 23.02.1996

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GU15 3QZ, United Kingdom

(51) INT CL[6]
H04M 1/00 , H04Q 7/32

(52) UK CL (Edition O)
H4K KBKQ
H4L LECX L1H3 L30

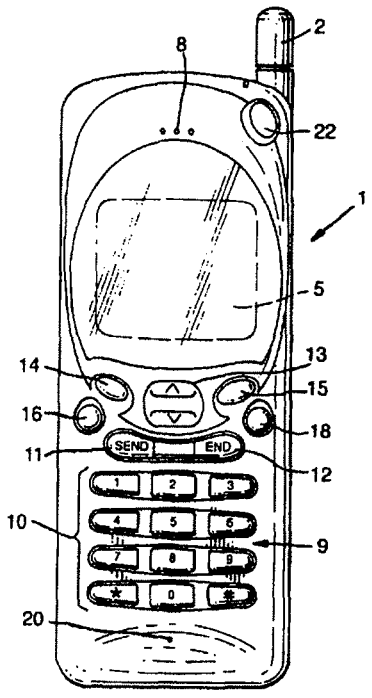
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(58) Field of Search
UK CL (Edition O) **H4K KBHX KBKQ KFH , H4L LECX**
INT CL[6] **H04B 1/38 , H04M 1/00 1/02 1/30 1/50 , H04Q 7/32**
ON-LINE : WPI, JAPIO

(54) Radiotelephone with user selectable default modes

(57) The radiotelephone has soft keys 14,15 and various functions associated with them. The function associated with a key 14, 15 in a particular mode is displayed adjacent the respective key on display 5. The telephone has means whereby the user can define the default mode functions. The radiotelephone enters the default mode, for example, on powering up, completion of a call or the exiting of a mode of operation.

Fig.1.



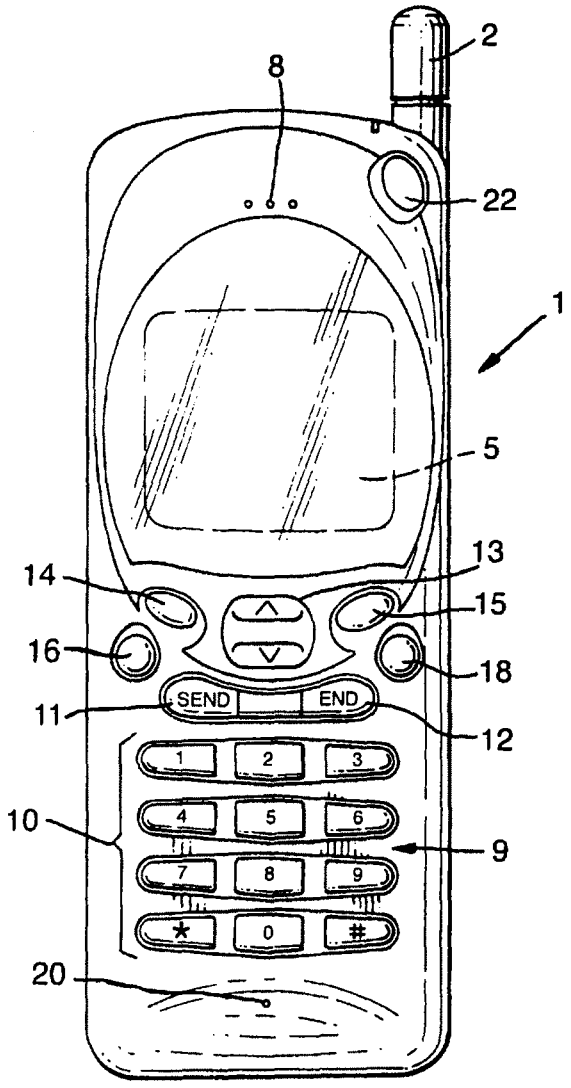
GB 2 310 567 A

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995

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Fig.1.



Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000438

Fig.2.

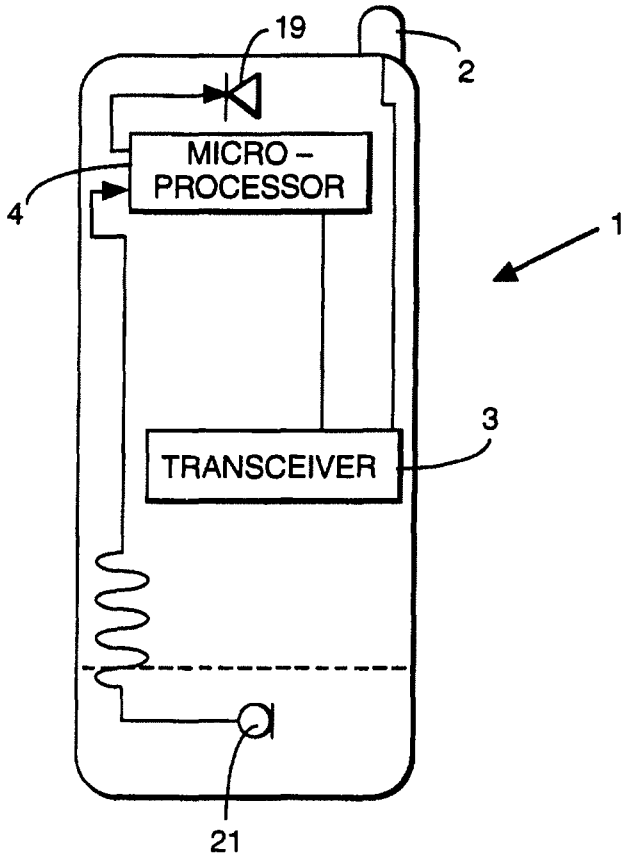


Fig.3.

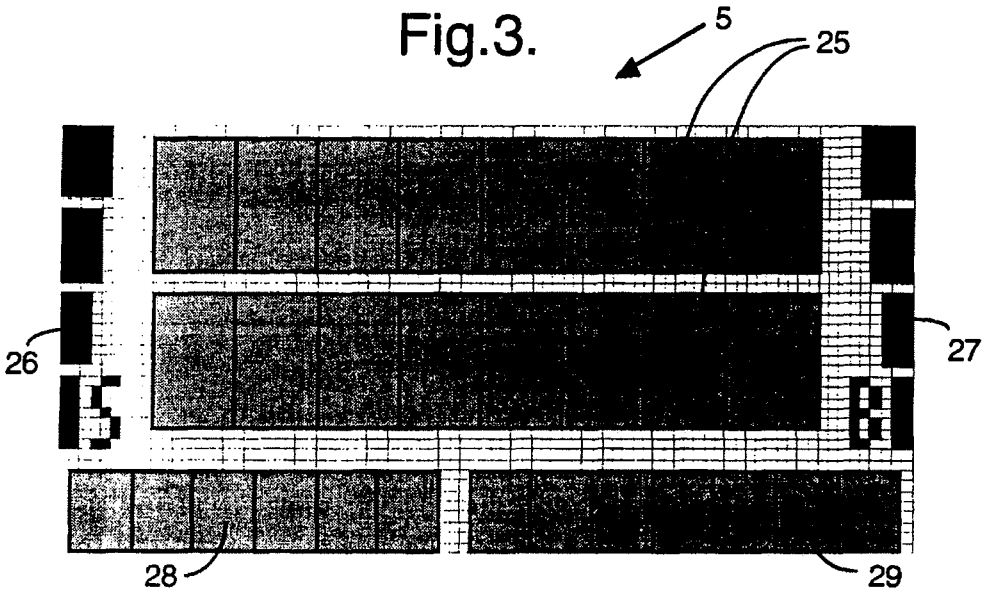
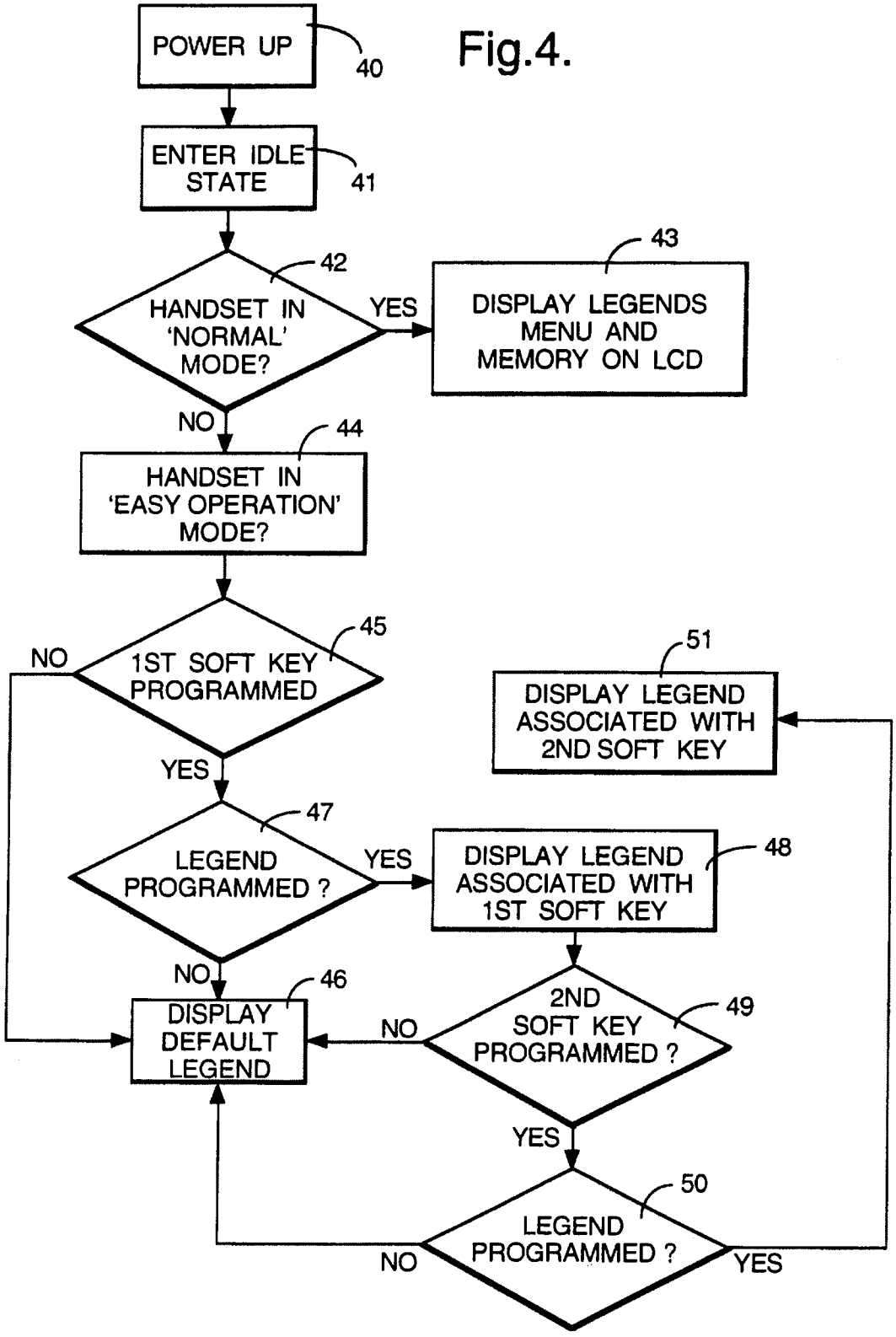
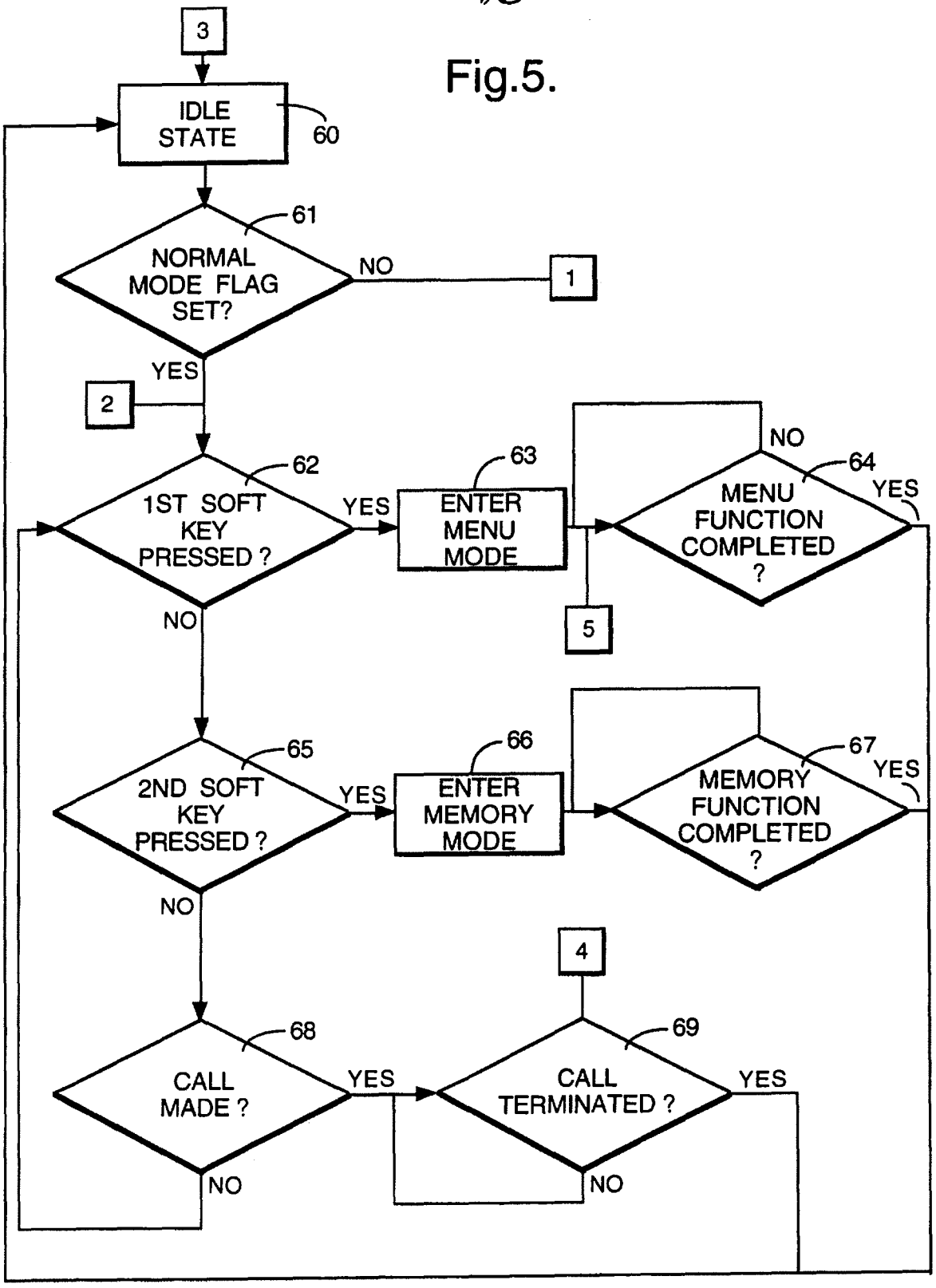


Fig.4.



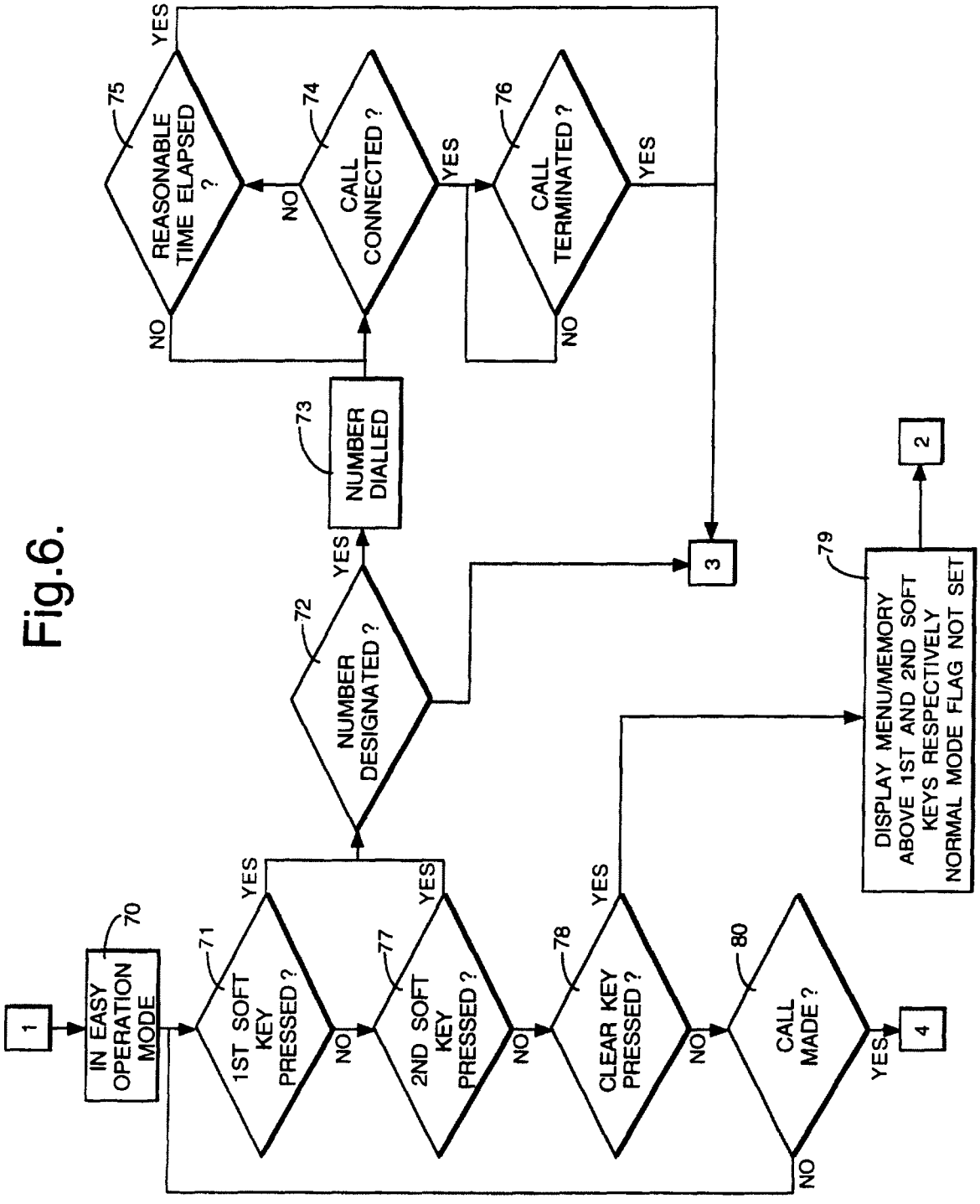
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Fig.5.



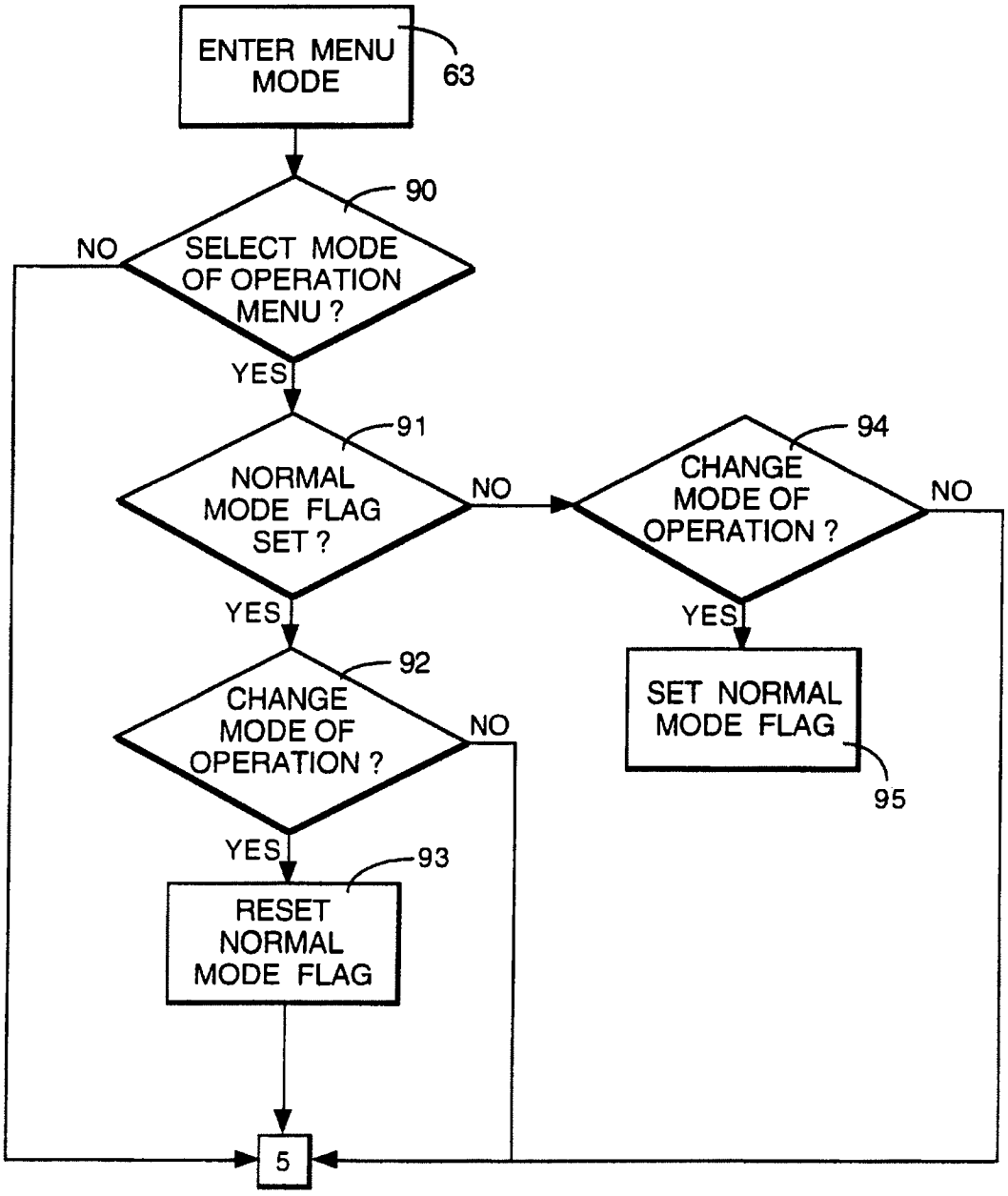
Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000441

Fig.6.



Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000442

Fig.7.



Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000443

A Radio Telephone

The invention relates to radio telephones sometimes referred to as radio handsets, in particular to radio telephones having user input means including a key with an associated legend for indicating the prevailing associated function thereof, and a processor responsive to actuation of the key to perform the respective associated functions.

Radio telephones have become complex technological devices, that can be off putting to users who are wary of technological advances. One of the concerns of designers of radio telephones is how to simply the phone to comply with the needs of a basic user who wants to use to use the radio telephone in the same way as he or she would use a typical landline phone ie to make and receive calls with minimum effort without alienating the more advanced user who enjoys the abundent features availble on many of today's radio telephones or vice versa.

Telephones are already known which include a speed dialling function allowing the user to call a telephone number stored at a predetermined location in a special abbreviated dialling memory, using a minimum number of keystrokes. This enables simplified operation of the radio telephone which, for priviate users who as a result of high tariffs will typcially use the phone to call relatively few numbers under a relatively restricted set of circumstances.

Other commercially available radio telephones have a number of dedicated keys for so-called super-speed dialling. These dedicated keys can be programmed by the user for storing selected numbers which can then be dialled using only a single keystroke. In other words, pressing one of the dedicated super-speed dialling keys will initiate a call to the pre-programmed telephone number associated therewith.

Although super-speed dialling has the advantage that only a single key stroke is required to initiate a call, it has the disadvantage that special additional keys are

required on the telephone keypad. This tends to make the keypad look more complicated and less user-friendly. Also the use of dedicated keys requires a larger keypad area, which is not compatible with smaller, more compact telephone handsets.

In accordance with the present invention there is provided a radio telephone operable in respective user selectable default modes to which the radio telephone returns under predetermined conditions comprising a processor, and user input means having a key with an associated legend for indicating the prevailing function associated therewith, the processor being operable to respond to actuation of the key to perform the respective associated function in the respective default modes.

The invention has the advantage of allowing different users to have a default mode tailored to their needs. The default modes may allow respectively simplified and complex use.

The the user is preferably able to select the function associated with the programmable key in a default mode. This allows any feature that might otherwise be difficult to perform because a large number of keystrokes are required to reach the function in a menu environment to be performed with a single key stroke. As the function is selectable by the user, the user can customise the telephone to cater for his or her individual needs and priorities. For example, if the user frequently wishes to change the default mode of operation of the handset, the user could select entry to the change of default mode menu setting on actuation of the programmable key.

Providing a programmable key for which the user can select a particular function in a particular default mode allows the user to set the telephone to a mode in which the particular function is performed by actuating the programmable key. A function given a high priority to an individual user is accessible without necessitating a large number of key presses or providing an

additional button that adds to the size, weight, cost, cluttered appearance and intimidation produced by the user interface; all of which radio telephone designers are striving to avoid.

The default mode is the mode that the handset enters on exit from other modes of operation of the telephone. The default mode will suitable be entered on powering up the telephone, and on termination of a telephone call.

In one particular embodiment of the invention the user selectable function associated with programmable key in the at least one of the respective default mode is an instant dial feature. The user can select a telephone number, suitably the most commonly used number, to be associated with the programmable key. In this embodiment, when the telephone the relevant default mode is selected, by pressing the programmable key the associated telephone number is dialled immediately. This allows the telephone to be set up to be used to make calls to frequently used numbers without it being necessary to use any of the more complicated features typically available on radio telephones. The same telephone can accordingly be used in the most appropriate fashion by both a basic and an advanced user.

In order to allow a simplified mode of operation of the telephone to be overridden in a straightforward fashion, suitably the processor is operable to change the function associated with the programmable key when in that default mode by user generation of a predefined cancellation signal. The function associated with the programmable key may only be temporarily be changed in response to the cancellation signal. Under these circumstances, it is possible for the function associated with the programmable key to revert to the function defined in the default mode on exiting the mode selected folowing generation of the cancellation signal.

The radio telephone suitably comprises a display to which the programmable key is adjacent and on which the associated legend is displayed.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000446

The user input means may comprise a plurality of programmable keys each having a respective function associated therewith for each of the default modes.

The invention will be described in more detail with reference to the accompanying drawings of which:

Figure 1 is a front view of a radio handset in accordance with an embodiment of the present invention;

Figure 2 is a schematic representation of the radio handset of Figure 1;

Figure 3 is a schematic representation of the liquid crystal display of the radio handset of Figures 1 and 2;

Figure 4 is a flow chart illustrating operation of the radio handset of Figures 1 and 2;

Figure 5 is a flow chart illustrating operation of the radio handset of Figures 1 and 2;

Figure 6 is a flow chart illustrating operation of the radio handset of Figures 1 and 2; and

Figure 7 is a flow chart illustrating operation of the radio telephone of Figures 1 and 2.

A radio telephone in accordance with an embodiment of this invention shown in Figures 1 and 2 comprises a housing 1 enclosing substantially the whole of the electronic circuitry of the radio telephone. The radio telephone has an antenna 2, a transceiver 3 and processing means 4 programmed with an algorithm which is

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000447

operative to select a communication channel with a base station (Figure 2). Information is displayed on a Liquid Crystal Display 5 (LCD).

Included on the housing is a key pad 9 which comprises a first group of keys or buttons 10 labelled 0 - 9, * and # arranged in an array of three rows and four columns, as is usual. The numeric digits 0,1,...9 and the characters "*" and "#" are especially for dialling telephone numbers, but also for entering alphanumeric data into the telephone number store. A second group of control keys or buttons for selecting various functions such as a call start key (eg labelled SEND) 11 a call terminate key 12 (eg labelled END), a scroll key 13, first 14 and second 15 soft keys that have a different associated function dependent upon the operating state of the radio telephone, a clear key 16, and a alphanumeric key 17 that toggles the input from the first group of keys between digits and alpha keys. For the purposes of this specification the term 'key' is taken to mean key or button or any similar element for user input to the microprocessor 4. The display panel, LCD 5 is located on the housing 1 above the two groups of keys. Above the display 5 is located a series of holes 8 behind which is an earphone 19 or speaker for transmitting speech or other sounds to the user of the radio telephone. The housing 1 also has a hole 20 at its lower end behind which is mounted a microphone 21 (Figure 2). The power is controlled by power key 22.

The user interface of the handset is shown in more detail in Figure 3. The visual display comprises the liquid crystal display 5 having regions 25 for displaying text to the user, a signal strength side bar 26 indicating signal strength and a battery capacity side bar 27 indicating battery capacity and first and second regions 28, 29 situated adjacent the soft keys 14,15 for displaying a legend indicating the prevailing function of the associated soft key.

In a NORMAL mode of operation, the soft keys 14, 15 may be used to access a variety of pre-set menus. In this mode one of the keys will have the legend 'MENU' displayed above it in the first region 28 on the LCD 5. Depression or actuation of this soft key 16 with the legend MENU enables the variety of pre-set

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000448

menus, the related instructions of which are stored in memory, to be viewed by depressing the scroll key 13 an appropriate number of times in one direction until a desired menu is reached. When the user is scrolling through the list of menus, the legend above the soft-key changes to 'select'. Actuation of the soft 14 key with this legend then allows the displayed menu to be selectively enabled. Once the relevant sub-menu is selected, the user is prompted to use the scroll key 13 to view each menu item in turn. The legends for the soft key 14,15 are then 'Select' and 'Quit' respectively to allow the user either to select a particular menu item or return to the previous screen as required. This is one way in which the soft keys can be utilised in a NORMAL mode of operation.

The radio telephone of this embodiment of the invention has an 'idle' state. This is the state adopted by the radio telephone when powered up and to which it reverts when not in use either because a call is terminated or other operations have been completed.

The functions of the soft keys in the idle state are dictated by the mode of operation adopted in the idle state, the default mode. For example, in a second mode of operation, termed the EASY OPERATION mode, the soft keys are arranged to function as speed-dial keys. The legend associated with the soft keys in this mode will indicate telephone numbers the user may wish to dial, for example, 'Peter' and 'Jack' respectively. Depressing or actuating one of the soft keys results in the telephone number associated with that soft key being dialled. The user need do no more than press the key and the call is made. There is no need even to press the SEND key following dialling the telephone number as is ordinarily the case.

Operation of the handset will now be described with reference to the two modes of operation possible in the idle state for this embodiment of the invention. These are the NORMAL mode in which the two soft keys perform the functions respectively of selecting the menu and accessing the radio telephone's memories and an EASY OPERATION mode in which the two soft keys perform the functions of speed

dialling two numbers selected by the user. In the EASY OPERATION mode, the legends above the soft keys are programmable by the user to label the numbers to be dialled when the keys are depressed so that the user remembers the numbers stored that are associated with the soft keys. The soft keys themselves are programmable with the numbers to be dialled.

Figure 4 is a flow chart illustrating operation of the radio telephone on powering up and entering the idle state. When the handset powers up 40, it enters an idle state immediately 41. The microprocessor checks to see if the handset is operating in NORMAL mode 42. If it is, the legends associated with the soft keys in the NORMAL mode are displayed 43 on the LCD 5 in the first and second regions 28,29. In the present example these legends are MENU and MEMORY respectively.

If it is determined that the handset is not in the NORMAL mode 42, as there are only two modes of operation in this embodiment, the handset is determined to be in the EASY OPERATION mode 44. The microprocessor 4 then checks to see if the 1st soft key has been programmed 45. If not a default legend is displayed on the LCD 46 and no function is performed on depression of the 1st soft key. If the 1st soft key has been programmed to hold a speed-dial number, the microprocessor checks if the legend has been programmed 47. If it has, the associated legend is displayed in the first region of the LCD display 48. If not, the default legend will be displayed 46. Depression of the 1st soft key, if suitably programmed, will in any case result in the number being called directly. If the legend has also been entered it will be clear to the user which telephone number the 1st soft key will dial if pressed. The default legend may be a standard character string indicating that no name is associated with the speed-dial number, or more practically, the previous legend used to identify the number to be dialled by depressing the 1st soft key.

The same process occurs for the 2nd soft key. The microprocessor checks to see if the second soft key is programmed 49. If it is, it also checks to see if the legend

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000450

is programmed 50 and if it is displays the legend associated with the 2nd soft key 51. If not, the default legend is displayed instead 46. In this way the LCD 5 is configured appropriately for the selected idle operating mode of the radio telephone when powered up. Figures 5, 6 and 7 illustrate operation of the radio telephone in the respective modes.

Beginning with Figure 5, when the radio telephone is in the idle state 60, the display will reflect the mode of operation. If the selected idle mode is NORMAL, the legend above the first soft key in this example will be MENU and the legend above the second soft key will be MEMORY. If the current idle mode is determined to be NORMAL 61, if the 1st soft key is pressed 62, the handset will enter a menu mode 63. In this mode, as discussed briefly above, the user is able to scroll through the available functions and change the operation state of the phone. One of the functions the user can perform in the memory mode is to change the mode of operation in the idle state. The user can scroll through the available options until a selection of NORMAL or EASY OPERATION is found. By scrolling between the options and pressing the soft key with the legend 'select' when the appropriate mode is highlighted, the user can change the idle operating mode if desired. When the user has completed any desired menu functions 64, the handset returns to the idle state 60. The processor then determines whether the handset is still in NORMAL mode 64 and the process continues.

Figure 7 shows the process of changing the mode of operation in the idle state in more detail. One of the menu mode operations that can be performed is changing the operating state of the radio telephone in idle. When the menu mode is entered 63 the processor determines if the mode of operation in idle state function has been selected 90. If it has the NORMAL mode flag is checked once more 91. The user is then able to toggle between selection of the NORMAL and EASY OPERATION modes by pressing the scroll key. A desired mode of operation will be selectable by depressing the soft keys that will be appropriately labelled 'select'. The prevailing mode will remain selected if the soft key with a legend 'Quit' is actuated. If the selection involves a change of mode of operation 92 ie the user

decides to change to the EASY OPERATION mode from the NORMAL mode, the NORMAL mode flag will be reset 93. If this does not involve a change of mode of operation ie the user decides to stay in the NORMAL mode, the flag will not be reset. In either case the radio telephone will remain in the menu mode until any operations are completed 64 at which point it returns to the idle state 60.

If the normal flag is not set at block 91 ie the handset is in the EASY OPERATION mode, the same process takes place. The microprocessor determines if the user has selected a new mode of operation 94. If it has, the NORMAL mode flag is set 95. If not, the handset will remain in the menu mode until the any menu functions are completed 64 and the handset returns to the idle state 60.

Returning to Figure 5, if the handset remains in NORMAL mode and the 1st soft key 14 is not pressed 62, the processor determines if the 2nd soft key 15 is pressed 65. If it is, the handset enters a MEMORY mode 66 and the user is able to perform memory functions. Once these have been completed 67, the handset returns to the idle state 61 and the processor determines the mode of operation 61. In this instance the handset will remain in NORMAL mode as the idle state mode cannot be changed in the memory mode. In the memory mode numbers can be stored and/or amended in the memory locations available.

If neither the 1st or 2nd soft key are actuated, the processor checks to see if a call is being made 68. If not, the process continues to poll the 1st and 2nd keys and the other keys of the key pad until the handset is again in use. If the processor determines that a call has been made 68, the call is monitored until the call has terminated 69. When the call has terminated 69 the handset reverts to the idle state 60 and the process continues.

Operation in EASY OPERATION mode will now be described with reference to Figure 6. If the handset is not in NORMAL mode 61 (Figure 5), it is determined to be in EASY OPERATION mode 70 as in this particular embodiment there are only two possible modes of operation in the idle state. In the EASY OPERATION mode

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000452

70 if the 1st soft key 14 is pressed 71, the processor 4 checks to see if there is a telephone number associated with the soft key 72. If there is, the number is dialled 73. The processor 4 checks to determine if the call has been connected 74. If not, after a reasonable period of time has elapsed 75, for example 30 seconds, the radio telephone reverts to the idle state 60. If the call is connected 74, the microprocessor 4 monitors the call to determine if it has terminated 76. When it has terminated, the radio telephone again reverts to the idle state 60.

The same steps are taken if instead of the 1st soft key being pressed 7 it is the 2nd soft key that is pressed 77. The difference being that another designated number will be dialled 73 instead. If neither of the soft keys are pressed the processors checks if the clear key 16 has been actuated 78. The clear key 16 in this embodiment is used to temporarily change the operation mode when in the idle state from the EASY OPERATION mode to the NORMAL mode of operation. Alternatively this can be viewed a temporarily changing the functions associated with the soft keys in EASY OPERATION mode to mimic those associated with them in the NORMAL mode.

When the NORMAL mode of operation has been entered temporarily by pressing the clear key 16 the legends associated with the soft keys 14, 15 in the NORMAL mode are displayed 79 in the first and second regions 28, 29 above the respective keys. These legends indicate the functions currently associated with the soft keys. The mode of operation in the idle state is not changed at this point. By actuating the menu or memory keys at this stage, the handset will operate as if in the NORMAL mode, however, when the handset next enters the idle state 61 the handset will still be in the EASY OPERATION mode as the NORMAL mode flag has not been set 61.

If the clear key 16 has not been pressed, the processor determines if a call has been made 80. If not the key pad continues to be polled 71,77,78,80, until an action is taken by the user. If a call is made 80, the processor monitors the call and when it is terminated 69 (Figure 5) the radio telephone returns to the idle state.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000453

In other embodiments of the invention consecutive actuations of the clear key 16 could be used to cause the handset to toggle between displaying the legends of the EASY OPERATION mode and the NORMAL mode on the LCD with the corresponding changes in the functionality of the soft keys 14,15. In yet other embodiments of the invention the NORMAL mode flag could be set when the clear key 16 is depressed to change the mode of the idle state permanently ie until the user chooses to change the mode by entering the menu mode, or perhaps semi permanently, for example, until the next time the handset is powered down.

In the embodiment described, there are only two operational states the handset can adopt in the idle state ie NORMAL and EASY OPERATION. In other embodiments of the invention there could be more than two modes available in the idle state. In this case the functionality of the soft keys would depend on which of the more than two modes, is the prevailing or current mode.

The functionality of the soft keys is not restricted to MENU, MEMORY or SPEED DIALLING. The soft keys could, in other embodiments of the invention, be programmed to adopt any of the functionalities available to the handset. Suitably these would be functions a particular user uses predominantly and would be programmable by the user to suit particular needs. For example, the user may wish to have the handset operate in a particular fashion when at work and in a different fashion at home. In embodiments of the present invention, the user could programme the soft keys to enter the 'work' and 'home' modes on depression of the associated soft key in the idle state.

The present invention includes any novel feature or combination of features disclosed herein either explicitly or any generalisation thereof irrespective of whether or not it relates to the claimed invention or mitigates any or all of the problems addressed.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000454

In view of the foregoing description it will be evident to a person skilled in the art that various modifications may be made within the scope of the invention.

Claims

1. A radio telephone operable in respective user selectable default modes to which the radio telephone returns under predetermined conditions comprising a processor, and user input means having a key with an associated legend for indicating the prevailing function associated therewith, the processor being operable to respond to actuation of the key to perform the respective associated function in the respective default modes.

2. A radio telephone according to claim 1 wherein the function associated with the key is user selectable for at least one of the respective default modes

3. A radio telephone according to claim 1 or 2 wherein the predetermined conditions comprise powering up the radio telephone.

4. A radio telephone according to any preceding claim wherein the predetermined conditions comprise termination of a telephone call.

5. A radio telephone according to any preceding claim wherein the predetermined conditions comprise exiting a selected mode of operation.

6. A radio telephone according to any preceding claim wherein the predetermined function comprises dialling a user selected telephone number associated with the key.

7. A radio telephone according to any preceding claim wherein the processor is operable to change the function associated with the key by user generation of a predefined cancellation signal.

8. A radio telephone according to claim 7 wherein the radio telephone subsequently reverts to the selected default mode.

9. A radio telephone according to any preceding claim wherein radio telephone comprises a display to which the programmable key is adjacent and on which the associated legend is displayed.

10. A radio telephone according to any preceding claim wherein the user input means comprises a plurality of keys each having a respective function associated therewith for each of the respective default modes.

11. A radio telephone substantially as hereinbefore described with reference to Figure 1 to 7 of the drawings.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000457

The Patent Office

15.

Application No: GB 9603926.8 **Examiner:** Paul Derry
Claims searched: 1-10 **Date of search:** 22 May 1996

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Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): H4K - (KFH, KBKQ, KBHX), H4L - (LECX)

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Other: On-line : WPI, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
A	GB 2285897 A	(NORTHERN TELECOM) See especially lines 12-17 of page 7.	
X	EP 0365200 A2	(AT&T) See the whole document.	1, 2 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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INFORMATION DISPLAY DEVICE

Inventor(s):	KONDO TAKASHI; KUDO TAKAHIRO; AKITA TAKASHI ±	
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Classification:	**- international:**	***G01C21/00; G06F3/048; G06T11/60; G08G1/0969; G09B29/00; G09B29/10; G09G5/00; G09G5/36; G09G5/377***
	- European:	
Application number:	JP20050260130 20050908	
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Abstract of JP2007072233 (A)

PROBLEM TO BE SOLVED: To provide an information display device which displays display information as an image based upon data as the display information, the information display device being capable of enlargement display through easy operation even when a plurality of arbitrary points to be enlarged are present apart from one another and information display taking wide-area and detailed scales into account. ; SOLUTION: When a wide-area (main) map and a detailed (enlarged) map are displayed on one display screen one over the other at the same time, the enlarged map is moved in synchronism with a movement quantity and a direction of a slide detected by a means of detecting the slide on the display screen. Further, the information display device is provided with a means of moving the enlarged map according to the scale of the wide-area map to display the enlarged map with a wide range on the main map and a means of moving according to the scale of the enlarged map to display movement of a very small region in the enlarged map. ; COPYRIGHT: (C)2007,JPO&INPIT

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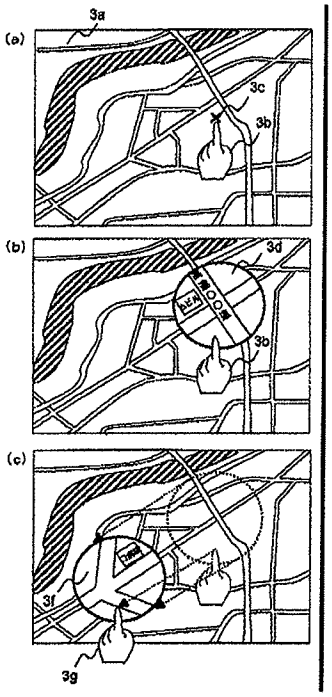
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(54)【発明の名称】情報表示装置

(57)【要約】
【課題】表示情報としてのデータに基づいて、情報を画像として表示する情報表示装置に関し、拡大したい任意点が複数離れてあっても簡単な操作で拡大表示することができるとともに、広域と詳細の縮尺を考慮した情報表示が可能な情報表示装置を提供することを目的とする。
【解決手段】１つの表示画面に広域（メイン）の図と詳細（拡大図）の図を同時に重畳表示させた場合に、表示画面上のスライドを検知する手段により検知されたスライドの移動量、方向に同期して拡大図を移動させる。また、メイン図上の広い範囲で拡大図を表示するために拡大図の移動を広域図の縮尺に合わせて移動させる手段と、拡大図内の微小領域の移動を表示するために拡大図の縮尺に合わせて移動する手段とを設ける。
【選択図】図３



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【特許請求の範囲】
【請求項1】
表示情報を記憶する情報記憶手段と、前記情報記憶手段に記憶された表示情報からなるメイン図を所定の縮尺で表示する表示手段と、前記表示手段への物理的な接触により指示を入力する入力手段と、前記入力手段により入力された任意点から所定領域の拡大図を生成し、前記メイン図上に前記拡大図を重畳表示する拡大図表示手段と、前記入力手段により入力された接触点の移動指示に応じて前記メイン図上の前記拡大図の表示位置を移動し、前記入力手段により入力された接触点の移動指示に応じた位置の拡大図を表示する拡大図移動手段とを備えることを特徴とする情報表示装置。
【請求項2】
前記拡大図表示手段は、前記任意点を表示中心とする円形の拡大図を重畳表示することを特徴とする請求項１記載の情報表示装置。
【請求項3】
前記拡大図表示手段は、前記任意点より上部を表示中心とする円形の拡大図を重畳表示することを特徴とする請求項１記載の情報表示装置。
【請求項4】
前記拡大図表示手段で重畳表示する拡大図の形状、サイズ、縮尺、表示中心のいずれかを設定するための設定手段を備えることを特徴とする請求項１記載の情報表示装置。
【請求項5】
表示情報を記憶する情報記憶手段と、前記情報記憶手段に記憶された表示情報からなるメイン図を所定の縮尺で表示する表示手段と、指示を入力する入力手段と、前記入力手段により入力された任意点から所定領域の拡大図を生成し、前記メイン図上に前記拡大図を重畳表示する拡大図表示手段と、前記入力手段により入力された任意点の移動指示に応じて前記メイン図上の前記拡大図の表示位置を移動し、前記入力手段により入力された任意点の移動指示に応じた位置の拡大図を表示する拡大図移動手段を備え、前記メイン図上に広域の縮尺を考慮した制御を行う広域制御エリアと詳細の縮尺を考慮した制御を行う詳細制御エリアを設けたことを特徴とする情報表示装置。
【請求項6】
前記広域制御エリアで前記入力手段により前記拡大図の移動指示をする場合、前記入力手段により指示された任意点の移動距離は、前記メイン図の縮尺での移動距離であり、前記詳細制御エリアで前記入力手段により前記拡大図の移動指示をする場合、前記入力手段により指示された任意点の移動距離は、前記拡大図の縮尺での移動距離であることを特徴とする請求項５記載の情報表示装置。
【請求項7】
前記詳細制御エリアにおいて、前記入力手段による任意点の入力があった場合、前記拡大図移動手段は、前記拡大図の表示中心を前記任意点とするように前記メイン図上の前記拡大図の表示位置を移動し、前記任意点を表示中心とする位置の拡大図を表示することを特徴とする請求項５記載の情報表示装置。
【請求項8】
前記広域制御エリアは前記拡大図の外枠であり、前記詳細制御エリアは前記拡大図の内部であることを特徴とする請求項５から請求項７のいずれかに記載の情報表示装置。
【請求項9】
前記詳細制御エリアで前記入力手段により前記拡大図の移動指示をする場合に、前記拡大図の表示中心である第１の座標値と前記メイン図上に前記拡大図を表示するための第２の座標値が常に一致することを特徴とする請求項５から請求項７のいずれかに記載の情報表示装置。
【請求項10】
前記入力手段により所定の時間以上長押しされたかどうかを判定する長押し判定手段を有し、前記拡大図内において所定の時間以上長押しされたことを前記長押し判定手段により

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検知すると、前記メイン図の縮尺を前記拡大図の縮尺に変更して表示することを特徴とする請求項１または請求項５記載の情報表示装置。
【請求項11】
前記入力手段により所定の時間以上長押しされたかどうかを判定する長押し判定手段を有し、前記拡大図内において所定の時間以上長押しされたことを前記長押し判定手段により検知すると、前記メイン図の縮尺を前記拡大図の縮尺に変更して表示し、前記拡大図の縮尺を変更後の前記メイン図の縮尺より詳細な縮尺に変更することを特徴とする請求項１または【発明の詳細な説明】記載の情報表示装置。
【技術分野】
【0001】
本発明は、表示情報としてのデータに基づいて、表示情報を画像として表示する情報表示装置に関し、特に、表示した画像の一部を拡大表示する情報表示装置に関する。
【背景技術】
【0002】
近年、ＨＤＤやＤＶＤに記憶される地図情報を現在位置や車両周辺の情報とともにディスプレイ上へ表示可能なナビゲーション装置やインターネット等の通信手段により受信した情報等をパソコン上に表示するアプリケーションが広く普及している。
【0003】
特に、ナビゲーション装置において、表示中の地図上にある任意部分だけを拡大表示することができる走行位置表示装置が開示されている（例えば、特許文献１参照）。特許文献１の走行位置表示装置では、地図上にある任意点が押下されると当該押下された任意点を検出し、任意点を含む所定領域を指定する。さらに、当該指定された領域に相当する地図を拡大表示する。
【0004】
同様に、１表示画面上に縮尺の異なる複数の地図情報を表示することができる地図表示装置が開示されている（例えば、特許文献２参照）。これにより、現在位置に近い周囲の詳細な情報と、その周囲の広域の情報を同時に見て把握することができる。
【特許文献1】特開平７－３３２９９１号公報
【特許文献2】特開２００２－５６７２号公報
【発明の開示】
【発明が解決しようとする課題】
【0005】
しかしながら、従来のナビゲーション装置やパソコン上で動作するアプリケーションにおいては、任意点付近の詳細図を一度に一箇所しか見ることができず、特に上記特許文献１では１表示画面上に広域の地図を表示しているときに拡大したい任意点が複数離れてある場合には、何度も指を押したり離したりして詳細地図の枠を表示させ所望の地点を探す必要があり、操作が煩雑になるという課題があった。特に、特許文献２では拡大表示する領域は現在地周辺のみに特化している。
【0006】
さらに、１表示画面上に異なる縮尺の地図を同時に表示している場合において、広域のメイン地図の縮尺と異なる詳細地図の縮尺に応じた地図表示を簡単な操作で行うことはできなかった。すなわち、詳細地図を表示する拡大図を広域地図が表示される１表示画面上を上下左右に自由に移動させる場合において、拡大図を広域地図の縮尺に応じて移動させると拡大図の枠内の詳細地図は大きく移動してしまうため、詳細地図を微小領域移動させることが困難になるという課題を有している。
【0007】
本発明は、こうしたことを背景としてなされたものである。すなわち本発明によれば、拡大したい任意点が複数離れてあっても簡単な操作で拡大表示することができるとともに、詳細地図を微小領域移動させることも可能な操作性に優れた情報表示装置を提供することを目的とする。

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【課題を解決するための手段】
【0008】
前記目的を達成するために、本発明における情報表示装置は、ユーザーに提供するための情報を記憶した情報記憶手段と、液晶ディスプレイや有機ＥＬディスプレイ等の表示手段と、タッチパネル等の物理的な接触により指示を入力する入力手段と、入力された任意点から所定領域を決定し、表示手段に表示されているメイン図上に拡大図を重畳表示する拡大図表示手段と、入力された任意点の移動に応じてメイン図上の拡大図の表示位置を移動し、かつ任意点の移動に応じた位置の拡大図を表示する拡大図移動手段とを備えるように構成したものである。拡大図の形状は、円形、四角形、多角形等どのような形状でもよく、表示中心を入力された任意点より上部にするなど操作性、視認性が良くなるような形態としてもよい。これらの条件を設定する設定手段を備えるようにしてもよい。
【0009】
また、メイン図上に広域の縮尺を考慮した制御を行う広域制御エリアと詳細の縮尺を考慮した制御を行う詳細制御エリアを設けるように構成し、広域制御エリアで拡大図の移動指示をする場合、メイン図の縮尺で拡大図を移動、および表示し、詳細制御エリアで拡大図の移動指示をする場合、詳細図の縮尺で拡大図を移動、および表示するように構成したものである。例えば、拡大図の外枠を広域制御エリア、拡大図の内部を詳細制御エリアとすることが考えられる。拡大図内や詳細制御エリアにおいて、任意点が入力された場合、メイン図上の拡大図の表示位置を任意点に移動し、かつ任意点を表示中心とする拡大図を表示するようにしてもよい。
【0010】
また、拡大図の移動と同時に、または移動完了後、拡大図の表示中心とメイン図における拡大図を表示するための座標値が一致するように構成したものである。
【0011】
また、拡大図内や詳細制御エリア内で長押しされた場合、メイン図の縮尺を拡大図と同じ縮尺に変更して表示するよう構成したり、さらに拡大図の縮尺を変更後のメイン図の縮尺より詳細な縮尺に変更するように構成したものである。
【発明の効果】
【0012】
本発明の情報表示装置は、上記説明した課題を解決するための手段から明らかなように、拡大したい任意点が複数離れてあっても接触点の移動指示による簡単な操作を行うことで複数点の拡大表示を連続的に行うことができるとともに、使用者は好みのサイズと縮尺の拡大図を表示することができる。特に、タッチパネル等の表示手段への物理的な接触による入力指示とすることにより、表示画面上での拡大図の動きと入力動作とが連動して動くこととなり、優れた操作性とすることが可能となる。
【0013】
また、本発明の情報表示装置は、広域制御エリアと詳細制御エリアを設けたので、簡単な操作でそれぞれの縮尺に合った拡大図の移動操作をすることが可能となり、メイン図の縮尺と拡大図の縮尺が大きく違う場合でも、それぞれの縮尺に応じた拡大図表示が可能な操作性に優れた地図表示装置を提供することができる。
【発明を実施するための最良の形態】
【0014】
以下、本発明の実施の形態１、２による情報表示装置について、図面を参照しながら具体的に説明する。本実施の情報表示装置としては、例えば自動車などの移動体に設置されるナビゲーション装置に適用した場合を例に挙げる。
【0015】
（実施の形態１）
図１は、本実施の形態のナビゲーション装置の全体構成を示す構成図である。ナビゲーション装置１は、制御部１０、地図情報記憶部１１、測位部１２、入力部１３、表示部１４から構成されている。尚、各図面において、本発明に関係のない構成要素は省略してい

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る。

【0016】

図１において、制御部１０（１０Ａは実施の形態１で、１０Ｂは実施の形態２で詳しく説明する）は、ナビゲーション装置１全体の動作を制御するＣＰＵやＭＰＵである。地図情報記憶部１１は、道路や交差点のデータ等の地図情報が記憶される、例えば、ＨＤＤやＤＶＤである。しかしながら、これに限らず、図示しない通信手段（例えば、携帯電話）によって地図情報記憶部１１に格納する情報をセンター設備より都度ダウンロードする構成も可能である。また、地図情報記憶部１１には、異なる縮尺の地図が記憶されている。測位部１２は、車両の現在位置や速度、方位を測位するための手段であり、例えば、ＧＮＳＳ（Global Navigation Satellite System）受信機、車速センサ、ジャイロセンサなどである。ＧＮＳＳ受信機は、例えば、ＧＰＳ受信機であり、衛星からの電波を受信し、それを復調することで受信機の位置を算出するものである。入力部１３は、ユーザーがナビゲーション装置１に対する指示を入力するための手段であり、タッチパネル、リモートコントローラー、音声入力装置等である。なお、以下では入力部１３は指の接触やスライドを検知するタッチパネルとし、表示部１４の上に配置される。入力部１３による地図の拡大操作に伴う処理については、後で詳細に説明する。表示部１４は、地図情報記憶部１１に記憶される地図情報などを表示するための液晶ディスプレイ、有機ＥＬディスプレイなどである。

【0017】

以上のように構成されたナビゲーション装置１において、制御部１０Ａは次に説明するナビゲーション装置としての基本機能が制御可能である。測位部１２で取得する現在位置と入力部１３から入力された目的地により、ルート探索を行い、その結果を表示部１４に表示することができる。また、測位部１２で得た車両の現在位置や速度、方位に関するデータをもとに自車位置マークを時々刻々とマップマッチング処理等により地図に重畳表示することができる。また、自車位置がルート上の誘導案内ポイントに達したときには、表示部１４に交差点拡大図を表示したり、図示しないスピーカ等の音声出力部からガイド音声を出力したりすることができる。

【0018】

また、本実施の形態１に係るナビゲーション装置では、表示部１４上に表示された画面を通じて、ユーザーが各種の設定を行うことができる。図２は「タッチパネルの設定」画面の一例を示しており、地図表示中にタッチパネルを短押しすることにより設定されるモードをユーザーが自由に選択・設定することができるようになっている。

【0019】

図２に例示する設定画面において、「中心へ移動」が選択・設定されている場合には、地図表示中にタッチパネルの任意の箇所の短押しが検出されると、制御部１０Ａは押下された点を画面中心に来るように地図のスクロールを行う。一方、「拡大図表示」が選択・設定されている場合は、後述する拡大図を表示するための各種の制御が行われる。なお、短押しとして説明したが、これに限らず、ナビゲーション装置１に係るその他の機能と重複がなければ、長押しや複数回押しで実現することも可能である。また、タッチパネルによる入力だけではなく、音声入力やリモートコントローラーでの入力により、選択・設定しても良いことはもちろんである。

【0020】

次に、図２で示した「拡大図表示」が選択・設定されている場合に表示部１４に表示される地図の拡大表示方法を図３（ａ）～（ｃ）に示した表示例に基づき説明する。

【0021】

図３（ａ）～（ｃ）は本実施の形態１の地図拡大表示方法の表示例を示す模式図である。図３（ａ）は、表示部１４に表示される地図の一例を表しており、３ａは表示部１４の表示画面一杯に表示される地図画像であり、以下『メイン地図』と呼ぶ。３ｂはユーザーのタッチする指を表しており、その接触点を３ｃで示す×印で示している（×印は実際には表示されない。）。なお、簡略化のため文字情報やランドマーク情報等の他の表示を省

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略している。

【0022】

ユーザーがタッチすると図３（ｂ）に示すような円形の拡大図３ｄが表示される。なお、拡大図３ｄは円形としているが、円形に限らず、楕円形であったり、四角形などの多角形状であってもよい。また、拡大図内部に表示する詳細地図を透過表示し、メイン地図と同時に表示するようにしてもよい。

【0023】

次に、ユーザーによる接触点からの指のスライド移動（例えば、図３（ｃ）における破線矢印で示したような動作）が検出されると、拡大図３ｄ（図３（ｃ）における破線円）が指の位置と同期してスライド移動し拡大図３ｆが表示される。拡大図３ｄから３ｆへの移動の間、拡大図内の詳細地図をある一定の間隔でメイン地図上の拡大図の位置に合わせて更新してもよいし、スライド移動が終了したことを検知したときのみ更新してもよい。３ｇはスライド移動後の指である。なお、破線は実際には表示されない。

【0024】

次に、図３（ｂ）で示したユーザーの指の位置と拡大図の配置関係について図４を用いて詳しく説明する。

【0025】

図４は、ユーザーの指の位置と拡大図の配置関係を示す模式図である。図４において、４ａは拡大図であり、４ｂは拡大図の表示中心であり、４ｃはユーザーの指であり、４ｄは指押下点であり、４ｅは拡大図の上端から指押下点までの距離であり、４ｆは拡大図の下端から指押下点までの距離である。図４に示すように、指押下点４ｄよりも上に拡大図の表示中心４ｂが来るように拡大図を表示する。例えば、４ｅと４ｆの比率を５：１に設定する（この比率は表示部１４に表示する図示しない設定画面を通じて変更可能にしても良い）。これにより、拡大図の表示中心４ｂと指押下点４ｄを一致させる拡大図表示と比べて、ユーザーは手や指に邪魔されず拡大図を視認することができる。

【0026】

次に、本実施の形態１に係るナビゲーション装置１における制御部１０Ａの動作について図５～９を参照し説明する。

【0027】

図５はメイン地図の任意の点を押下してから拡大図を表示するまでの動作を示す動作フロー図である。なお、本処理動作は、拡大図表示モード設定時に実行される。

【0028】

まず、メイン地図における任意の点をタッチされるまでは待機状態を維持する（Ｓ１０およびＳ１１：Ｎｏ）。メイン地図を表示中にタッチパネルの任意点が押下されると（Ｓ１１：Ｙｅｓ）、ステップＳ１２に処理を進める。ステップＳ１２では、拡大図の領域（図３（ｂ）で示した円形の大きさ）を取得し、表示中心（図４における４ｂ）を算出、さらに表示中心の座標値を取得する。なお、座標値は、通常地図で管理される座標値である正規化座標値（縦ＸＨ×横ＹＨ）を用いる。正規化座標については特許文献１で詳しく述べられているのでその説明は省略する。次いで、ステップＳ１３では拡大図の縮尺を取得する。そして、拡大図をメイン地図上に重ねて表示する（Ｓ１４）。

【0029】

なお、図５の動作フロー図におけるステップＳ１２とＳ１３で説明した拡大図の領域の取得、縮尺の取得については、あらかじめ後述する設定画面を通じてメモリ（不図示）等に設定・記憶された領域、縮尺を参照することで取得することが望ましい。

【0030】

次に、拡大図の領域と縮尺を設定する画面の一例について、図７～９を参照し説明する。ユーザーは図７～９に示す設定画面を通じて、拡大図の領域と縮尺を自由に選択・設定することができるようになっている。

【0031】

図７は、表示部１４上に表示され、拡大図の領域を設定するか、あるいは縮尺を設定す

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るかをユーザーに選択させるための拡大図表示設定画面の一例を示す模式図である。ここで、制御部１０Ａは、「拡大図領域設定」が選択されると、図８に示す拡大図領域設定画面を表示し、「拡大図縮尺設定」が選択されると、図９に示す拡大図縮尺設定画面を表示する。

【0032】

図８は、拡大図の領域を自由に選択・設定することを可能とする拡大図領域設定画面の一例を示す模式図である。図８に示すように、拡大図の領域を「大」、「中」、「小」と３段階で選択・設定することができるようになっている。図８（ａ）は「大」が選択された状態であり、図８（ｂ）は「中」が選択された状態であり、図８（ｃ）は「小」が選択された状態である。ユーザーは設定釦を押下することにより、図３（ｂ）で示した拡大図の領域を設定、メモリに記憶することができる。なお、図８では、領域は「大」、「中」、「小」の３段階として説明したが、これに限らず、複数段階での設定やスライドバー等を使った連続的な領域設定を行えるようにしても良い。また、図８では、拡大図の領域形状を円形としたが、楕円形や四角形等の多角形としてもよいし、任意の形状とすることも可能である。

【0033】

図９は、拡大図の縮尺を自由に選択・設定することを可能とする拡大図領域設定画面の一例を示す模式図である。図９では、説明を簡略化するために、地図情報記憶部１１には５段階の縮尺の地図が格納されているものとする。ここで、メイン地図の縮尺５段階それぞれに応じて、拡大図の縮尺設定ができるようになっている。図９（ａ）は、メイン地図の縮尺が一番広域であるときに、拡大図の縮尺が４段階で切替えることを示す模式図である（現在は２番目に広域な縮尺を選択している状態）。また、現在の縮尺と同じ縮尺の拡大図は表示できないようになっている（斜線はトーンダウンを表す）。図９（ｂ）は、メイン地図の縮尺が真ん中（３番目）であるときに、拡大図の縮尺が２段階で切替えることを示す模式図である（現在は２番目に詳細な縮尺を選択している状態）。また、現在の縮尺と同じかあるいは広域な縮尺の拡大図は表示できないようになっている（斜線はトーンダウンを表す）。図９（ｃ）は、メイン地図の縮尺が一番詳細であるときに、拡大図の縮尺が０段階で切替えることを示す模式図である（拡大図の選択ができない状態）。メイン地図の縮尺は一番詳細なため、これ以上詳細な拡大図は表示することができないため、拡大図の縮尺設定はすべてトーンダウンされている状態である。このように、メイン地図の縮尺が一番詳細なときは、図５の動作フロー図ステップＳ１４で行う拡大図表示は、例外として表示しないことが望ましい。

【0034】

なお、上記説明では、拡大図の領域設定と縮尺設定をユーザーが自由に選択・設定することを示したが、これに限らず、制御部１０Ａが自動化して拡大図の領域と縮尺を任意に設定しても良い。拡大図の領域の設定に関しては、場所に応じて自由にその円の大きさを変化させることができる。例えば、建物の密集度が高い地域（例えば市街地）では拡大図の円の大きさを大きくし、密集度が低くなる程、円の大きさを小さくすることができる。他の実施態様では、メイン地図の縮尺に応じて自由に拡大図の円の大きさを変化させることができる。例えば、メイン地図が広域の地図を表示しているときは拡大図の円の大きさを大きくし、詳細になる程、円の大きさを小さくすることができる。一方、拡大図の縮尺の設定に関しては、例えば、拡大図に表示する縮尺はメイン地図に表示する縮尺より１段階詳細な地図というように固定的に設定することもできる。

【0035】

次に、本実施の形態１に係るナビゲーション装置１における制御部１０Ａの動作の説明を図６に戻り続ける。

【0036】

図６は拡大図を表示中（指も押下された状態を継続）にユーザーから指示があった場合の動作を示す動作フロー図である。なお、本処理動作は、図５における（Ａ）以降の処理である。図６（ａ）は、拡大図表示中に指のスライドに同期して拡大図も移動させること

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を示す動作フロー図である。まず、押下点からのスライド移動があるかを判断する（Ｓ１５）。スライド移動が無い場合は、再び（Ａ）に処理を戻す（Ｓ１５：Ｎｏ）。一方、スライド移動を検知した場合には（Ｓ１５：Ｙｅｓ）、ステップＳ１６に処理を進める。ステップＳ１６では、拡大図を指のスライドと同期して移動させる。次いで、図５における（Ｃ）以降の処理を行い、指のスライドした先の拡大図を同じようにして表示させる。本動作フローにより、図３（ｃ）で示した拡大図の表示が可能となる。なお、ステップＳ１６の後に、指のスライドが停止したかの判定処理を入れても良い。このようにすることで、指のスライド移動中の描画更新を控えることができ、制御部１０Ａの処理負荷を抑えることができる。

【0037】

図６（ｂ）は、拡大図表示中に指が離された場合の動作を示す動作フロー図である。まず、指が離されたかどうかを判断する（Ｓ１７）。指が離されていない場合は（Ｓ１７：Ｎｏ）、再び（Ａ）に処理を戻す（Ｓ１７：Ｎｏ）。一方、指が離されたことを検知した場合には（Ｓ１７：Ｙｅｓ）、ステップＳ１８に処理を進める。ステップＳ１８では、拡大図を消去、すなわち、メイン地図に拡大図を表示しないようにする。

【0038】

以上説明した実施の形態１に係るナビゲーション装置により、拡大したい任意点が複数離れてあっても、指を押下して拡大図を表示させた後、指をスライド移動させることで拡大図も指と同期して移動するので、ユーザーにとって使い勝手が良く操作負荷の少ない地図表示装置を実現することができる。

【0039】

（実施の形態２）

次に、実施の形態２に係る地図表示装置を図面を参照しながら具体的に説明する。実施の形態１と同様に、本実施の形態の地図表示装置としてナビゲーション装置に適用した場合を例に挙げる。ただし、ナビゲーション装置の構成については、制御部１０を除いて、図１に示したナビゲーション装置の構成と同じであるため、制御部１０を異なる符号を付し（１０Ｂ）、その他の説明をここでは省略する。また種々の設定画面に関する図２、図７～図９についても同様であり、その説明を省略する。

【0040】

まず、図２で示した「拡大図表示」が選択・設定されている場合に表示部１４に表示される地図の拡大表示方法を図１０（ａ）～（ｂ）に示した表示例に基づき説明する。

【0041】

図１０（ａ）～（ｂ）は本実施の形態２の拡大図表示方法の表示例を示す模式図である。図１０（ａ）は、表示部１４に表示される地図の一例を表しており、１０ａは表示部１４の表示画面一杯に表示される地図画像であり、以下『メイン地図』と呼ぶ。１０ｂはユーザーのタッチする指を表しており、その接触点を１０ｃで示す×印で示している（×印は実際には表示されない）。なお、簡略化のため文字情報やランドマーク情報等の他の表示を省略している。

【0042】

ユーザーがタッチすると図１０（ｂ）に示すような円形の拡大図１０ｄが接触点を中心として表示される。なお、拡大図１０ｄは円形としているが、円形に限らず、楕円形であったり、四角形などの多角形状であってもよい。また、拡大図内部に表示する詳細地図を透過表示し、メイン地図と同時に表示するようにしてもよい。

【0043】

次に、本実施の形態２に係るナビゲーション装置１における制御部１０Ｂの動作について図１１～１２を参照し説明する。

【0044】

図１１はメイン地図の任意の点を押下してから拡大図を表示するまでの動作を示す動作フロー図である。なお、本処理動作は、拡大図表示モード設定時に実行される。なお、本拡大図表示処理動作は、図５におけるステップＳ１２の代わりにステップＳ２０を挿入し

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た構成となっており、以下ここでは相違点のみ説明することとする。

【0045】

まず、メイン地図における任意の点をタッチされるまでは待機状態を維持する（Ｓ１０およびＳ１１：Ｎｏ）。メイン地図を表示中にタッチパネルの任意点が押下されると（Ｓ１１：Ｙｅｓ）、ステップＳ２０に処理を進める。ステップＳ２０では、拡大図の領域（図１０（ｂ）で示した円形の大きさ）を取得し、表示中心（図１０（ａ）における１０ｃ）を算出、さらに表示中心の座標値を取得する。本実施の形態１では、ユーザーが指を押下した箇所を表示中心として拡大図を表示することとしていないが、本実施の形態２においては、ユーザーの指が離されても拡大図を消去せず、その後の操作を続けるため、ユーザーの意図した拡大図が得やすいため、押下位置を表示中心として拡大図を表示することが望ましい。

【0046】

次いで、図１２を用いて、ユーザーの指が離された場合の動作について説明する。なお、本処理動作は、図１１における（Ｄ）以降の処理である。また、図６（ｂ）におけるステップＳ１８の代わりにステップＳ２１を挿入した構成となっている。

【0047】

図１２は、拡大図表示中に指が離された場合の動作を示す動作フロー図である。まず、指が離されたかどうかを判断する（Ｓ１７）。指が離されていない場合は（Ｓ１７：Ｎｏ）、再び（Ｄ）に処理を戻す（Ｓ１７：Ｎｏ）。一方、指が離されたことを検知した場合には（Ｓ１７：Ｙｅｓ）、ステップＳ２１に処理を進める。ステップＳ２１では、拡大図の表示を継続する。すなわち、図６（ｂ）との相違点は、ユーザーの指が離されても拡大図を消去しないことにある。

【0048】

次に図１２における（Ｆ）以降に、指の接触があった場合について、拡大図のタッチされる場所に応じて、制御部１０Ｂはメイン地図に表示される広域の縮尺と拡大図に表示される詳細の縮尺に基づき異なる制御を実施することを示す表示例（図１３、図１５、図１８）とその動作フロー（図１４、図１６、図１７、図１９）について詳細に説明する。

【0049】

まず、図１３と図１４を用いて、拡大図における広域制御エリア（制御部１０Ｂが広域の縮尺を考慮した制御を行うためのエリア）がタッチされた場合の表示例とその動作フローについて説明する。

【0050】

図１３（ａ）、（ｂ）は、拡大図における広域制御エリアがタッチされた場合の表示例を示す模式図である。なお、図１３は、図１０（ｂ）以降の表示例について示している。図１３（ａ）は、ユーザーによる拡大図における広域制御エリアの接触があった場合の一例を示しており、ここでは広域制御エリアとして、拡大図の外枠１３ａをタッチしている様子を示している（×印は実際には表示されない）。次に、広域制御エリアをタッチした状態で指のスライド移動（例えば、図１３（ｂ）における破線矢印で示したような動作）が検出されると、拡大図１３ｂ（図１３（ｂ）における破線円）が指の位置と同期してスライド移動し拡大図１３ｃが表示される。１３ｄはスライド移動後の指である。なお、破線は実際には表示されない。

【0051】

次に、図１４を用いて、拡大図における広域制御エリアがタッチされた場合の動作について説明する。

【0052】

図１４は、拡大図における広域制御エリアがタッチされた場合の動作を示す動作フロー図である。なお、図１４の動作フローは、図１２における（Ｆ）以降の動作について示している。

【0053】

まず、ステップＳ２２において、拡大図の広域制御エリア（拡大図の外枠）が押下され

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たかを判断する。押下されていなければ（Ｓ２２：Ｎｏ）、再び（Ｆ）に処理を戻す。一方、広域制御エリアを押下された場合には（Ｓ２２：Ｙｅｓ）、次のステップＳ２３に処理を進める。ステップＳ２３では、押下点からのスライド移動が発生したかを検知する。スライド移動が発生していなければ（Ｓ２３：Ｎｏ）、再び（Ｆ）に処理を戻す。一方、スライド移動の発生を検知すれば（Ｓ２３：Ｙｅｓ）、次のステップＳ２４に処理を進める。ステップＳ２４では、拡大図を指のスライドと同期して移動させる。次いで、拡大図の領域を取得し、表示中心を算出、座標値を取得する（Ｓ２５）。表示中心位置は拡大図の外枠にタッチされた指の位置と領域の大きさによって、一意に決めることができる。また、座標値とは、正規化座標である。次に、ステップＳ２６では、拡大図の縮尺を取得する。そして、拡大図を表示する（Ｓ２７）。本動作フローにより、図１３（ｂ）で示した拡大図の表示が可能となる。なお、ステップＳ２４の後に、指のスライドが停止したかの判定処理を入れても良い。このようにすると、指のスライド移動中の描画更新を控えることができ、制御部１０Ｂの処理負荷を抑えることができる。

【0054】

次に、図１５と図１６を用いて、拡大図における詳細制御エリア（制御部１０Ｂが詳細の縮尺を考慮した制御を行うためのエリア）がタッチされた場合の表示例とその動作フローについて説明する。

【0055】

図１５（ａ）～（ｃ）は、拡大図における詳細制御エリアがタッチされた場合の表示例を示す模式図である。なお、図１５は、図１０（ｂ）以降の表示例について示している。図１５（ａ）は、ユーザーによる拡大図における詳細制御エリアの接触があった場合の一例を示しており、ここでは詳細制御エリアとして、拡大図の内部１５ａをタッチしている様子を示している（×印は実際には表示されない）。次に、詳細制御エリアをタッチした状態で指のスライド移動（例えば、図１５（ｂ）における破線矢印で示したような動作）が検出されると、拡大図１５ｃ（図１５（ｂ）における実線円）内部の表示が指のスライド移動と同期してスライド移動し拡大図１５ｃへと変わる。１５ｄはスライド移動後の指である。なお、破線矢印は実際には表示されない。次に、図１５（ｂ）の状態では、拡大図の表示中心における座標値とメイン地図に対して拡大図を表示している座標値が一致しないので、図１５（ｃ）に示すように、拡大図を破線矢印で示した量と方向だけ移動させる。図１５（ｃ）において、１５ｅは移動後の拡大図であり、破線の円は移動前の拡大図であり、その位置は図１５（ｂ）における１５ｃと一致している。破線は実際には表示されない。なお、指のスライド移動に同期して拡大図を移動してもよいし、指が離されたことを検知してから拡大図を移動してもよい。

【0056】

次に、図１５（ａ）に戻り、ユーザーによる拡大図における詳細制御エリアの接触があった場合の別の例を説明する。

【0057】

先程と同じように図１５（ａ）は、詳細制御エリアとして、拡大図の内部１５ａをタッチしている様子を示している（×印は実際には表示されない）。次に、詳細制御エリアをタッチした状態で指はスライド移動をさせることなく保持した状態を維持する（図１５（ｂ）の１５ｆの破線で示す指）と、図１５（ｂ）に示すように、詳細制御エリアでタッチされた位置が中心に来るように拡大図内部の詳細地図がスクロールする。なお、破線矢印はスクロール量と方向を示しており、実際には表示されない。また、１５ｄはスライド移動後の指であり本例では関係しない。次に、先程と同じように、この時点では、メイン地図に対する拡大図の位置は固定されている。図１５（ｂ）の状態では、拡大図の表示中心における座標値とメイン地図に対して拡大図を表示している座標値が一致しないので、図１５（ｃ）に示すように、拡大図を破線矢印で示した量と方向だけ移動させる。図１５（ｃ）において、１５ｅは移動後の拡大図であり、破線の円は移動前の拡大図であり、その位置は図１５（ｂ）における１５ｃと一致している。拡大図内部の詳細地図のスクロールに同期して拡大図を移動してもよいし、指が離されたことを検知してから拡大図を移動し

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てもよい。前者の場合、図１５（ｂ）の状態は存在せず、図１５（ａ）から図１５（ｃ）への画面遷移となる。なお、破線は実際には表示されない。

【0058】

次に、図１６を用いて、拡大図における詳細制御エリアがタッチされた場合の動作について説明する。

【0059】

図１６は、拡大図における詳細制御エリアがタッチされた場合の動作を示す動作フロー図である。なお、図１６の動作フローは、図１２における（Ｆ）以降の動作について示している。

【0060】

まず、ステップＳ２８において、拡大図の詳細制御エリア（拡大図内部の詳細地図）が押下されたかを判断する。押下されていなければ（Ｓ２８：Ｎｏ）、再び（Ｆ）に処理を戻す。一方、詳細制御エリアを押下された場合には（Ｓ２８：Ｙｅｓ）、次のステップＳ２９に処理を進める。ステップＳ２９では、指のスライド移動（図１５におけるスライド前の指１５ｆからスライド後の指１５ｄへの移動）と同期した詳細地図または、押下点を中心に移動（図１５における１５ａと１５ｆの指の位置は同じであり、押下したまま保持している。）した詳細地図を表示する。なお、この時点では、メイン地図に対する拡大図の位置は固定されていてもよいし、スクロールに同期して移動してもよい。次いで、ステップＳ２９において、メイン地図に対する拡大図の位置が固定されているとき、ステップＳ３０に進み、メイン地図と拡大図内部の詳細地図の表示中心を一致させるように拡大図を移動させる。拡大図表示後は、図１２の（Ｄ）に処理を戻す。本動作フローにより、図１５（ｃ）で示した拡大図の表示が可能となる。

【0061】

次に、表示例は示していないが、図１７を用いて、拡大図における詳細制御エリアがタッチされた場合の別の動作フローについて説明する。

【0062】

図１７は、拡大図における詳細制御エリアがタッチ（長押し）された場合の動作を示す動作フロー図である。なお、図１７の動作フローは、図１２における（Ｆ）以降の動作について示している。

【0063】

まず、ステップＳ３１において、拡大図の詳細制御エリア（拡大図内部の詳細地図）が一定時間押下されたかを判断する。長押し判定には、周知のタイマー処理を行えば良い。押下されていなければ（Ｓ３１：Ｎｏ）、（Ｇ）に処理を移し図１６で説明した処理を実行する。一方、詳細制御エリアを一定時間押下された場合には（Ｓ３１：Ｙｅｓ）、次のステップＳ３２に処理を進める。ステップＳ３２では、メイン地図の縮尺を拡大図の縮尺に変更して表示する。次いで、拡大図の縮尺を取得する（Ｓ３３）。さらに、ステップＳ３４で拡大図を表示し、図１２の（Ｄ）に処理を戻す。これにより、拡大図内部の詳細地図を長押しすることで、メイン地図の縮尺を拡大図の縮尺に変更することができるとともに、メイン地図変更後の拡大図の縮尺変更もできる。

【0064】

次に、図１８と図１９を用いて、拡大図における詳細制御エリア（拡大図内部の拡大図消去ボタン）がタッチされた場合の表示例とその動作フローについて説明する。

【0065】

図１８（ａ）、（ｂ）は、拡大図の拡大図消去ボタンが押下された場合の表示例を表す模式図である。図１８（ａ）は、拡大図１８ａの内部に存在する拡大図消去ボタン１８ｂをユーザーの指１８ｃが押下していることを表している。このように拡大図消去ボタンが押下されると、図１８（ｂ）に示すように拡大図が消去される。図１８（ｂ）において破線の円は消去されたことを表している。

【0066】

次に、図１９を用いて、拡大図における拡大図消去ボタンがタッチされた場合の動作に

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ついて説明する。

【0067】

図１９は、拡大図における拡大図消去ボタンがタッチされた場合の動作を示す動作フロー図である。なお、図１９の動作フローは、図１２における（Ｆ）以降の動作について示している。図１９において、まず、ステップＳ３５において、拡大図の詳細制御エリア（拡大図内部の拡大図消去ボタン）が押下されたかを判断する。押下されていなければ（Ｓ３５：Ｎｏ）、再び（Ｆ）に処理を戻す。一方、拡大図内部の拡大図消去ボタンを一定時間押下された場合には（Ｓ３５：Ｙｅｓ）、次のステップＳ３６に処理を進める。ステップＳ３６では、拡大図を消去する。

【0068】

なお、実施の形態２に係る地図表示装置を採用したカーナビゲーション装置の拡大図消去方法としては、これに限らず、音声入力による消去やタイマーを回し図１０（ａ）でユーザーの指が押下されてからの経過時間から所定の時間に達したときに消去することができる。

【0069】

以上説明した実施の形態２に係る地図表示装置を採用したカーナビゲーション装置により、１表示画面に広域（メイン地図）の地図と詳細（拡大図）の地図を同時に表示する場合において、広域と詳細の縮尺を考慮した地図表示が可能な地図表示装置を実現することができる。特に、詳細地図を表示する拡大図を広域地図が表示されるメイン地図上を上下左右に自由に移動可能にした拡大図表示方法において、拡大図をメイン地図（広域地図）の縮尺に応じて移動させると拡大図内部の詳細地図は大きく移動してしまうため、拡大図を微小領域移動させることが困難になるが、実施の形態２の地図表示装置を用いれば、拡大図内部を操作することにより、微小領域移動させることを可能としている。

【0070】

なお、実施の形態１と実施の形態２のそれぞれで説明した拡大表示方法を同時にナビゲーション装置に実現することができる。このときは、図２０に示した「拡大図表示機能設定」画面を通じて、拡大図の表示方法の切替えを自由に選択・設定できることが望ましい。例えば、図２０において、「標準」が選択・設定されている場合には、実施の形態１の表示方法を採用し、「拡張」が選択・設定されている場合には、実施の形態２の表示方法を採用する。これにより、制御部１０は、選択・設定された拡大図表示方法に従った処理を行うことができる。

【0071】

以上、本発明を詳細に説明してきたが、前述の説明はあらゆる点において本発明の例示にすぎず、その範囲を限定しようとするものではない。本発明の範囲を逸脱することなく種々の改良や変形を行うことができることは言うまでもない。特に、本装置を携帯型のナビゲーション装置、パソコン上に表示する情報表示アプリケーションとしても利用でき、表示される画像も地図には限定されず、写真などにも利用することができる。

【産業上の利用可能性】

【0072】

本発明の情報表示装置は、車両内に設置され、自動車の現在位置とその現在位置付近の地図を表示するナビゲーション装置、車載情報端末として有用である。また、携帯型のナビゲーション装置、パソコン上に表示する情報表示アプリケーションなどにも適用できる。

【図面の簡単な説明】

【0073】

【図1】本発明の実施の形態に係る地図表示装置を採用したカーナビゲーション装置の概略の構成を示す構成図

【図2】本発明の実施の形態に係る地図表示装置を採用したカーナビゲーション装置におけるユーザーが各種の設定を行うことができる「タッチパネルの設定」画面の一例を示す模式図

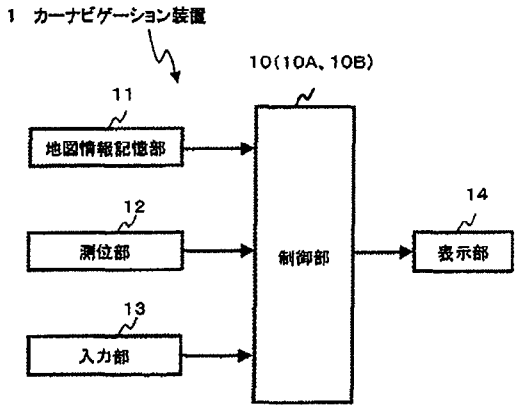
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【図3】（ａ）本実施の形態１に係る地図表示装置を採用したカーナビゲーション装置の拡大地図表示の指示状態を示す模式図（ｂ）拡大図を重畳表示した一例を表した模式図（ｃ）拡大図のスライド移動の一例を表した模式図
【図4】ユーザーの指の位置と拡大図の配置関係を示す模式図
【図5】メイン地図の任意の点を押下してから拡大図を表示するまでの動作を示す動作フロー図
【図6】（ａ）拡大図を表示中に指のスライドに同期して拡大図も移動させることを示す動作フロー図（ｂ）拡大図表示中に指が離された場合の動作を示す動作フロー図
【図7】拡大図の領域を設定するか、あるいは縮尺を設定するかをユーザーに選択させるための拡大図表示設定画面の一例を示す模式図
【図8】拡大図の領域を自由に選択及び設定することを可能とする拡大図領域設定画面の一例を示す模式図
【図9】拡大図の縮尺を自由に選択及び設定することを可能とする拡大図領域設定画面の一例を示す模式図
【図10】（ａ）本実施の形態２に係る地図表示装置を採用したカーナビゲーション装置の拡大地図表示の指示状態を示す模式図（ｂ）拡大図を重畳表示した一例を表した模式図
【図11】メイン地図の任意の点を押下してから拡大図を表示するまでの動作を示す動作フロー図
【図12】拡大図表示中に指が離された場合の動作を示す動作フロー図
【図13】（ａ）拡大図における広域制御エリアがタッチされた場合の表示例を示す模式図（ｂ）広域制御エリアで操作した場合の拡大図移動を示した模式図
【図14】拡大図における広域制御エリアがタッチされた場合の動作を示す動作フロー図
【図15】（ａ）拡大図における詳細制御エリアがタッチされた場合の表示例を示す模式図（ｂ）詳細制御エリアで操作した場合の拡大図内部の表示を示した模式図（ｃ）拡大図の表示中心における座標値とメイン地図に対して拡大図を表示している座標値を一致させる様子を示した模式図
【図16】拡大図における詳細制御エリアがタッチされた場合の動作を示す動作フロー図
【図17】拡大図における詳細制御エリアがタッチ（長押し）された場合の動作を示す動作フロー図
【図18】（ａ）拡大図の拡大図消去ボタンが押下された場合の表示例を表す模式図（ｂ）拡大図が消去された場合の表示例を表す模式図
【図19】拡大図における拡大図消去ボタンがタッチされた場合の動作を示す動作フロー図
【図20】ユーザーが各種の設定を行うことができる「拡大図表示機能設定」画面の一例を示す模式図
【符号の説明】
【0074】
１　カーナビゲーション装置
３ａ、１０ａ　メイン地図
３ｂ、３ｇ、４ｃ、１０ｂ、１３ｄ、１５ｄ、１５ｆ、１８ｃ　ユーザーの指
３ｃ、４ｄ、１０ｃ、１３ａ、１５ａ　接触点（任意点）
３ｄ、４ａ、３ｆ、１０ｄ、１３ｂ、１３ｃ、１５ｂ、１５ｃ、１５ｅ、１８ａ　拡大図
４ｂ　拡大図の表示中心
４ｅ　拡大図の上端から指押下点までの距離
４ｆ　拡大図の下端から指押下点までの距離
１０、１０Ａ、１０Ｂ　制御部
１１　地図情報記憶部
１２　測位部
１３　入力部
１４　表示部

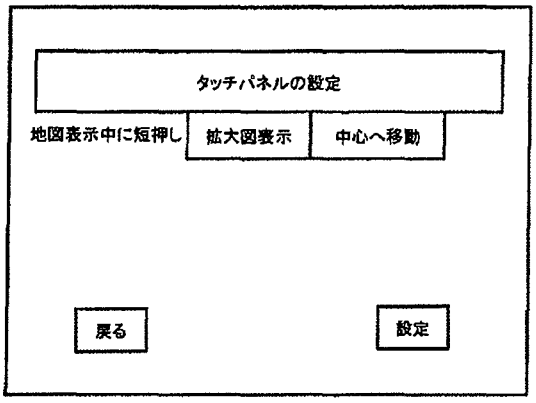
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１８ｂ　拡大図消去ボタン

【図1】

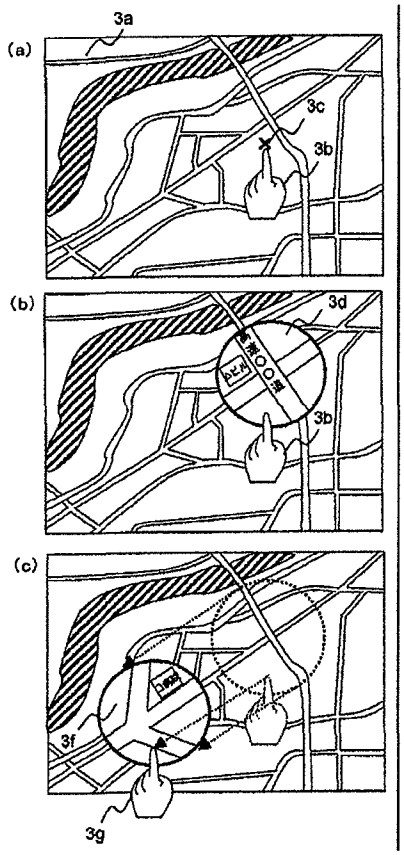


【図2】

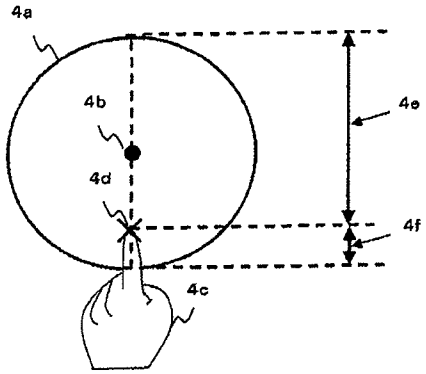


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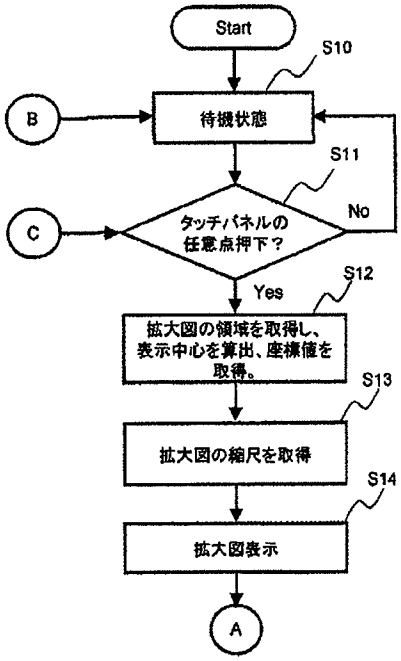
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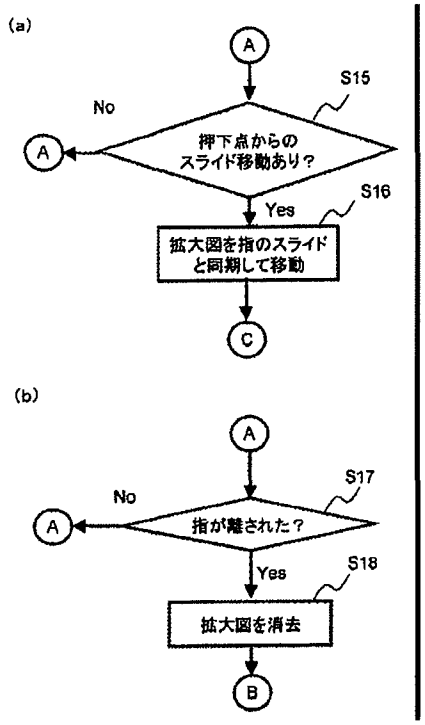
【図4】



【図5】

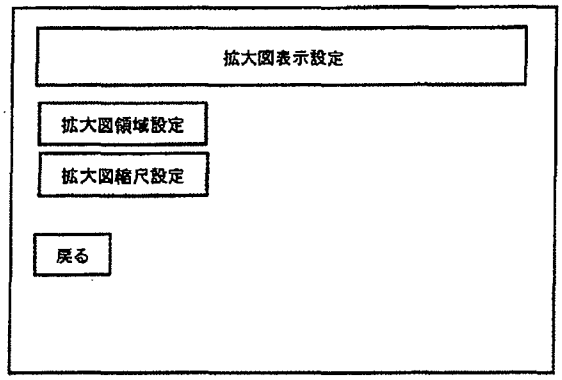


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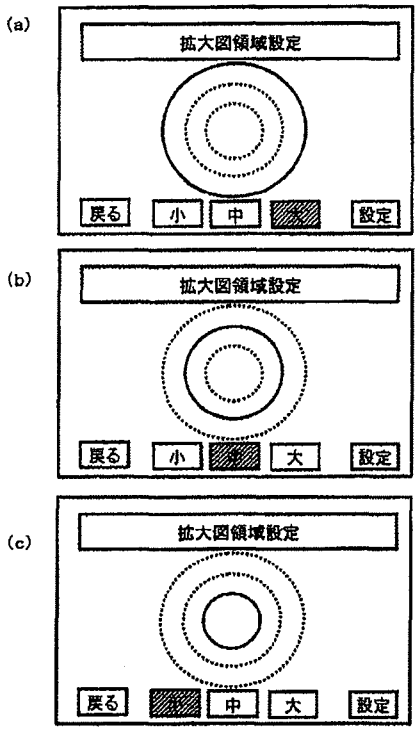


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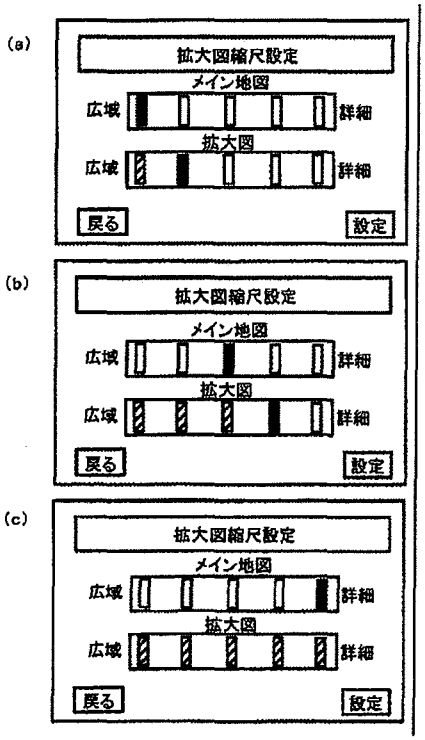
【図7】



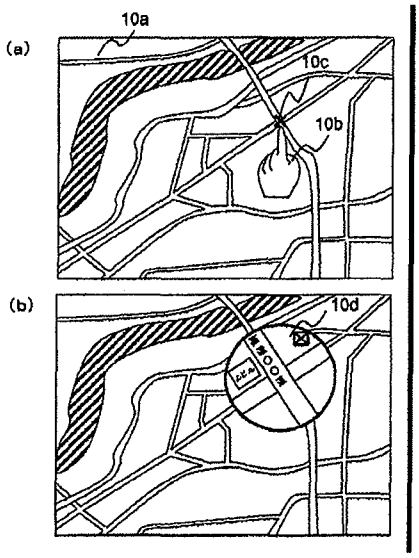
【図8】



【図9】

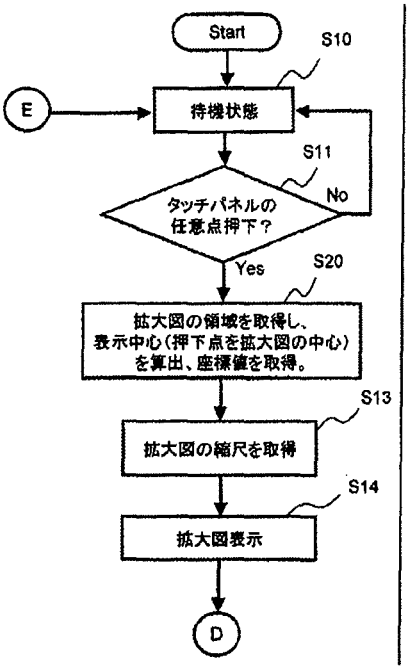


【図10】

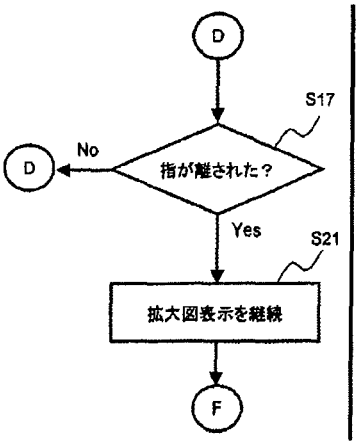


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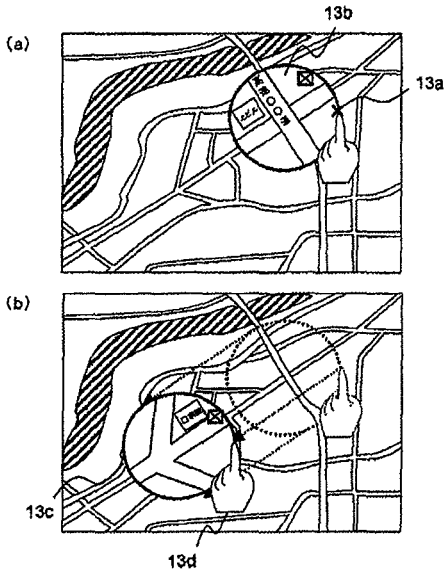
【図11】



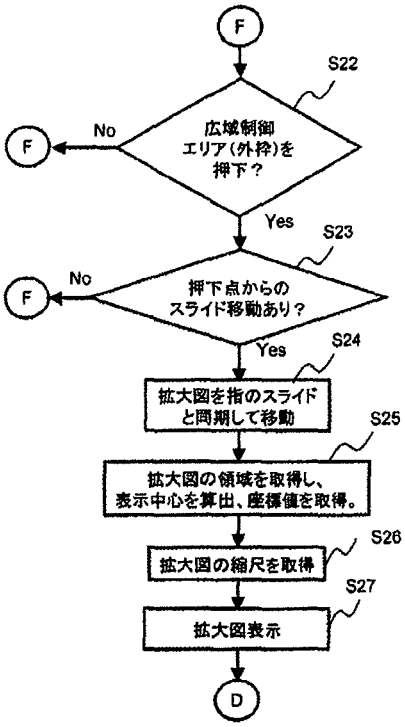
【図12】



【図13】

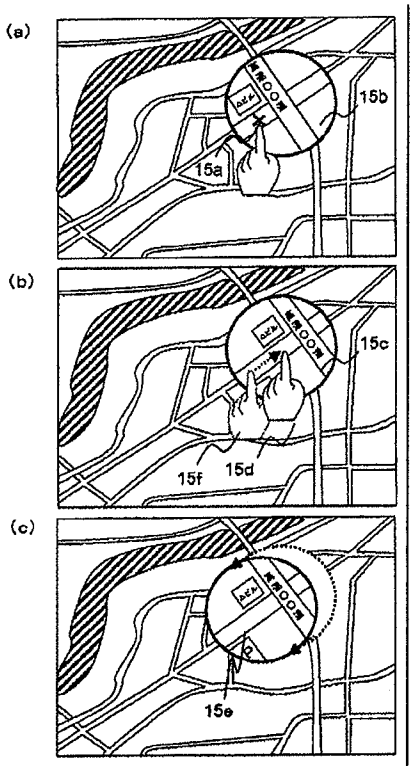


【図14】

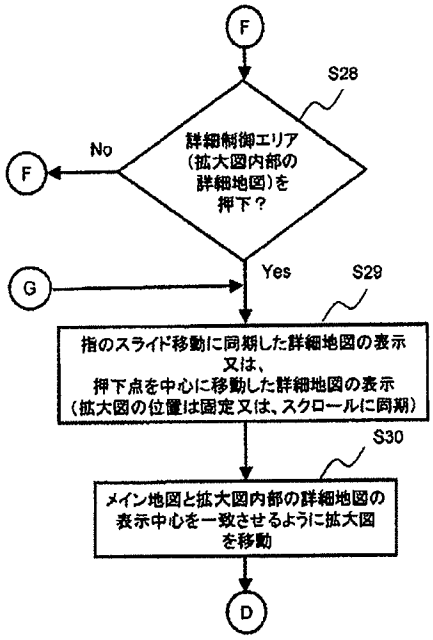


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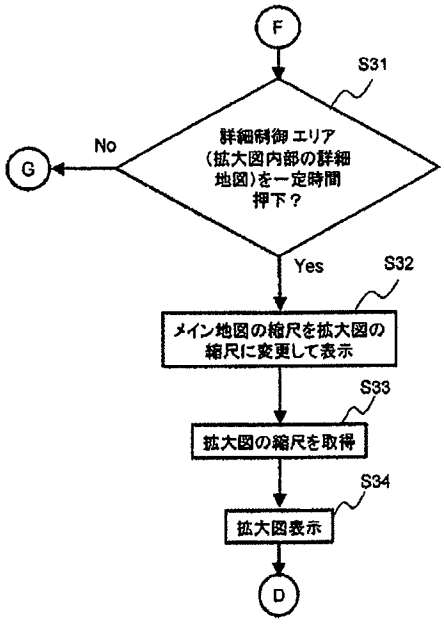
【図15】



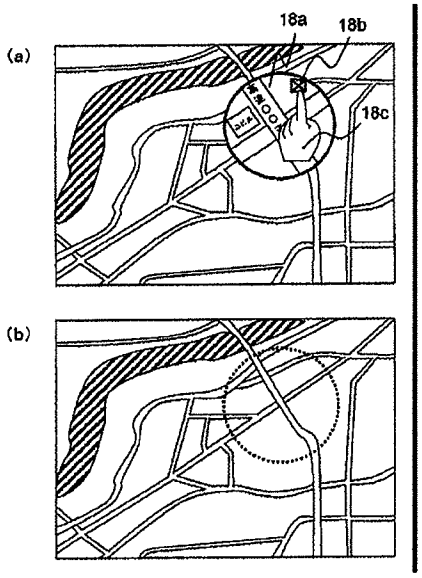
【図16】



【図17】

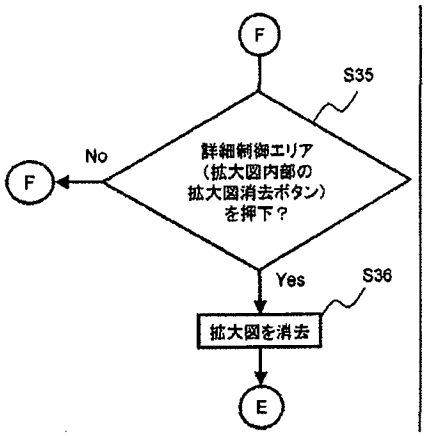


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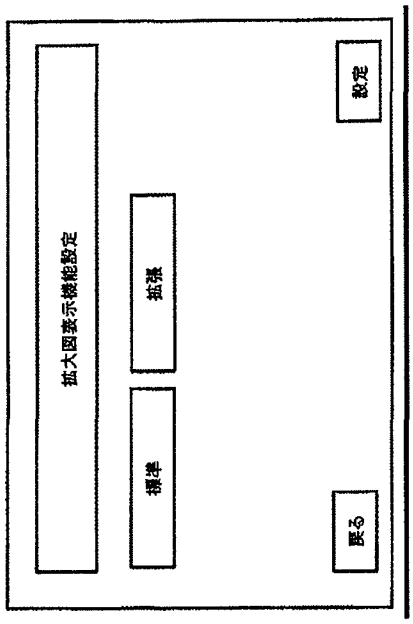


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【図19】



【図20】



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Ｇ０９Ｂ	29/00	(2006.01)	Ｇ０８Ｇ	1/0969		
Ｇ０９Ｂ	29/10	(2006.01)	Ｇ０６Ｔ	11/60	３００	
Ｇ０６Ｆ	3/048	(2006.01)	Ｇ０９Ｂ	29/00	Ｃ	
			Ｇ０９Ｂ	29/10	Ａ	
			Ｇ０６Ｆ	3/048	６５６Ａ	

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(54) Title: METHOD FOR APPLICATION LAUNCH AND SYSTEM FUNCTION INVOCATION

(57) Abstract: The system comprises the ability to detect certain gestures made by sliding a finger or stylus on a touch sensitive screen on a hand-held device, even when a so called "screen lock" is active where the gesture is used to unlock the device and trigger the desired function associates with the gesture.

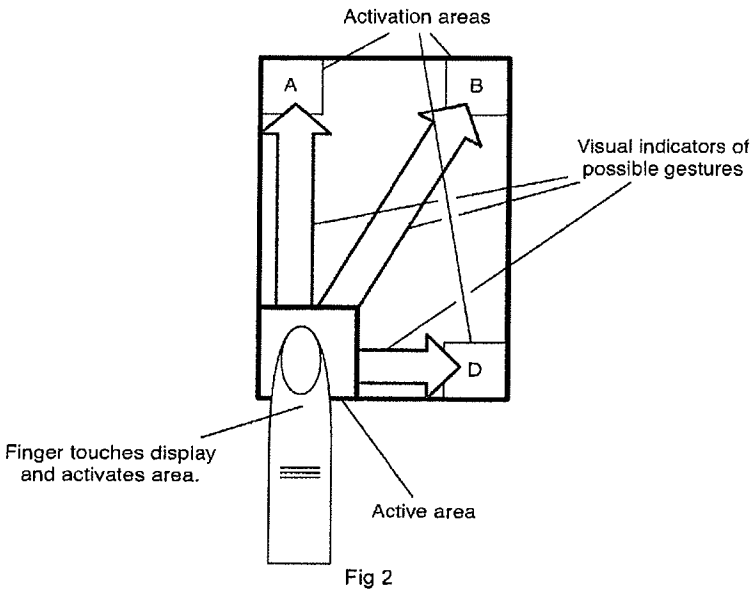


Fig 2

WO 2010/040670 A2

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000480

METHOD FOR APPLICATION LAUNCH AND SYSTEM FUNCTION INVOCATION

Background

This invention combines two previously unrelated areas, namely screen- and keyboard unlocking mechanisms and application launch systems, which are here described separately.

Traditionally and typically, screen- and keyboard unlocking mechanisms on mobile/handheld devices involve multiple key presses or a combination of key presses and touch screen gestures to prevent spurious unlocks that would occur if only one action was necessary. Note that several devices on the market today actually a single key press on a special key to unlock the device (e.g. a Camera button). This special key can easily be pressed by mistake when the device is placed in a pocket or a bag.

These systems all suffer from the fact that extra actions are needed to start using the device and access the functionality and/or applications on the device if the user already knows what she wants to access.

Application launch and access to certain system functions sometimes need to be very quick. Typical ways of starting applications on a mobile/handheld device involve navigating a menu system. The number of key presses or gestures vary immensely from device to device and from manufacturer to manufacturer, and in some cases the devices even have dedicated hardware buttons that trigger the start of certain applications. Note that the latter tend to suffer from the spurious device unlocks described in the paragraph above.

The fewest number of actions needed to start an application after the device has been safely unlocked is however in the best case 1 (one), and that is in

the case of having a direct shortcut to the application from the screen that is shown after the device is unlocked.

Many application launch systems – especially those running on devices with only touch sensitive screens as main input – require the user to look on the screen when navigating the menu structure or using the direct shortcuts available. Even worse is the situation on devices where layout is dynamic and a certain application launch command is located on different positions on different occasions.

Brief list of figures

Fig 1. One possible embodiment of invention; a device with touch sensitive screen with four activation areas.

Fig 2. When touching an activation area, the available choices are shown in the other activation areas.

Fig 3. All possible single slide gestures available when the four corners are used as activation areas.

Fig 4a-d. Demonstrating a single slide gesture from activation zone C to D

Fig 5. All possible two-slide gestures available when the four corners are used as activation zones.

Fig 6.a-e Demonstrating a multi slide gesture from C to D to B

Fig 7a-d. Demonstrating unlocking the device and launching an application using a single slide gesture from activation zone C to D.

Fig 8a-d. Demonstrating a single slide gesture by example of launching the Calendar application.

Detailed description of the invention

The present invention combines the two previously unrelated areas of screen- and keyboard unlocking mechanisms and application launch systems. Further, the invention utilizes the physically distinguishable areas, such as corners of the screen, which is advantageous since these are easy to recognize by a user without looking at the screen. By utilizing the physically distinguishable areas it is possible for a user to rely on muscle memory which is positive from a user experience perspective. Therefore, the problem that

there is little or no possibility to "feel" where virtual buttons and selection areas are represented is solved.

Starting with application launch, the intention is to bring the simplicity and ease-of-use of non-touch screen devices to touch screen devices. As described in the "background" section, touch screen devices typically suffer from not encouraging or allowing the user to learn how to start applications and access system functions using muscle memory.

The invention introduces a set of restricted gestures that allow the user to perform them without looking at the screen. This is achieved by designing gestures that start, go through and end at certain activation areas on the screen that are easy to feel with the fingers. Throughout the text and figures of this document we use the four corners of the touch sensitive screen as activation areas for simplicity and clarity since these are especially easy to feel with the finger, but the technique is easily extendable to more or other areas if the physical embodiment of the device encourage other areas of the screens to be used instead of or in addition to the corners.

Note that applications and system functions are activated through slides between different activation areas and not by simply touching/pressing the activation areas.

The simplest form of slide gesture is the Single Slide Gesture, which goes from one activation area to another. All possible Single Slide Gestures using four activation areas are shown in Fig 3. There are 12 possible Single Slide Gestures using four corners.

Fig 4 illustrates the use case of launching an application using a single slide gesture. In Fig 4a the graphical representations of the activation areas prompt the user to touch one activation area. Fig 4b illustrate that when one of them is touched there is a visual prompt to slide the finger to another activation area. Fig 4c illustrate when the finger has reached the destination activation area where visual feedback is given informing the user that by releasing the finger, the application will be launched [or system function invoked]. And finally in Fig 4d, the finger is released and visual feedback is given in the form of the launching application [or equivalent].

The Multi Slide Gesture is a gesture where more slides are used to describe the gesture. Still, only slides between activation areas are used. All possible slides using two slides ("Two Slide Gestures") using four activation areas are shown in Fig 5. There are 36 possible Two Slide Gestures using four activation areas. The generic formula for calculating the number of N-Slide Gestures for M activation areas is M*(M-1)^N.

Fig 6 illustrates the use case of launching an application using a Two Slide Gesture. In Fig 6a the graphical representations of the activation areas prompt the user to touch one activation area. Fig 6b illustrate that when one of them is touched there is a visual prompt to slide the finger to another activation area. Fig 6c illustrate that the gesture must be continued by sliding the finger to another activation area. Fig 6d illustrate having reached the destination activation area and visual feedback is given informing the user that by releasing the finger, the application will be launched [or system function invoked]. And finally in Fig 6e, the finger is released and visual feedback is given in the form of the launching application [or equivalent]. This technique for identifying gestures is very robust from a system perspective and from an end user's perspective there are obvious gains in form of muscle memory utilization and implicit tactile feedback.

Yet another important aspect of the invention remains though, which will become clear when observing Fig 7. In Fig 7a, the device's screen- and key lock is activated, meaning that the screen is turned off or in power save mode. However, the touch sensors are still active and looking for finger touches. In Fig 7b, a finger in an activation area has been detected, but no visual or other feedback is given to the user. In Fig 7c the finger has entered another activation area and still no feedback is given to the user. Not until in Fig 7d does something happen, and that is unlocking the screen- and key lock as well as launching an application as the result of the Single Slide Gesture from activation area C to D. Note that this is the exact same gesture as in the first example illustrated in Fig 4, and repeated here it gives the exact same result.

Note how the combination of the touch screen unlock mechanism and application launch system has reduced the number of actions on the end

user's part substantially. The time required for accessing applications and system functions can thus be drastically lowered, increasing the ease-of-use for the end user.

In Fig 8, a concrete use case is shown. In Fig 8a, the user touches an area that brings up three sub-choices; Launch Calendar, launch Messaging and launch Contacts. Graphical objects (arrows) are shown to indicate where to slide fingers in order to make a choice. In Fig 8b, the user slides his finger through the intermediary area and the graphical indicator objects are updated to reflect in which directions the various choices are. In Fig 8c, the finger has reached the target area and two things happen: 1) Another area is activated as a sub-choice (or sub-menu if you will) and 2) the current area is made to trigger on releasing the user's finger. In Fig 8d, the user releases his finger instead of sliding to the next area and thus the calendar application (the first choice) is launched. This example demonstrated that Single- and Multi Slide Gestures are allowed to share a common start. The activation does not occur until the finger is released.

Claims

1. A method comprising

receiving a start area user input actuation from a start area of a screen,

receiving at least one intermediate area user input actuation from an intermediate area of said screen, said intermediate area being placed between said start area and a target area of said screen, wherein said target area is operatively connected to an activation event,

receiving a target area user input actuation from said target area of said screen,

if said target area is operatively connected with launching an application, said activation event comprises

launching said application,

if said target area is associated with at least one sub-choice, said activation event comprises

introducing a new start area coinciding with said target area, and

introducing at least one new target area associated with said sub-choice, and

executing said activation event.

2. The method according to claim 1, further comprising

if said activation event comprises launching said application,

detecting that said target area user input actuation is discontinued before launching said application.

3. The method according to claim 1 or 2, further comprising

if said activation event comprises launching said application and said screen is in idle screen mode,

switching screen mode from idle screen mode to active screen mode.

4. The method according to claim 3, wherein said idle screen mode is an energy saving screen mode in comparison with said active screen mode.

5. The method according to any of the preceding claims, further comprising

in association with receiving said start area user input actuation from said start area of said screen,

displaying a graphical object on said screen, said graphical object indicating a placement of said target area on said screen.

6. The method according to claim 5, further comprising

determining a most recent user input actuation of said intermediate user input actuations,

determining a most recent position based on said most recent user input actuation,

and wherein said displaying a graphical object on said screen is made with respect to said most recent position.

7. The method according to any of the preceding claims, wherein said start area is a physically distinguishable area of said screen.

8. The method according to claim 7, wherein said start area is a corner of said screen.

9. The method according to any of the preceding claims, wherein said target area is a physically distinguishable area of said screen.

10. The method according to claim 9, wherein said target area is a corner of said screen.

11. The method according to any of the preceding claims, wherein said application software is any of a calendar application software, a messaging application software, a web browser application software, a contacts list application software, game application software, setting management application software, music player application software, a camera application

software, communications settings application software or a video recording application software.

12. A method comprising

receiving a start area user input actuation from a start area of a screen,

receiving at least one intermediate user input actuation from an intermediate area of said screen, said intermediate area being placed between said start area and a target area of said screen, wherein said target area is operatively connected to an activation event,

receiving a target area user input actuation from said target area of said screen,

if said target area is associated with at least one sub-choice, said activation event comprises

introducing a new start area coinciding with said target area, and

introducing at least one new target area associated with said sub-choice, and

executing said activation event.

13. The method according to claim 12, further comprising

if said target area is operatively connected with launching an application, said activation event comprises

launching said application.

14. The method according to claim 13, further comprising

if said activation event comprises launching said application,

detecting that said target area user input actuation is discontinued before launching said application.

15. The method according to claim 13 or 14, further comprising

if said activation event comprises launching said application and said screen is in idle screen mode,

switching screen mode from idle screen mode to active screen mode.

16. The method according to claim 15, wherein said idle screen mode is an energy saving screen mode in comparison with said active screen mode.

17. The method according to any of the claims 12 to 16, further comprising in association with receiving said start area user input actuation from said start area of said screen,

displaying a graphical object on said screen, said graphical object indicating a placement of said target area on said screen.

18. The method according to claim 17, further comprising

determining a most recent user input actuation of said intermediate user input actuations,

determining a most recent position based on said most recent user input actuation,

and wherein said displaying a graphical object on said screen is made with respect to said most recent position.

19. The method according to any of the claims 12 to 18, wherein said start area is a physically distinguishable area of said screen.

20. The method according to claim 19, wherein said start area is a corner of said screen.

21. The method according to any of the claims 12 to 20, wherein said target area is a physically distinguishable area of said screen.

22. The method according to claim 21, wherein said target area is a corner of said screen.

23. The method according to any of the claims 12 to 22, wherein said application software is any of a calendar application software, a messaging application software, a web browser application software, a contacts list

application software, game application software, setting management application software, music player application software, a camera application software, communications settings application software or a video recording application software.

24. An apparatus comprising

a processing device,

a memory operatively connected to said processing device, and

a screen,

said screen being adapted to display graphical information, and

said screen being adapted to provide said processing device with information pertaining to a user input actuation input via said screen, said information being associated with a position of said screen and an input time,

said processing device being adapted to

receive a start area user input actuation from a start area of a screen,

receive at least one intermediate area user input actuation from an intermediate area of said screen, said intermediate area being placed between said start area and a target area of said screen, wherein said target area is operatively connected to an activation event,

receive a target area user input actuation from said target area of said screen,

if said target area is operatively connected with launching an application, said activation event comprises

launching said application,

if said target area is associated with at least one sub-choice, said activation event comprises

introducing a new start area coinciding with said target area, and

introducing at least one new target area associated with said sub-choice, and

execute said activation event.

25. The apparatus according to claim 24, wherein said apparatus is a mobile communications terminal.

26. The apparatus according to claim 24 or 25, wherein said screen is a touch screen.

27. The apparatus according to claim 24 or 25, wherein said screen is a capacitive touch screen.

28. The apparatus according to claim 24 or 25, wherein said screen is a resistive touch screen.

29. An apparatus comprising

a processing device,

a memory operatively connected to said processing device, and

a screen,

said screen being adapted to display graphical information, and

said screen being adapted to provide said processing device with information pertaining to a user input actuation input via said screen, said information being associated with a position of said screen and an input time,

said processing device being adapted to

receive a start area user input actuation from a start area of a screen,

receive at least one intermediate user input actuation from an intermediate area of said screen, said intermediate area being placed between said start area and a target area of said screen, wherein said target area is operatively connected to an activation event,

receive a target area user input actuation from said target area of said screen,

if said target area is associated with at least one sub-choice, said activation event comprises

introducing a new start area coinciding with said target area, and

introducing at least one new target area associated with said sub-choice, and

execute said activation event.

30. The apparatus according to claim 29, wherein said apparatus is a mobile communications terminal.

31. The apparatus according to claim 29 or 30, wherein said screen is a touch screen.

32. The apparatus according to claim 31, wherein said screen is a capacitive touch screen.

33. The apparatus according to claim 31, wherein said screen is a resistive touch screen.

34. A computer program product comprising computer program code stored on a computer readable medium which, when executed on a processor, carries out the method according to any of the claims 1 to 11.

35. A computer program product comprising computer program code stored on a computer readable medium which, when executed on a processor, carries out the method according to any of the claims 12 to 23.

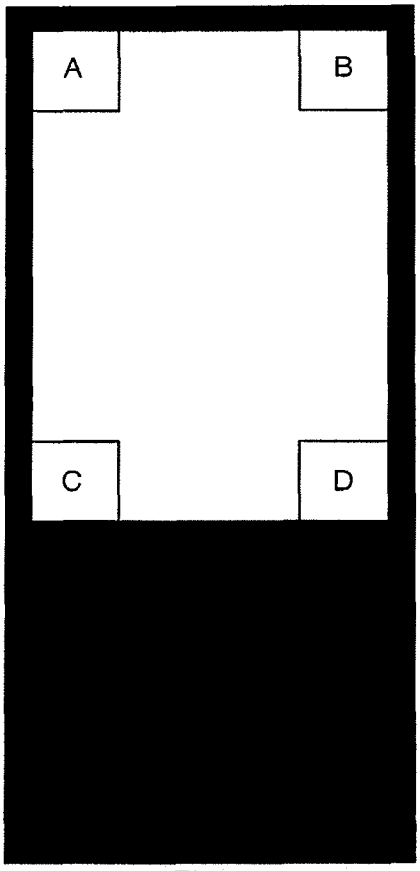


Fig 1

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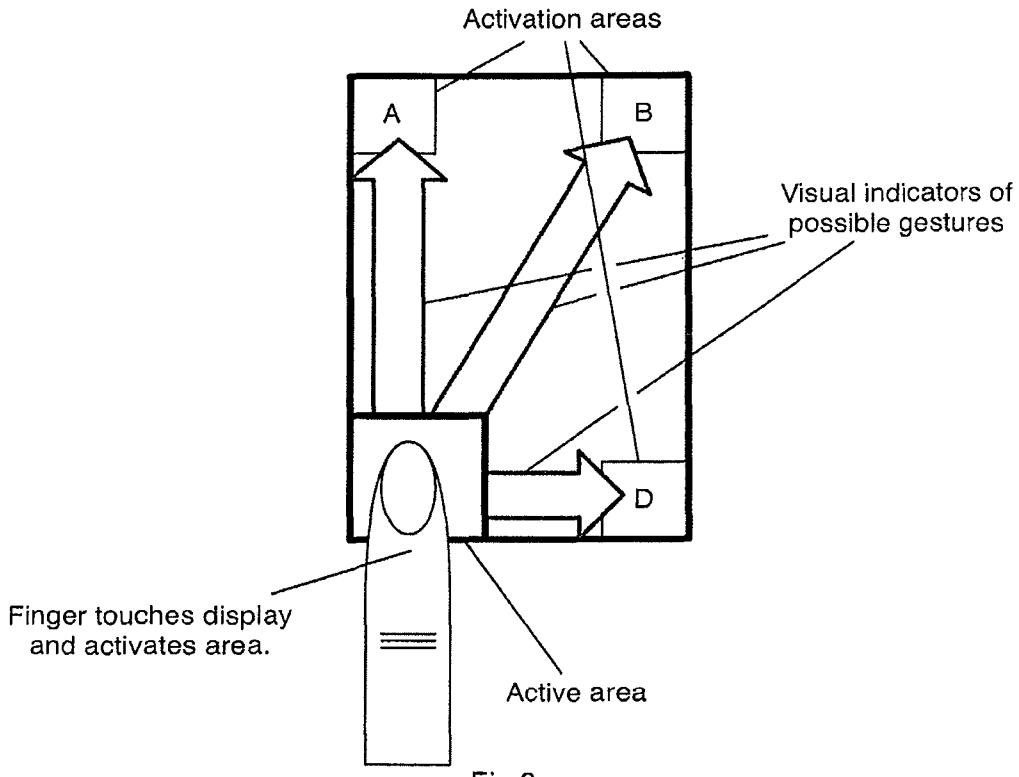

Activation areas
A
B
Visual indicators of possible gestures
D
Finger touches display and activates area.
Active area

Fig 2

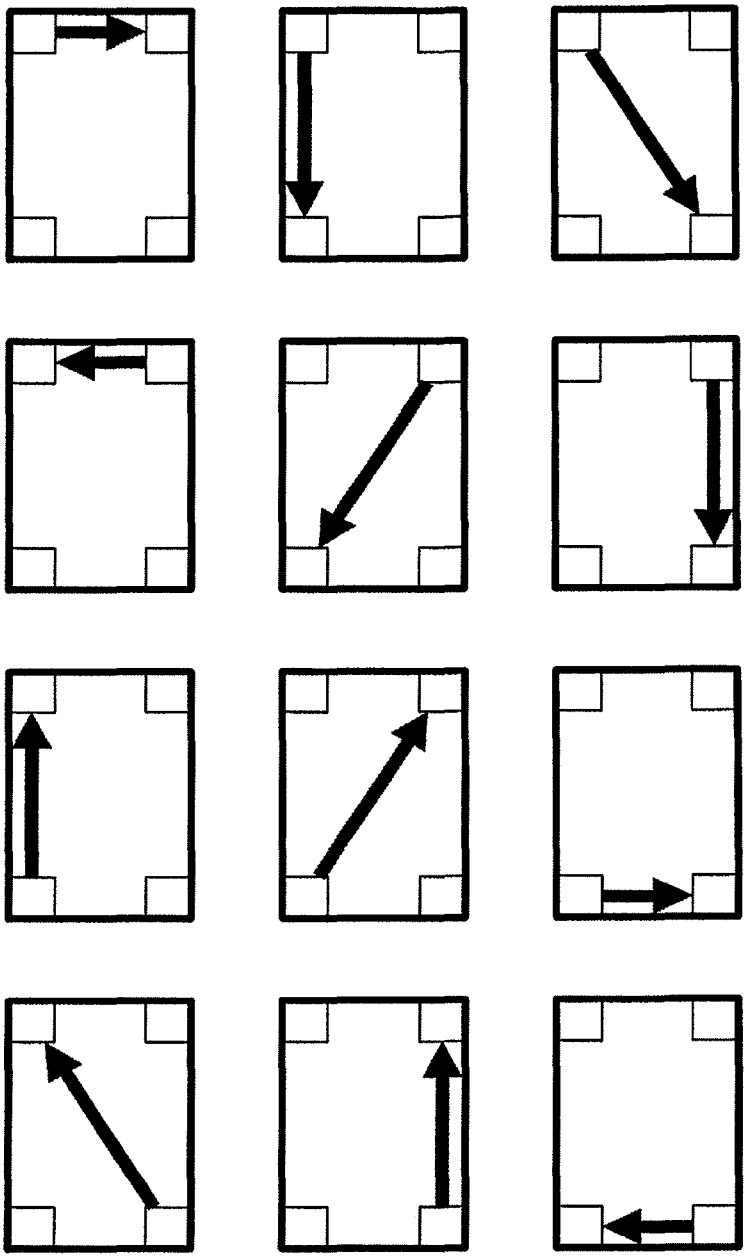


Fig 3

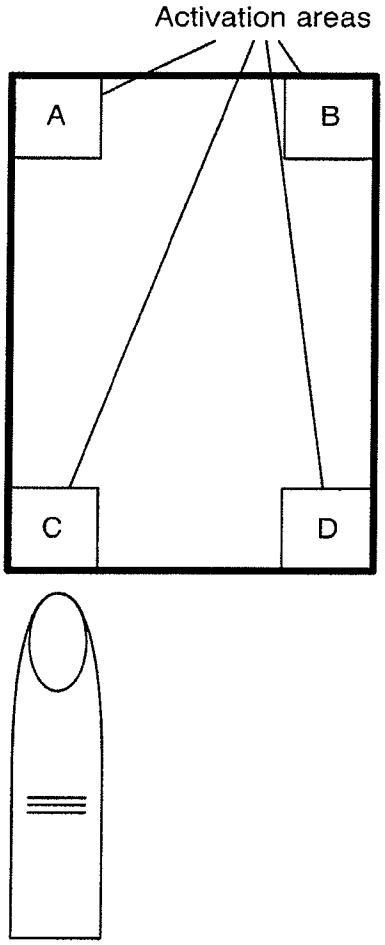


Fig 4a

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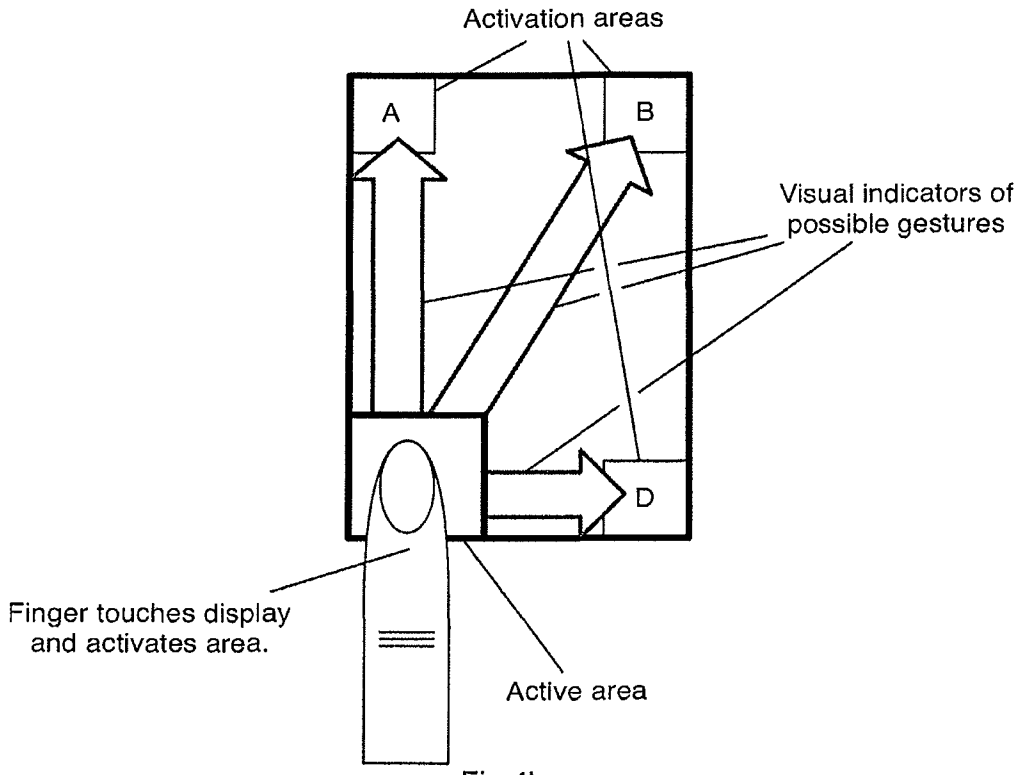

Activation areas
A
B
Visual indicators of possible gestures
D
Finger touches display and activates area.
Active area

Fig 4b

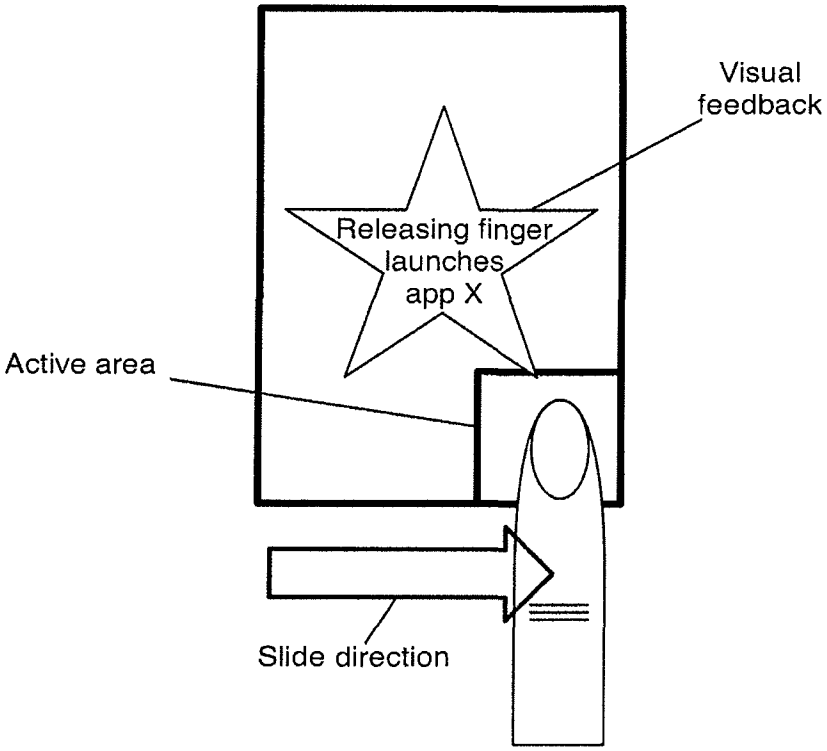

Visual feedback
Releasing finger launches app X
Active area
Slide direction

Fig 4c

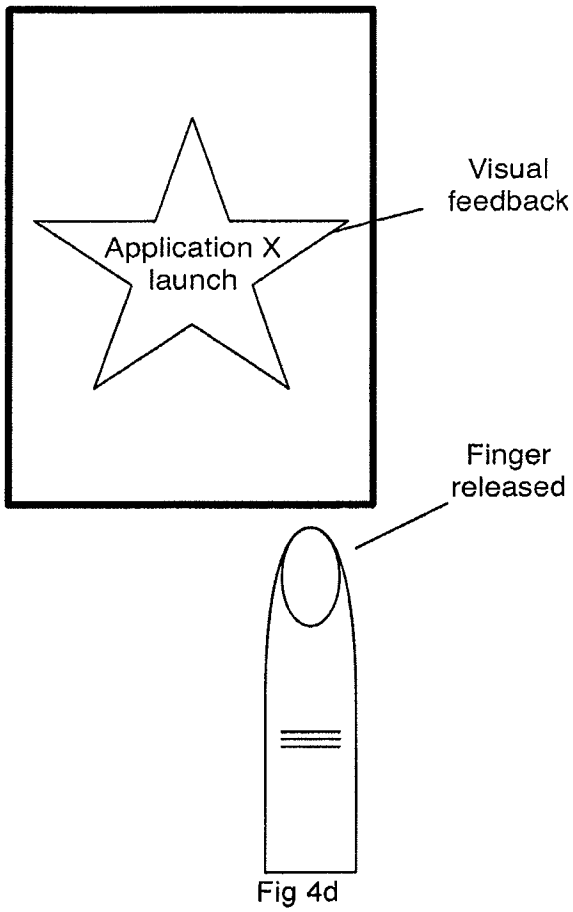


Fig 4d

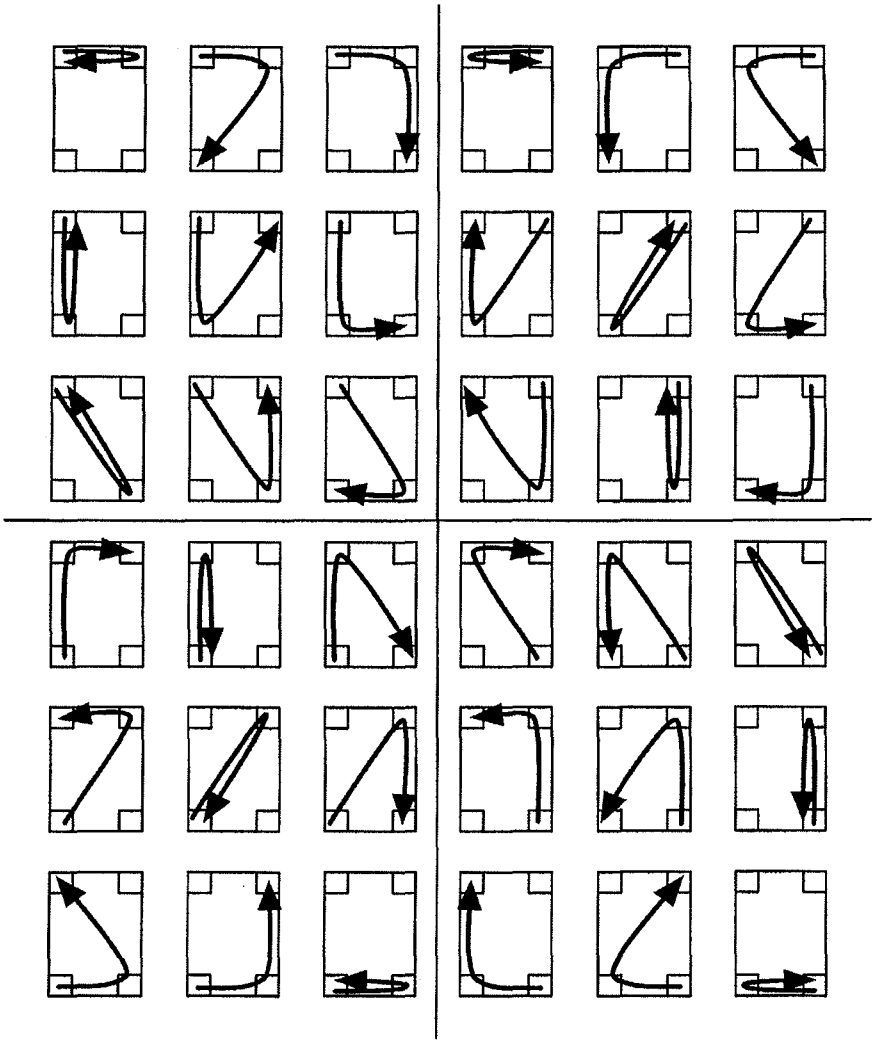


Fig 5

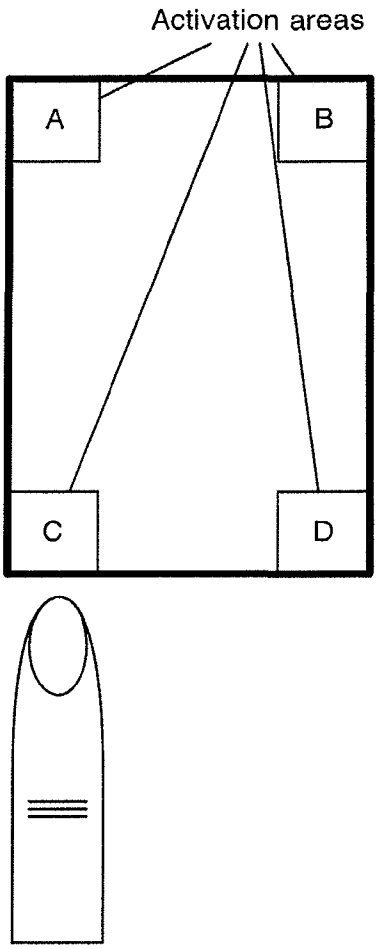


Fig 6a

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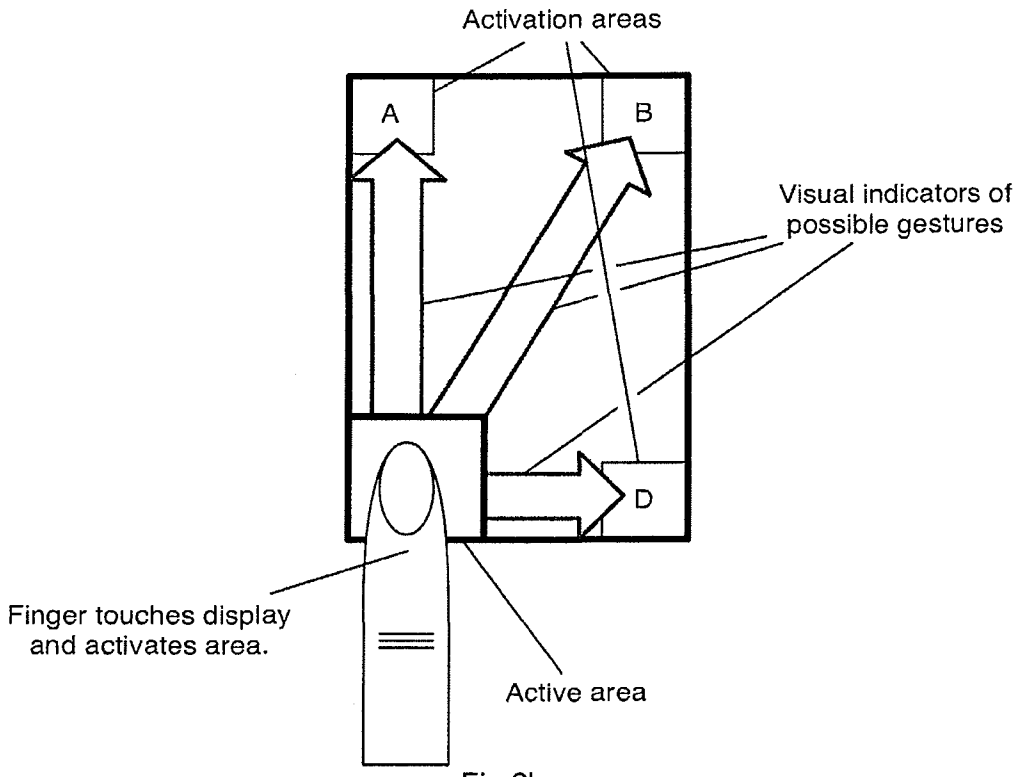

Activation areas
A
B
Visual indicators of possible gestures
D
Finger touches display and activates area.
Active area

Fig 6b

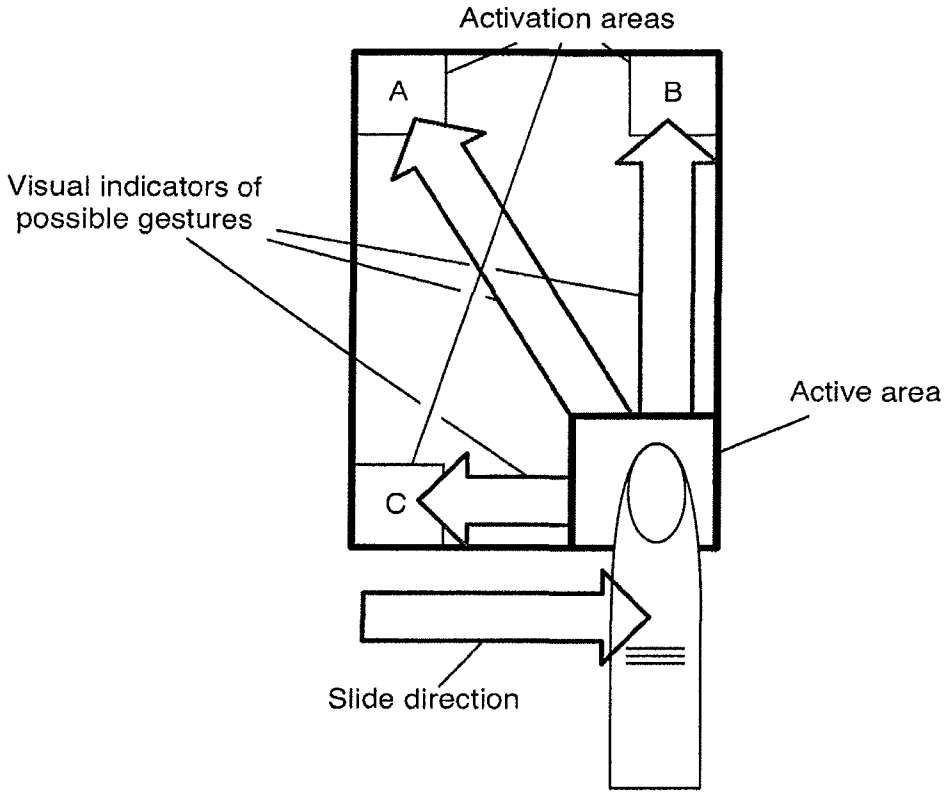

Activation areas
A
B
Visual indicators of possible gestures
Active area
C
Slide direction

Fig 6c

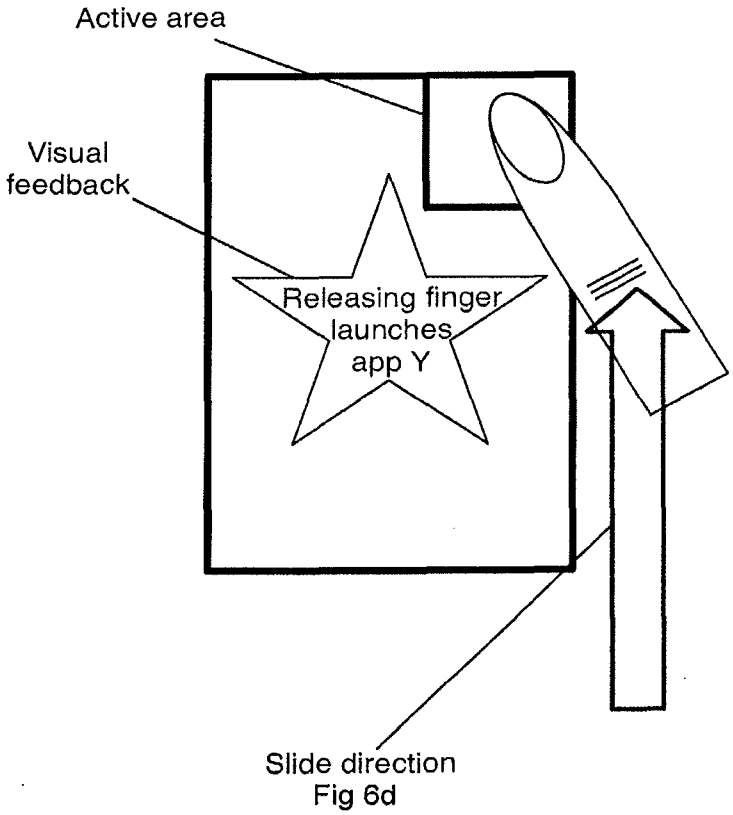

Active area
Visual feedback
Releasing finger launches app Y
Slide direction

Fig 6d

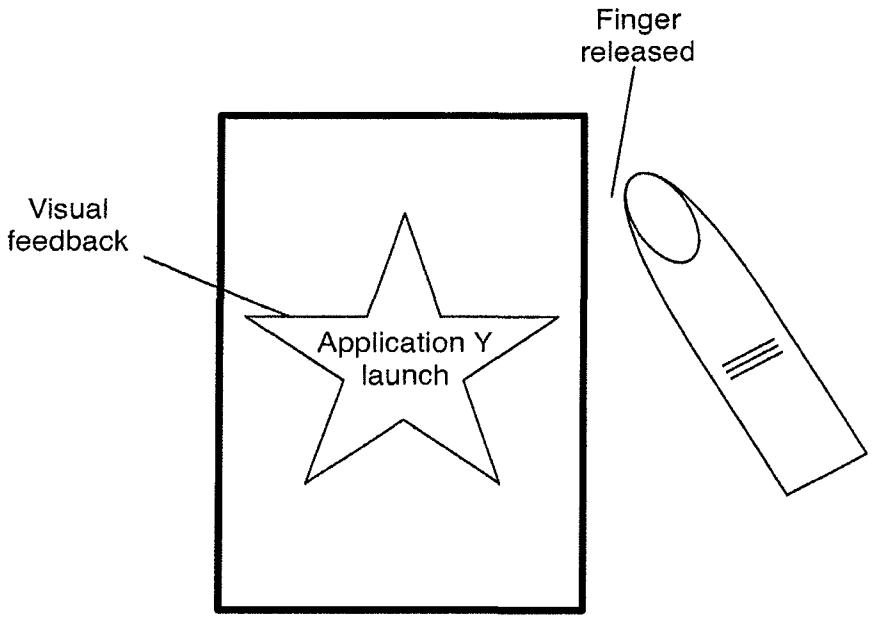


Fig 6e

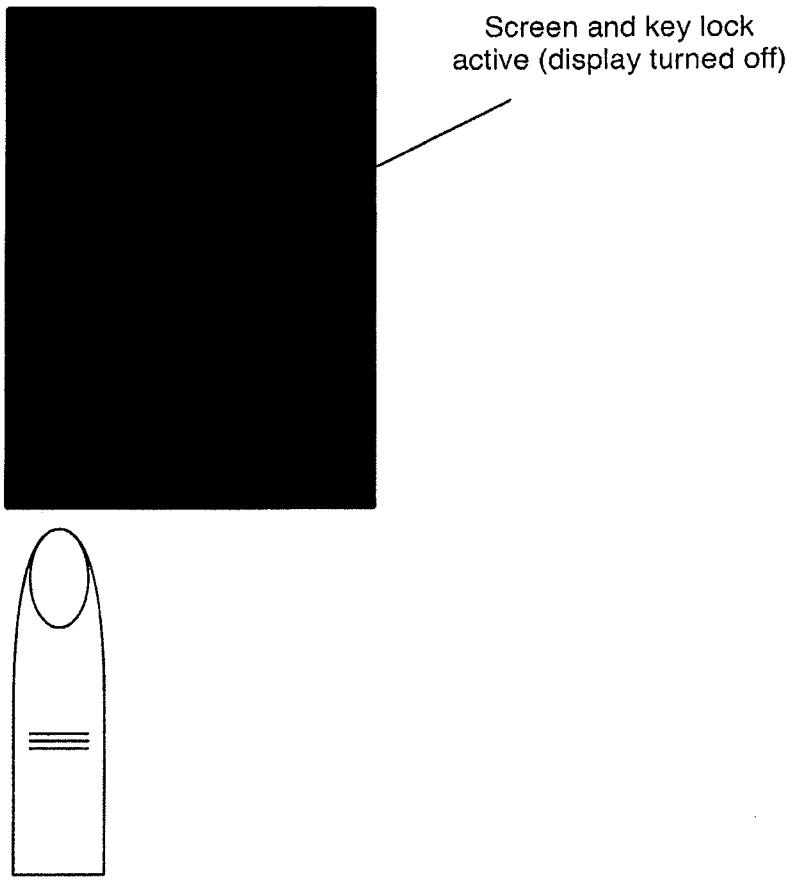


Fig 7a

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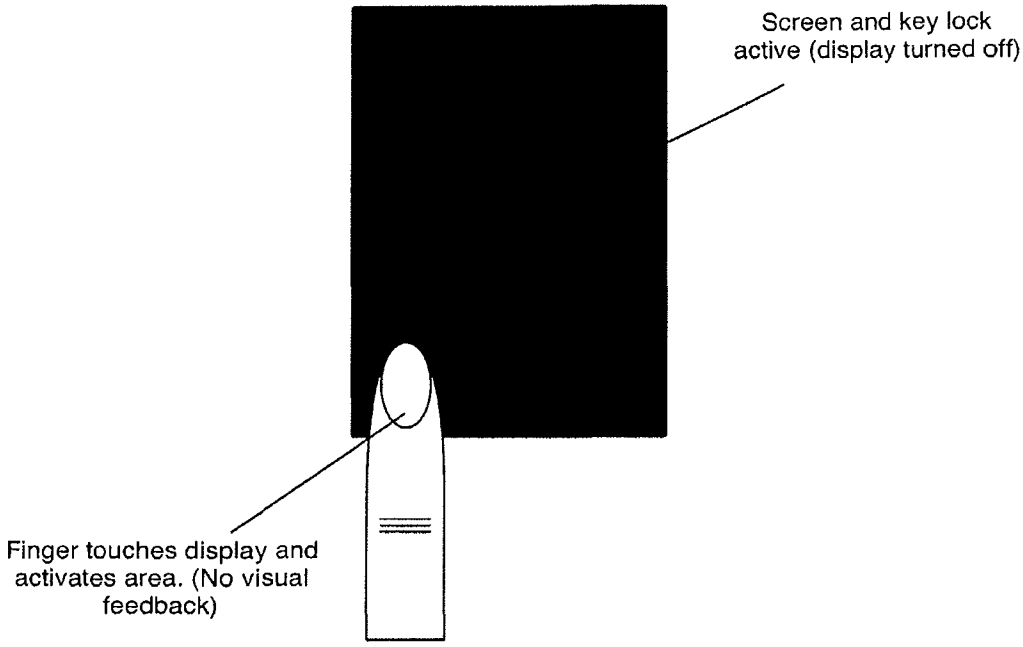

Screen and key lock active (display turned off)
Finger touches display and activates area. (No visual feedback)

Fig 7b

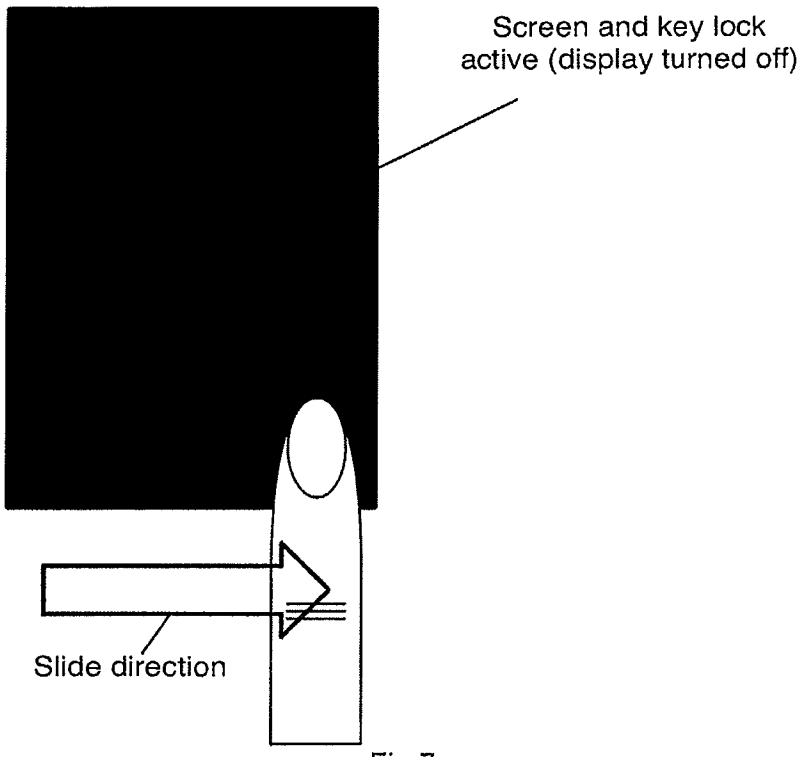

Screen and key lock
active (display turned off)
Slide direction

Fig 7c

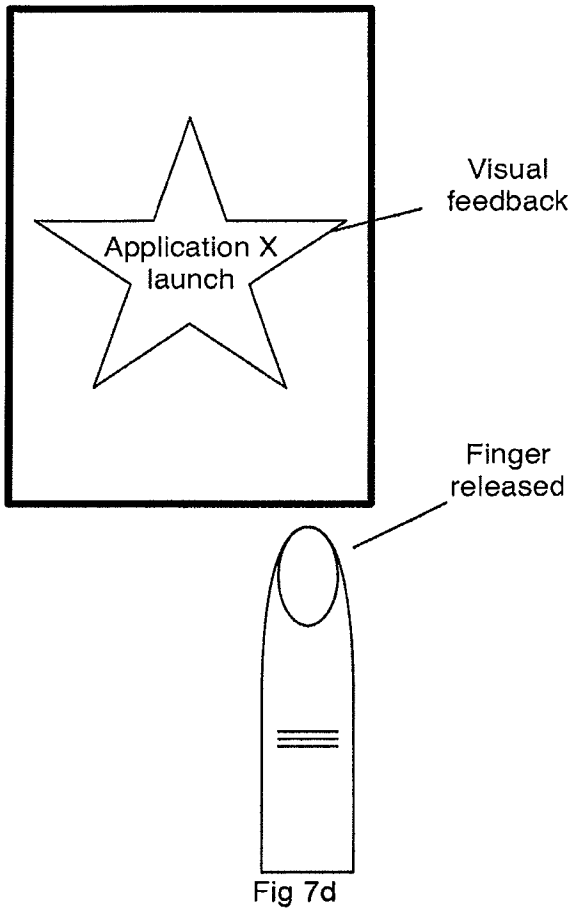


Fig 7d

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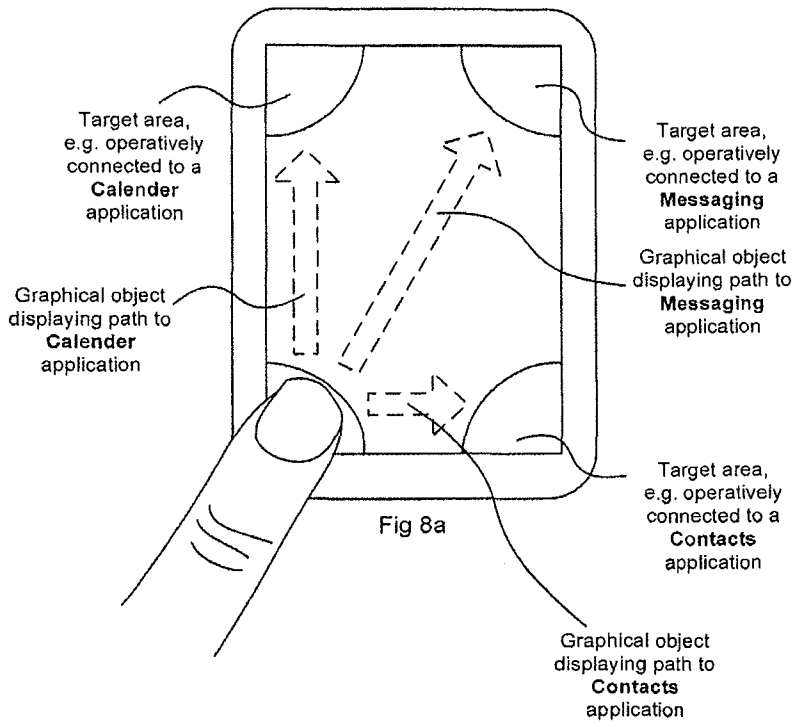

Target area, e.g. operatively connected to a **Calender** application
Graphical object displaying path to **Calender** application
Target area, e.g. operatively connected to a **Messaging** application
Graphical object displaying path to **Messaging** application
Target area, e.g. operatively connected to a **Contacts** application
Graphical object displaying path to **Contacts** application

Fig 8a

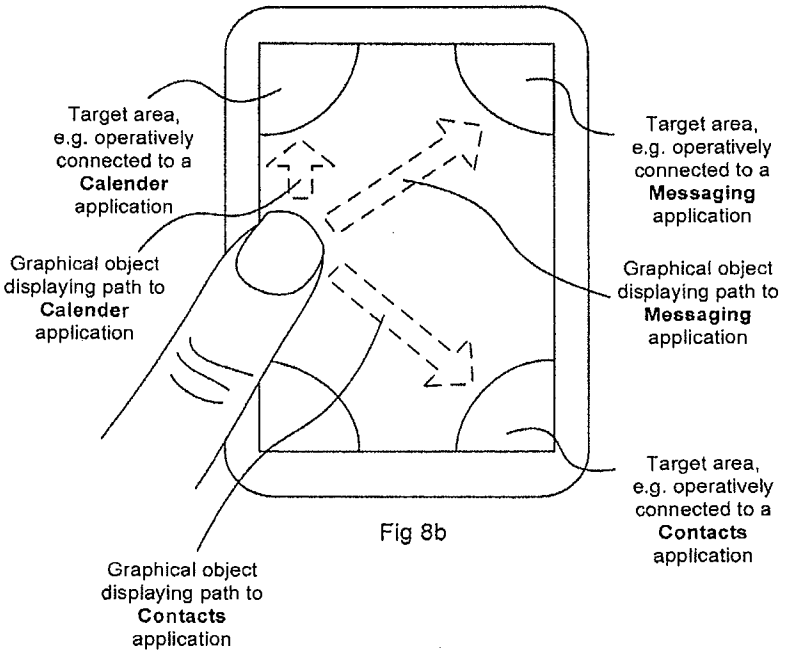

Target area, e.g. operatively connected to a **Calender** application
Graphical object displaying path to **Calender** application
Target area, e.g. operatively connected to a **Messaging** application
Graphical object displaying path to **Messaging** application
Target area, e.g. operatively connected to a **Contacts** application
Graphical object displaying path to **Contacts** application

Fig 8b

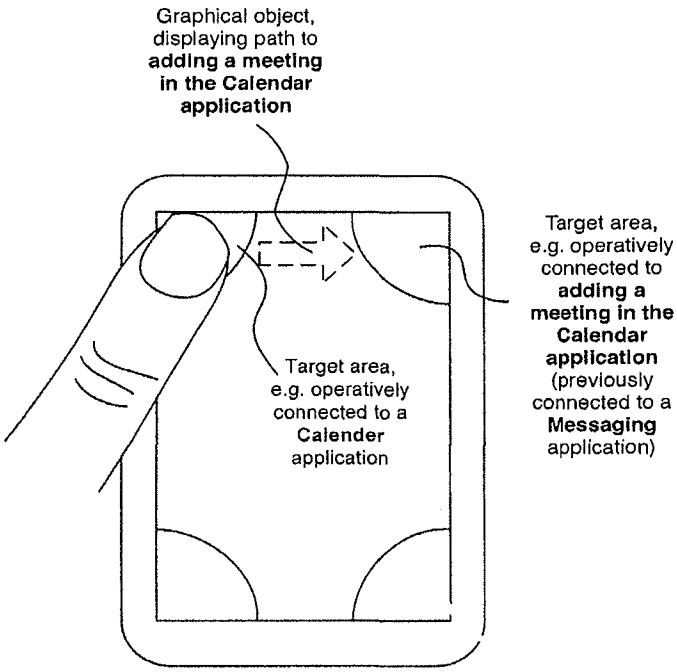

Graphical object, displaying path to **adding a meeting in the Calendar application**
Target area, e.g. operatively connected to **adding a meeting in the Calendar application** (previously connected to a **Messaging** application)
Target area, e.g. operatively connected to a **Calender** application

Fig 8c

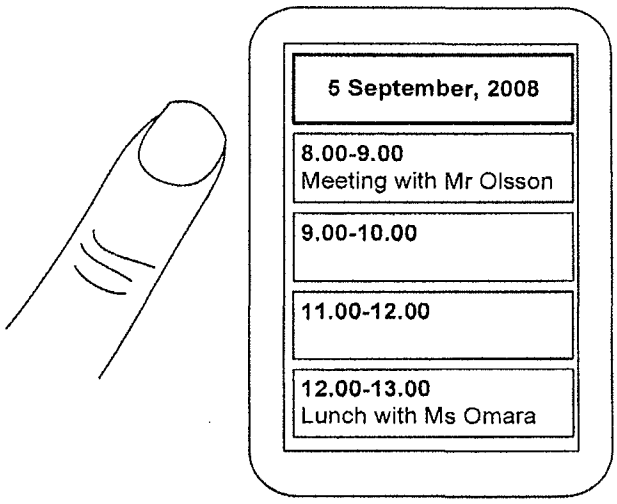

5 September, 2008
8.00-9.00
Meeting with Mr Olsson
9.00-10.00
11.00-12.00
12.00-13.00
Lunch with Ms Omara

Fig 8d

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[Continued on next page]

(54) Title: MULTI-LAYER USER INTERFACE WITH FLEXIBLE PARALLEL AND ORTHOGONAL MOVEMENT

(57) Abstract: A user interface (UI) system calculates movements in a multi-layer graphical user interface. The UI system receives user input corresponding to gestures on a touchscreen. The UI system calculates a movement of a first layer in a first direction (e.g., a horizontal direction) at a first movement rate. The UI system calculates a movement of a second layer substantially parallel to the movement of the first layer, at a second movement rate that differs from the first movement rate. The UI system calculates a movement (e.g., a vertical movement) in a direction substantially orthogonal to the first direction, in a UI element of one of the layers.

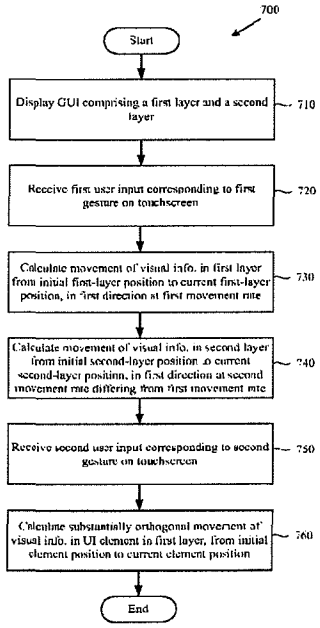


Figure 7

WO 2011/100623 A2

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000514

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MULTI-LAYER USER INTERFACE WITH FLEXIBLE PARALLEL AND ORTHOGONAL MOVEMENT

BACKGROUND

The design of an effective user interface poses many challenges. One challenge is how to provide a user with an optimal amount of visual information or functionality, given the space limitations of a display and the needs of a particular user. This challenge can be especially acute for devices with small displays, such as smartphones or other mobile computing devices. This is because there is often more information available to a user performing a particular activity (e.g., browsing for audio or video files in a library of files) than can fit on the display. A user can easily become lost unless careful attention is paid to how information is presented on the limited amount of available display space.

Whatever the benefits of previous techniques, they do not have the advantages of the techniques and tools presented below.

SUMMARY

Techniques and tools described herein relate to presenting visual information to users on computer displays, and more particularly relate to presenting visual information on small displays, such as those found on smartphones and other mobile computing devices. In particular, techniques and tools are described that relate to different aspects of a user interface in which layers of visual information that relate to one another move at different rates. In one implementation, the layers move in the same direction at rates that are a function of the length of the layer (which can also be referred to as the width of the layer, such as when the layer is oriented horizontally), in response to user input. For example, a graphical user interface (GUI) comprises a background layer, a title layer, and a content layer. A user navigating through the content layer in a particular direction (e.g., from left to right in a horizontal dimension) also causes movement in the same direction in one or more of the background layer and the title layer. The amount and nature of the movement in the layers depends on one or more factors, such as the data in the layers, or the relative distance between corresponding lock points in the layers. For example, if a content layer is longer than a background layer, the content layer moves faster than the background layer. The movement rate of the content layer can match with a movement rate of a gesture on a touchscreen, to give the user a sense of directly manipulating the content on the touchscreen.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000516

In one aspect, a UI system displays a GUI comprising at least first and second layers. A first portion of visual information in the first layer is within a display area of a touchscreen. The UI system receives first user input corresponding to a first gesture on the touchscreen. The UI system calculates a first movement based at least in part on the user input, the first movement comprising a movement of the first layer from an initial first-layer position in which a second portion of visual information in the first layer is outside the display area to a current first-layer position in which the second portion of visual information in the first layer is within the display area. The first movement is in a first direction at a first movement rate (e.g., a movement rate substantially equal to the movement rate of a gesture made by a user's finger or other object on the touchscreen). The UI system calculates a second movement substantially parallel to the first movement based at least in part on the user input, the second movement comprising a movement of visual information in the second layer from an initial second-layer position to a current second-layer position. The second movement is in the first direction at a second movement rate. The second movement rate differs from the first movement rate.

The first layer has a user interface element (e.g., a vertically scrollable element such as a list of links) operable to move in a second direction (e.g., a vertical direction) substantially orthogonal to the first direction (e.g., a horizontal direction). The UI system receives a second user input corresponding to a second gesture on the touchscreen and calculates a substantially orthogonal movement (e.g., a vertical movement) based at least in part on the second user input. The substantially orthogonal movement comprises a movement of visual information in the user interface element in the first layer from an initial element position to a current element position. The current element position can be calculated based on the initial element position and a velocity of the second gesture. A portion of visual information in the user interface element can be outside the display area when the element is in the initial element position and within the display area when the element is in the current element position.

In another aspect, a computing device displays a GUI comprising a content layer, a section header layer, and a title layer. Each layer comprises at least first and second portions of visual information in the respective layer. The first portion of visual information in the respective layer is in a display area, and the second portion of visual information in the respective layer is outside of the display area. The content layer comprises at least one scrollable element having a first portion of visual information in the display area and a second portion of visual information outside of the display area. The

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000517

computing device receives first user input via a touchscreen and calculates a content-layer movement based at least in part on the first user input. The content-layer movement comprises a movement of the content layer from (a) an initial content-layer position in which the second portion of visual information in the content layer is outside the display area, to (b) a current content-layer position in which the second portion of visual information in the content layer is within the display area. The computing device animates the movement from (a) to (b). The content-layer movement is in a first direction at a content-layer movement rate. The computing device calculates a section-header-layer movement based at least in part on the first user input. The section-header-layer movement comprises a movement of the section header layer from (c) an initial section-header-layer position in which the second portion of visual information in the section header layer is outside the display area, to (d) a current section-header-layer position in which the second portion of visual information in the section header layer is within the display area. The computing device animates the movement from (c) to (d). The section-header-layer movement is in the first direction at a section-header-layer movement rate. The computing device calculates a title-layer movement based at least in part on the first user input. The title-layer movement comprises a movement of the title layer from (e) an initial title-layer position in which the second portion of visual information in the title layer is outside the display area, to (f) a current title-layer position in which the second portion of visual information in the title layer is within the display area. The computing device animates the movement from (e) to (f). The title-layer movement is in the first direction at a title-layer movement rate. The computing device receives second user input via the touchscreen and calculates a scrollable-element movement based at least in part on the second user input. The scrollable-element movement comprises a movement of visual information in the scrollable element from (g) an initial scrollable-element position in which the second portion of visual information in the scrollable element is outside of the display area, to (h) a current scrollable-element position in which the second portion of visual information in the scrollable element is within the display area. The computing device animates the movement from (g) to (h). The scrollable-element movement is in a second direction substantially orthogonal to the first direction. The title-layer movement rate differs from the content-layer movement rate and from the section-header-layer movement rate. The content layer, the section header layer and the title layer are substantially parallel to each other and non-overlapping with respect to each other.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000518

Layers can include lock points. For example, a content layer that includes content panes can have lock points determined (e.g., automatically) based on the number and/or positions of the content panes. Lock points can be set in other ways. For example, lock points can be based on some aspect of a previous state of a layer, such as an exit position of a user interface element in the first layer. Lock points in a second layer (e.g., a background layer, title layer, or section header layer) can have second-layer lock points corresponding to the first layer lock points. Movement rates can be based on distances between lock points. For example, a movement rate can be proportional to a difference between the distance between second-layer lock points and a distance between first-layer lock points (e.g., content-layer lock points) corresponding to the second-layer lock points.

Locking animations can be performed. For example, a locking animation comprises determining whether a threshold number of pixels in a user interface element in a layer are inside the display area and, based on that determination, animating a transition in the layer from a current position to a post-locking-animation position such that the user interface element is visible in the display area. As another example, a locking animation comprises selecting a lock point and animating a transition in a layer from a current position to a post-locking-animation position in which the selected lock point is aligned with a part of the display area. Other transitions can be animated as well, such as a transition in a second layer from a current second-layer position to a second-layer post-locking-animation position that corresponds to the first-layer post-locking-animation position (e.g., a second-layer position in which a second-layer lock point is aligned with a selected first-layer lock point. As another example, a locking animation comprises selecting a first-layer lock point associated with a user interface element (e.g., a content pane) in a first layer (e.g., a content layer), and animating a transition in the first layer from a current first-layer position to a first-layer post-locking-animation position in which the selected first-layer lock point is aligned with a part of the display area and such that the user interface element is visible in the display area. Locking animations can be performed based on user gestures. For example, lock points can be selected based on a velocity of a flick gesture or on a position of a tap gesture.

Locking animations can be adapted to orthogonal movements (e.g., vertical movements) in user interface elements in layers. For example, a vertical locking animation can be performed in a vertically scrollable element (e.g., a list), wherein the vertical locking animation comprises moving the vertically scrollable element such that a

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000519

lock point in the vertically scrollable element is vertically aligned with a part of the display area.

Wrapping animations can be performed. For example, where two layers each comprise a beginning and an end, and the ends of the layers are displayed in a current position, performing a wrapping animation comprises animating a transition in the first layer from the current first-layer position to a post-wrapping-animation first-layer position in which the beginning of the first layer is displayed, and animating a transition in the second layer from the current second-layer position to a post-wrapping-animation second-layer position in which the beginning of the second layer is displayed. Animating the transitions can comprise moving visual information at a wrapping movement rate that differs from other movement rates.

Movement in the layers (e.g., movement rate, direction, and current position) can be calculated based on user input. For example, a current position can be based on an initial position, and a direction and velocity of a gesture. Movements in layers also can be calculated based on positions of other layers. For example, a current second-layer position can be calculated based on a calculated current first-layer position, such as by calculating the current second-layer position based on a location of a second-layer lock point that corresponds to a first-layer lock point.

Gestures can include, for example, pan, drag, flick, and tap interactions. A flick can be detected by determining whether a rate of movement of a gesture exceeds a threshold. Gestures that indicate direction can cause movement in the indicated direction or in some other direction. For example, a gesture in a horizontal direction can cause movement in a vertical or horizontal direction.

Movement rates can be determined in different ways. For example, a movement rate for a layer can be calculated based on a motion ratio for the layer, where the motion ratio is the width of the layer divided by a maximum width of another layer. As another example, a movement rate can be based on a difference between a length of the first layer and a length of the second layer.

Additional layers can be added. For example, the graphical user interface can include a third layer (or more layers) substantially parallel to the first and second layers. Movement rates in layers can be proportional to differences between lengths the respective layers. In one implementation, a section header layer is above a content layer in the display area, a title layer is above the section header layer in the display area, and the content layer, the section header layer and the title layer overlap a background layer.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000520

The foregoing and other objects, features, and advantages of the invention will become more apparent from the following detailed description, which proceeds with reference to the accompanying figures.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a diagram showing a background layer and a content layer with lock points, according to one or more described embodiments.

Figure 2 is a flow chart showing an example technique for providing a user interface with multiple layers moving at different rates, according to one or more described embodiments.

Figures 3A-3C are diagrams showing multiple layers in a graphical user interface presented by a multi-layer UI system, according to one or more described embodiments.

Figure 3D is a diagram showing the multiple layers of Figures 3A-3C, where the display area is oriented in landscape fashion, according to one or more described embodiments.

Figure 4 is a flow chart showing an example technique in which a UI system calculates movements in a first direction in a multi-layer GUI, according to one or more described embodiments.

Figures 5A-5D are diagrams showing multiple UI layers, with a layer with different parts capable of moving at different rates, according to one or more described embodiments.

Figures 6A-6D are diagrams showing multiple UI layers where two layers move in tandem, according to one or more described embodiments.

Figure 6E is a diagram showing the multiple UI layers of Figures 6A-6D, with possible upward and downward motion indicated for a list in a content layer, according to one or more described embodiments.

Figure 7 is a flow chart showing an example technique in which a UI system calculates movements in a first direction in a multi-layer GUI having at least one layer with a UI element that is operable to move in a second direction that is orthogonal to the first direction, according to one or more described embodiments.

Figures 8A-8C are diagrams showing multiple UI layers including a background layer, according to one or more described embodiments.

Figure 9 is a system diagram showing a multi-layer UI system in which described embodiments can be implemented.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000521

Figure 10 illustrates a generalized example of a suitable computing environment in which several of the described embodiments may be implemented.

Figure 11 illustrates a generalized example of a suitable implementation environment in which one or more described embodiments may be implemented.

Figure 12 illustrates a generalized example of a mobile computing device in which one or more described embodiments may be implemented.

DETAILED DESCRIPTION

Techniques and tools are described that relate to different aspects of a user interface in which layers of visual information that relate to one another move at different rates. In one implementation, the layers move in the same direction at rates that are a function of the length of the layer, in response to user input. For example, a graphical user interface (GUI) comprises a background layer, a title layer, and a content layer. A user navigating through the content layer in a particular direction (e.g., from left to right in a horizontal dimension) also causes movement in the same direction in the background layer and/or the title layer. The amount and nature of the movement depends on one or more factors, such as the relative length of the layers, or the relative distance between corresponding lock points. For example, if the content layer is longer (in terms of pixels) than the background layer, the content layer moves faster (on a pixel basis) than the background layer.

Various alternatives to the implementations described herein are possible. For example, techniques described with reference to flowchart diagrams can be altered by changing the ordering of stages shown in the flowcharts, by repeating or omitting certain stages, etc. As another example, systems described with reference to system diagrams can be altered by changing the ordering of processing stages shown in the diagrams, by repeating or omitting certain stages, etc. As another example, user interfaces described with reference to diagrams can be altered by changing the content or arrangement of user interface features shown in the diagrams, by omitting certain features, etc. As another example, although some implementations are described with reference to specific devices and user input mechanisms (e.g., mobile devices with a touchscreen interface), described techniques and tools can be used with other devices and/or user input mechanisms.

The various techniques and tools can be used in combination or independently. Different embodiments implement one or more of the described techniques and tools.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000522

I. Layered Graphical User Interface Techniques and Tools

The design of effective user interfaces poses many challenges. One challenge is how to provide a user with an optimal amount of visual information or functionality, given the space limitations of displays. This challenge can be especially acute for devices with small displays, such as smartphones or other mobile computing devices. This is because there is often more information or functionality available than can fit on the display.

By putting layers of data on top of each other and allowing them to move in different ways, a graphical user interface can provide a context for information that a user is viewing, even if there is more information relevant to the user's current activity that is not visible on the display. For example, a content layer can move independently to at least some extent, allowing a user to move different parts of the content layer into view and out of view, while some portion of another layer associated with the content layer remains visible, even if that other layer moves to a lesser extent than the content layer.

Described techniques and tools relate to separating information (e.g., visual information, functional information and metadata) in a user interface (UI), such as a graphical user interface (GUI), into layers (e.g., parallel layers or layers that are at least substantially parallel), and moving such layers in different ways (e.g., at different speeds). For example, described embodiments involve a multi-layer UI system that presents UI layers that move at different speeds relative to one another. The rate of movement in each layer can depend on several factors, including the amount of data to be presented visually (e.g., text or graphics) in the layer, or the relative distance between corresponding lock points, which are described in more detail below. The amount of data to be presented visually in a layer can measured by, for example, determining the length as measured in a horizontal direction of the data as rendered on a display or as laid out for possible rendering on the display. Length can be measured in pixels or by some other suitable measure (e.g., the number of characters in a string of text). A layer with a larger amount of data and moving at a faster rate can advance by a number of pixels that is greater than a layer with a smaller amount of data moving at a slower rate. Layer movement rates can be determined in different ways. For example, movement rates in slower layers can be derived from movement rates in faster layers, or vice versa. Or, layer movement rates can be determined independently of one another.

The movement in various layers of the UI typically depends to some extent on user interaction. For example, a user that wishes to navigate from one part of a layer to another provides user input to indicate a desired direction of movement. The user input can then

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000523

cause movement in one or more layers on a display. In some embodiments, a user causes movement of a layer visible in a display area of a device by interacting with a touchscreen. The interaction can include, for example, contacting the touchscreen with a fingertip, stylus or other object and moving it (e.g., with a flicking or sweeping motion) across the surface of the touchscreen to cause a layer to move in a desired direction. Alternatively, a user can interact with a layer in some other way, such as by pressing buttons (e.g., directional buttons) on a keypad or keyboard, moving a trackball, pointing and clicking with a mouse, making a voice command, etc.

When user interaction causes movement in layers, the movement of the layers is a typically a function of the length of the layers and the size, movement rate and direction of the motion made by the user. For example, a leftward flicking motion on a touchscreen produces a leftward movement of the layers relative to the display area. The layers also can be arranged relative to one another such that the layers can move at different rates while providing a user with visual context. For example, a section header (e.g., a text string such as "History") can span visible and off-screen content (e.g., an image representing a currently-playing media file and a list of recently-played media) in a content layer, moving at a different rate than the content layer but providing context for the content.

Depending on implementation and/or user preferences, user input can be interpreted in different ways to produce different kinds of movement in the layers. For example, a multi-layer UI system can interpret any movement to the left or right, even diagonal movements extending well above or below the horizontal plane, as a valid leftward or rightward motion of a layer, or the system can require more precise movements. As another example, a multi-layer UI system can require that a user interact with a part of a touchscreen corresponding to the display area occupied by a layer before moving that layer, or the system can allow interaction with other parts of the touchscreen to cause movement in a layer. As another example, a user can use an upward or downward motion to scroll up or down in a part of the content layer that does not appear on the display all at once, such as a list of elements, and such upward/downward motion can even be combined with left/right motion for diagonal movement effects.

The actual amount and direction of the user's motion that is necessary to produce particular movements in the layers can vary depending on implementation or user preferences. For example, a multi-layer UI system can include a default setting that is used to calculate the amount of motion in a layer (e.g., in terms of pixels) as a function of

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000524

the size or movement rate (or velocity) of a user movement. As another example, a user can adjust a touchscreen sensitivity control, such that the same motion of a fingertip or stylus on a touchscreen will produce smaller or larger movements of the layers, depending on the setting of the control.

In some embodiments, layers include lock points. Lock points in layers indicate corresponding positions with which a display area of a device will be aligned. For example, when a user navigates to a position on a content layer such that the left edge of the display area is at a left-edge lock point "A," the left edge of display area will also be aligned at a corresponding left-edge lock point "A" in each of the other layers. Lock points also can indicate alignment of a right edge of a display area (right-edge lock points), or other types of alignment (e.g., center lock points). Typically, corresponding lock points in each layer are positioned to account for the fact that layers will move at different speeds. For example, if the distance between a first lock point and a second lock point in a content layer is twice as great as the distance between corresponding first and second lock points in a background layer, the background layer moves at half the rate of the content layer when transitioning between the two lock points.

In the example shown in Figure 1, a background layer 110 and a content layer 112 have corresponding left-edge lock points "A," "C," "E," and "G," and corresponding right-edge lock points "B," "D," "F," and "H." The left-edge lock points align with the left edge of a display area (not shown), and right-edge lock points align with the right edge of the display area. Left-edge or right-edge alignment corresponding to lock points can involve precise alignment of lock points with the edge of a display area, or can involve some amount of padding between the lock point and the edge of the display area. In the content layer 112, the left-edge lock points align on the left edge of a content pane (e.g., content panes 120, 122, 124 and 126, respectively), and the right-edge lock points align on the right edge of a content pane. The mapping between the lock points in the two layers 110, 112 is indicated by arrows between the two layers and dashed lines in background pane 102.

The lock points shown in Figure 1 are not generally representative of a complete set of lock points. As an alternative, lock points can indicate other kinds of alignment. For example, center lock points can indicate alignment with the center of a display area. As another alternative, fewer lock points can be used, or more lock points could be used so as to provide overlap between displayable areas. For example, lock points can be limited

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000525

to either left-edge or right-edge lock points, or lock points can be used for some parts of a layer, but not others. As another alternative, lock points can be omitted.

In addition to indicating corresponding positions in layers, lock points can exhibit other behavior. For example, lock points can indicate positions in a content layer to which the layer will move when the part of the layer corresponding to the lock point comes into view on the display. This can be useful, for example, when an image, list or other content element comes partially into view near the left or right edge of the display area – the content layer can automatically bring the content element completely into view by moving the layer such that an edge of the display area aligns with an appropriate lock point. A lock animation can be performed at the end of a navigation event, such as a flick or pan gesture, to align the layers with a particular lock point. In the event that a navigation event produces a user-generated movement that does not align precisely with a lock point, a lock animation can be used to align the layers. As an example, a lock animation can be performed at the end of a navigation event that causes movement of a content layer to a position between two content panes (e.g., where portions of two content panes are visible in a display area). A multi-layer UI system can check which content pane occupies more space in the display area and transition to that pane using the lock animations. This can improve the overall look of the layers and can be effective in bringing information or functionality (e.g., functional UI elements) into view in a display area.

Lock points also can be useful to provide a locking "notch" or "bump" effect during navigation. For example, as a user navigates along the length of a content layer, the layer can stop at lock points (e.g., at regularly spaced intervals, between content elements, etc.) after each navigation movement (e.g., a flick or pan motion on a touchscreen) made by the user.

Movement of various layers can differ depending on context. For example, a user can navigate left from the beginning of a content layer to reach the end of a content layer, and can navigate right from the end of the content layer to reach the beginning of a content layer. This wrapping feature provides more flexibility when navigating through the content layer. Wrapping can be handled by the multi-layer UI system in different ways. For example, wrapping can be handled by producing an animation that shows a rapid transition from the end of layers such as title layers or background layers back to the beginning of such layers, or vice-versa. Such animations can be combined with ordinary panning movements in the content layer, or with other animations in the content layer, such as locking animations. However, wrapping functionality is not required.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000526

Example 1 – Multiple UI Layers

Figure 2 is a flow chart showing an example technique 200 for providing a user interface with multiple layers moving at different rates. At 210, a multi-layer UI system provides a user interface comprising parallel layers displayed simultaneously (e.g., in a display area of a computing device). Typically, at least part of at least one of the layers is not visible in the display area. At 220, the system receives user input that indicates movement to be made in a layer. For example, where a content layer extends beyond the right edge of a display area, a user can interact with a touchscreen to cause a panning motion in the content layer, in order to view a different portion of the content layer. At 230, the system renders movement in the parallel layers at different movement rates, depending at least in part on the user input. For example, the system can cause a content layer to move at a rate equal to the rate of a panning gesture on a touchscreen, and cause a title layer and a background layer to move at a slower rate.

Figures 3A-3C are diagrams showing multiple layers 310, 312, 314 in a GUI presented by a multi-layer UI system for a device having a display with a display area 300. The display area 300 has dimensions typical of displays on smartphones or similar mobile computing devices. According to the example shown in Figures 3A-3C, a user 302 (represented by the hand icon) interacts with content layer 314 by interacting with a touchscreen having the display area 300. The interaction can include, for example, contacting the touchscreen with a fingertip, stylus or other object and moving it (e.g., with a flicking or sweeping motion) across the surface of the touchscreen.

The content layer 314 includes content elements (e.g., content images 330A-H). Layers 310, 312 include text information ("Category" and "Selected Subcategory," respectively). The length of content layer 314 is indicated to be approximately twice the length of layer 312, which is in turn indicated to be approximately twice the length of layer 310.

In Figures 3A-3C, the direction of motion of the layers that can be caused by the user 302 is indicated by a left-pointing arrow and a right-pointing arrow. These arrows indicate possible movements (e.g., left or right horizontal movements) of the layers 310, 312, 314 in response to user input.

In the example shown in Figure 3A-3C, the system interprets user movements to the left or right, even diagonal movements extending above or below the horizontal plane, as input that indicates a valid leftward or rightward motion of a layer. Although the example shown in Figures 3A-3C shows the user 302 interacting with a portion of the

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000527

display area 300 that corresponds to the content layer 314, the system does not require a user to interact with a part of a touchscreen corresponding to the display area occupied by the content layer 314. Instead, the system allows interaction with other parts of the touchscreen (e.g., parts that correspond to portions of display area 300 occupied by other layers) to cause movement in the layers 310, 312, 314.

When the user input indicates a motion to the right or left, the system produces a rightward or leftward movement of the layers 310, 312, 314 relative to the display area 300. The amount of movement of the layers 310, 312, 314 is a function of the data in the layers and the size or movement rate (or velocity) of the motion made by the user.

In the example shown in Figures 3A-3C, the layers 310, 312, 314 move according to the following rules, except during wrapping animations:

1. The content layer 314 will move at approximately twice the rate of the layer 312, which is approximately half the length of layer 314.
2. The layer 312 will move at approximately twice the rate of the layer 310, which is approximately half the length of layer 312.
3. The content layer 314 will move at approximately four times the rate of the layer 310, which is approximately 1/4 the length of layer 314.

Movement in the layers 310, 312, 314 may differ from the rules described above in some circumstances. In the example shown in Figures 3A-3C, wrapping is permitted. The arrows indicate that a user can navigate left from the beginning of the content layer 314 (the position shown in Figure 3A), and can navigate right from the end of the content layer 314 (the position shown in Figure 3C). During a wrapping animation, some layers may move faster or slower than during other kinds of movements. In the example shown in Figures 3A-3C, the text in layers 310 and 312 moves faster when wrapping back to the beginning of the content layer. In Figure 3C, display area 300 shows portions of one and two letters, respectively, in layers 310 and 312, at the end of the respective text strings. A wrapping animation to return to the state shown in Figure 3A can include bringing the text of the layers 310, 312 into view from the right, resulting in a more rapid movement than in other contexts, such as the transition from the state shown Figure 3A to the state shown in Figure 3B.

In Figures 3A-3C, example left-edge "lock points" "A," "B" and "C" are indicated for each layer. The left-edge lock points indicate the corresponding position of the left edge of the display area 300 on each layer. For example, when a user navigates to a position on content layer 314 such that the left edge of the display area 300 is at lock point

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000528

"A," the left edge of display area will also be aligned at lock point "A" of the other layers 310, 312, as shown in Figure 3A. In Figure 3B, the left edge of the display area 300 is at lock point "B" in each of the layers 310, 312, 314. In Figure 3C, the left edge of the display area 300 is at lock point "C" in each of the layers.

The lock points shown in Figures 3A-3C are not generally representative of a complete set of lock points, and are limited to lock points "A," "B" and "C" only for brevity. For example, left-edge lock points can be set for each of the content images 330A-330H. Alternatively, fewer lock points can be used, or lock points can be omitted. As another alternative, lock points can indicate other kinds of alignment. For example, right-edge lock points can indicate alignment with the right edge of display area 300, or center lock points can indicate alignment with the center of display area 300.

Example 2 – Changes in Display Orientation

Described techniques and tools can be used on display screens in different orientations, such as landscape orientation. Changes in display orientation can occur, for example, where a UI has been configured (e.g., by user preference) to be oriented in landscape fashion, or where a user has physically rotated a device. One or more sensors (e.g., an accelerometer) in the device can be used to detect when a device has been rotated, and adjust the display orientation accordingly. In the example shown in Figure 3D, the display area is oriented in landscape fashion, and only layers 312 and 314 are visible. However, more of the content layer is visible, allowing the user to see more content in the content layer (e.g., content images 330A-330D) at one time. Alternatively, adjustments can be made to keep all layers visible, such as by reducing the height of layers and reducing font and image sizes, as appropriate. For example, the height of layers 310 and 312 can be reduced, along with a corresponding reduction in the size of the font in the text, so that the layers 310 and 312 are still visible, while keeping the content layer 314 the same size for ease of navigation.

As in Figures 3A-3C, a user 302 can make leftward or rightward (in landscape orientation) motions to navigate along the content layer 314. The positioning of lock points "A," "B" and "C" in each layer, and the relative length of the layers, shows that the content layer 314 will move at approximately twice the rate of the layer 312 above it. Alternatively, positions of lock points and distances between lock points can be dynamically adjusted to take into account effects of the reorientation (e.g., a new effective width of the display area). However, such adjustments are not required. For example, if a

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000529

display area has equal height and width, reorientation of the display area to a landscape orientation will not change the effective width of the display area.

Example 3 – Calculating Movements in Multiple UI Layers

Figure 4 is a flow chart showing an example technique 400 in which a UI system calculates movements in a first direction (e.g., a horizontal direction) in a multi-layer GUI (e.g., the GUI shown in Figures 3A-3C).

At 410, the UI system displays a graphical user interface comprising plural layers. A first portion of visual information (e.g., content image 330 as shown in Figure 3A) in a first layer (e.g., content layer 314) is within a display area (e.g., display area 300) of a touchscreen. At 420, the UI system receives user input corresponding to a gesture on the touchscreen. At 430, the UI system calculates a first movement based at least in part on the user input. The first movement is a movement of the first layer from an initial first-layer position (e.g., the position shown in Figure 3A) in which a second portion of visual information (e.g., content image 330C) in the first layer is outside the display area to a current first-layer position (e.g., the position shown in Figure 3B) in which the second portion of visual information in the first layer is within the display area. The first movement is in a first direction (e.g., a rightward, horizontal direction) at a first movement rate. The first movement rate is based on a movement rate of the gesture. For example, the first movement rate can be substantially equal to the gesture movement rate (e.g., the movement rate of a user's finger or other object on the touchscreen), to give the user a sense of directly manipulating content on the touchscreen. At 440, the UI system calculates a second movement substantially parallel to the first movement based at least in part on the user input. The second movement is a movement of visual information in a second layer (e.g., layer 312) from an initial second-layer position (e.g., the position shown in Figure 3A) to a current second-layer position (e.g., the position shown in Figure 3B). The second movement is in the first direction (e.g., the rightward, horizontal direction) at a second movement rate that differs from the first movement rate.

The movements can be animated and/or rendered for display (e.g., on a touchscreen of a mobile phone or other computing device).

Example 4 – Individual Layers Moving at Varying Speeds

Figures 5A-5D are diagrams showing a GUI presented by a multi-layer UI system with three layers 510, 512, 514, in which different parts of a section header layer 512 are associated with different parts of a content layer 514. According to the example shown in Figures 5A-5D, a user (not shown) interacts with content layer 514. For example, the user

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000530

navigates the content layer 514 by pressing navigational buttons (not shown) to highlight different sections (e.g., Section 1a, 1b, 1c, 1d, 2a, 2b, 2c, or 2d) in the content layer. Alternatively, the user interacts with content layer 514 by interacting with a touchscreen having the display area 300. The interaction can include, for example, contacting the touchscreen with a fingertip, stylus or other object and moving it (e.g., with a flicking or sweeping motion) across the surface of the touchscreen.

The content layer 514 includes Sections 1a, 1b, 1c, 1d, 2a, 2b, 2c, and 2d, which can be images, icons, lists of text strings or links, or some other content. The other layers 510, 512 include text information. Section header layer 512 includes two text strings ("Feature 1" and "Feature 2"). "Feature 1" is associated with Sections 1a, 1b, 1c and 1d. "Feature 2" is associated with Sections 2a, 2b, 2c and 2d. Layer 510 includes one text string ("Application"). The length of content layer 514 is indicated to be longer than the total length of section header layer 512 (e.g., the combined length of the two strings), and longer than the length of layer 510.

In Figures 5A-5D, the direction of motion that can be indicated by the user is indicated by a left- and right-pointing arrow above display area 300. These arrows indicate possible movements (left or right horizontal movements) of the layers 510, 512, 514 in response to user input.

In the example shown in Figure 5A-5D, the user highlights different sections of the content layer 514 (e.g., Section 1a in Figure 5A, Section 1d in Figure 5B, Section 2a in Figure 5C, and Section 2d in Figure 5D) when navigating left or right in the content layer 514. When the user input indicates a motion to the right or left, the system produces a rightward or leftward movement of the layers 510, 512, 514 relative to the display area 300. The amount of movement of the layers 510, 512, 514 is a function of the data in the layers and the size or movement rate (or velocity) of the motion made by the user.

In Figures 5A-5D, example right-edge lock points "A," "B," "C" and "D" are indicated for each layer 510, 512, 514. The right-edge lock points for each layer indicate the corresponding position of the right edge of the display area 300 on each layer. For example, when a user navigates to Section 1a on content layer 514, the right edge of the display area 300 is at lock point "A," and the right edge of the display area 300 will also be aligned at lock point "A" of the other layers 510, 512, as shown in Figure 5A. In Figure 5B, the right edge of the display area 300 is at lock point "B" in each of the layers 510, 512, 514. In Figure 5C, the right edge of the display area 300 is at lock point "C" in

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000531

each of the layers 510, 512, 514. In Figure 5D, the right edge of the display area 300 is at lock point "D" in each of the layers 510, 512, 514.

The lock points shown in Figures 5A-5D are not generally representative of a complete set of lock points, and are limited to lock points "A," "B," "C" and "D" only for brevity. For example, left-edge lock points can be set for one or more sections in the content layer 514. Alternatively, additional right-edge lock points can be used, fewer lock points can be used, or lock points can be omitted. As another alternative, lock points can indicate other kinds of alignment. For example, or center lock points can be used to obtain alignment with the center of display area 300.

In the example shown in Figures 5A-5D, the layers 510, 512, 514 move according to the following rules, except during wrapping animations:

1. The portion of content layer 514 associated with the "Feature 1" text string in section header layer 512 (Sections 1a, 1b, 1c and 1d) will move at approximately four times the rate of the "Feature 1" text string. Although the "Feature 1" text string is approximately half the length of the portion of content layer 514 (Sections 1a, 1b, 1c and 1d) associated with the "Feature 1" text string, the distance to be moved from right-edge lock point "A" to right-edge lock point "B" in content layer 514 is approximately four times longer than the distance between the corresponding lock points in section header layer 512. Similarly, the portion of content layer 514 associated with the "Feature 2" text string in section header layer 512 (Sections 2a, 2b, 2c and 2d) will move at approximately four times the rate of the "Feature 2" text string.

2. When navigating through the portion of content layer 514 associated with the "Feature 1" text string in section header layer 512 (Sections 1a, 1b, 1c and 1d), the "Feature 1" text string will move at approximately twice the rate of layer 510. Although the "Feature 1" text string is nearly as long as the "Application" text string in layer 510, the distance to be moved from right-edge lock point "A" to right-edge lock point "B" in layer 510 is approximately half as long as the distance between the corresponding lock points in section header layer 512. Similarly, when navigating through the portion of content layer 514 associated with the "Feature 2" text string in section header layer 512 (Sections 2a, 2b, 2c and 2d), the "Feature 2" text string will move at approximately twice the rate of layer 510.

3. When navigating from the portion of content layer 514 associated with the "Feature 1" text string in section header layer 512 to the portion of content layer

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000532

514 associated with the "Feature 2" text string in section header layer 512 (i.e., from Section 1d as shown in Figure 5B to Section 2a as shown in Figure 5C), section header layer 512 moves more rapidly, as shown by the distance between right-edge lock point "B" and right-edge lock point "C" in layer 512 in Figure 5C.

4. Content layer 514 will move at approximately eight times the rate of layer 310. The distance to be moved between neighboring right-edge lock points (e.g., from "A" to "B") in content layer 514 is approximately eight times longer than the distance between the corresponding right-edge lock points in layer 510.

Movement in layers 510, 512, 514 may differ from the rules described above in some circumstances. In the example shown in Figures 5A-5D, wrapping is permitted. The arrows above display area 300 indicate that a user can navigate left from the beginning of the content layer 514 (the position shown in Figure 5A), and can navigate right from the end of the content layer 514 (the position shown in Figure 5D). During a wrapping animation, some layers may move faster or slower than during other kinds of movements. For example, a wrapping animation to return to the state shown in Figure 5A from the state shown in Figure 5D can include bringing the text of layers 510, 512 into view from the right, resulting in a more rapid movement than in other contexts, such as the transition from the state shown Figure 5A to the state shown in Figure 5B.

Example 5 – Layers Moving in Tandem

Figures 6A-6D are diagrams showing a GUI presented by a multi-layer UI system that includes a content layer 614 that moves in tandem (i.e., in the same direction and at the same rate) with layer 612 above it. In this example, a user 302 (represented by the hand icon) navigates through content layer 614 by interacting with a touchscreen having the display area 300. The interaction can include, for example, contacting the touchscreen with a fingertip, stylus or other object and moving it (e.g., with a flicking or sweeping motion) across the surface of the touchscreen.

The content layer 614 includes game images 640, 642, 644, lists 650, 652, 654, and avatar 630 (which is described in more detail below). The other layers 610, 612 include text information ("Games" in layer 610; "Spotlight," "Xbox Live, "Requests" and "Collection" in layer 612). In Figures 6A-6D, example lock points "A," "B," "C" and "D" are indicated for layers 610 and 612. In terms of horizontal motion, content layer 614 is locked to layer 612; the lock points indicated for layer 612 also apply to layer 614.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000533

The lock points for each layer indicate the corresponding position of the left edge of the display area 300 on each layer. For example, when a user navigates to a position on content layer 614 such that the left edge of the display area 300 is at lock point "A," the left edge of display area 300 also is aligned at lock point "A" of the other layers 610, 612, as shown in Figure 6A. In Figure 6B, the left edge of the display area 300 is at lock point "B" in each of the layers 610, 612, 614. In Figure 6C, the left edge of the display area 300 is at lock point "C" in each of the layers 610, 612, 614. In Figure 6D, the left edge of the display area 300 is at lock point "D" in each of the layers 610, 612, 614.

The lock points shown in Figures 6A-6D are not generally representative of a complete set of lock points, and are limited to lock points "A," "B," "C" and "D" only for brevity. For example, right-edge lock points can be added to obtain alignment with the right edge of display area 300, or center lock points can be added to obtain alignment with the center of display area 300. Alternatively, fewer lock points can be used, more lock points can be used, or lock points can be omitted.

The direction of motion that can be caused in layers 610, 612, 614 by user 302 is indicated by a left-pointing arrow and a right-pointing arrow in Figures 6A-6D. The right-pointing and left-pointing arrows indicate possible movements (left or right horizontal movements) of the layers 610, 612, 614 in response to user movements. The system can interpret user movements to the left or right, even diagonal movements extending above or below the horizontal plane, as a valid leftward or rightward motion of a layer. Although the example shown in Figures 6A-6E shows the user 302 interacting with a portion of the display area 300 that corresponds to the content layer 614, the system does not require a user to interact with a part of a touchscreen corresponding to the display area occupied by the content layer 614. Instead, the system also allows interaction with other parts of the touchscreen (e.g., parts that correspond to display area occupied by other layers) to cause movement in the layers 610, 612, 614.

When the user input indicates a motion to the right or left, the system produces a rightward or leftward movement of the layers 610, 612, 614 relative to the display area 300. In this example, the amount of horizontal movement of the layers 610, 612, 614 is a function of the data in the layers and the size or rate of the motion made by the user. Layers 610, 612, 614 move horizontally according to the following rules, except during wrapping animations:

1. The horizontal movement of content layer 614 is locked to layer 612.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000534

2. Layers 612 and 614 will each move horizontally at approximately three times the rate of layer 610, which is approximately 1/3 the length of layers 612 and 614.

Movement in the layers 610, 612, 614 may differ from the rules described above in some circumstances. In the example shown in Figures 6A-6E, wrapping is permitted. The arrows indicate that a user can navigate left from the beginning of the content layer 614 (the position shown in Figures 6A and 6E), and can navigate right from the end of the content layer 614 (the position shown in Figure 6D). During a wrapping animation, some layers may move faster or slower than during other kinds of movements. In the example shown in Figures 6A and 6D, the text in layer 610 moves faster when wrapping back to the beginning of content layer 614. In Figure 6D, display area 300 shows portions two letters in layer 610, at the end of the "Games" text string. A wrapping animation to return to the state shown in Figure 6A can include bringing the data in layers 610, 612, 614, including the text of layer 610, into view from the right, resulting in a more rapid movement in layer 610 than in other contexts, such as the transition from the state shown Figure 6A to the state shown in Figure 6B.

Example 6 – Movements of Layer Elements

In addition to movements of entire layers, a user also can cause movements in elements or parts of layers, depending on the data in the layer and how the layer is arranged. For example, a user can cause movements (e.g., vertical movements) in layer elements (e.g., lists) that are orthogonal or substantially orthogonal to movements (e.g., horizontal movements) that can be caused in a layer as a whole. Orthogonal movements of layer elements in layers that move horizontally can include scrolling vertically in a list embedded in a content layer, such as when the list contains more information than can be displayed in a display area. Alternatively, a system that presents layers that move vertically can allow horizontal movements in layer elements.

In Figures 6A and 6E, list 650 in content layer 614 contains more information than is visible in display area 300. The system can interpret upward or downward movements made by user 302, including diagonal movements extending to the left or right of the vertical plane, as a valid upward or downward motion of list 650. The amount of movement of list 650 can be a function of the size or rate of the motion made by user 302, and the data in list 650. Thus, scrolling of the list 650 can be item-by-item, page-by-page of items, or something in between that depends on size or rate of the motion. In this example, list 650 includes only one list item that is not visible in display area 300 in Figure 6A, so a range of small or large downward movements can be sufficient to scroll to

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000535

the end of list 650. As shown in Figures 6A and 6E, the vertical position of other visual information in the layers (e.g., visual information in content layer 614 outside the list 650, or visual information in other layers) is not affected by upward or downward movements. In this example, movements of the layers as a whole (including wrapping animations and locking animations that affect the layers as a whole) are constrained to horizontal motion (a primary axis of motion). The list 650 is an example of a user interface element within a layer that also permits motion along a secondary axis (e.g., vertical motion) that is orthogonal to the motion in the layers as a whole.

Figures 6A and 6E show user 302 interacting with a portion of the display area 300 that corresponds to list 650 in content layer 614. Alternatively, the system can allow interaction with other parts of a touchscreen (e.g., parts that correspond to portions of display area 300 occupied by other layers) to cause an upward or downward movement in list 650.

The direction of motion that can be caused by user 302 is indicated by a left-pointing arrow and a right-pointing arrow in Figures 6A and 6E, along with an additional down-pointing arrow in Figure 6A and an additional up-pointing arrow in Figure 6E. The right-pointing and left-pointing arrows indicate possible movements (left or right horizontal movements) of the layers 610, 612, 614 in response to user movements. The down-pointing and up-pointing arrows indicate possible movements (up or down vertical movements) of list 650 in response to user movements. User 302 can move left or right in content layer 614 after making an up or down movement in list 650. The current position of list 650 (e.g., the bottom-of-list position indicated in Figure 6E) can be saved, or the system can revert to a default position (e.g., the top-of-list position indicated in Figure 6A) when navigating left or right in content layer 614 from list 650. Although the arrows in Figures 6A–6E (and other figures) that indicate possible movements are shown for purposes of explanation, the display area 300 can itself display graphical indicators (such as arrows or chevrons) of possible movements for the layers and/or list.

Example 7 – Movement in Layers with Elements Capable of Orthogonal Movements

Figure 7 is a flow chart showing an example technique 700 in which a UI system calculates movements in a first direction (e.g., a horizontal direction) in a multi-layer GUI (e.g., the GUI shown in Figures 6A-6E) having at least one layer with a UI element that is operable to move in a second direction that is orthogonal (or substantially orthogonal) to the first direction.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000536

At 710, the UI system displays a graphical user interface comprising plural layers. A first layer (e.g., content layer 614) comprises a user interface element (e.g., list 650) operable to move in a second direction (e.g., a vertical direction) substantially orthogonal to the first direction (e.g., a horizontal direction). A first portion of visual information (e.g., list 652 as shown in Figure 6B) in the first layer is within a display area (e.g., display area 300) of a touchscreen.

At 720, the UI system receives first user input corresponding to a first gesture on the touchscreen. At 730, the UI system calculates a first movement based at least in part on the first user input. The first movement is a movement of the first layer from an initial first-layer position (e.g., the position shown in Figure 6B) in which a second portion of visual information (e.g., list 650) in the first layer is outside the display area to a current first-layer position (e.g., the position shown in Figure 6A) in which the second portion of visual information in the first layer is within the display area. The first movement is in a first direction (e.g., a leftward, horizontal direction) at a first movement rate. At 740, the UI system calculates a second movement substantially parallel to the first movement based at least in part on the first user input. The second movement is a movement of visual information in the second layer from an initial second-layer position (e.g., the position shown in Figure 6B) to a current second-layer position (e.g., the position shown in Figure 6A). The second movement is in the first direction (e.g., the leftward, horizontal direction) at a second movement rate that differs from the first movement rate.

At 750, the UI system receives second user input corresponding to a second gesture on the touchscreen. At 760, the UI system calculates a substantially orthogonal movement (e.g., a vertical movement) based at least in part on the second user input. The substantially orthogonal movement is a movement of visual information in the user interface element of the first layer from an initial element position to a current element position.

The substantially orthogonal movement can be a movement of visual information in a vertically scrollable element (e.g., list 650) from an initial vertical position (e.g., the position of list 650 as shown in Figure 6A) to a current vertical position (e.g., the position of list 650 as shown in Figure 6E). The current vertical position can be calculated based on, for example, the initial vertical position and a velocity of the second gesture. A portion of visual information in the vertically scrollable element can be outside the display area when the vertically scrollable element is in the initial vertical position (e.g., the position of list 650 as shown in Figure 6A) and within the display area when the vertically

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000537

scrollable element is in the current vertical position (e.g., the position of list 650 as shown in Figure 6E).

The movements can be animated and/or rendered for display (e.g., on a touchscreen of a mobile phone or other computing device).

Example 8 - Avatar

Layers can include elements that indicate relationships between other elements, such as other elements in a layer or sections of a layer. Elements that indicate relationships between other elements can be contained in a separate layer, or in the same layer as the respective other elements. For example, an avatar layer can include a visual element (an avatar) with a scope of motion that spans two related sections in another layer that relate to a user. Other elements also can be used to indicate relationships between elements. For example, an image of a music artist could be used to indicate a relationship between a list of albums by the artist and a list of tour dates for the artist.

In Figures 6A-6E, avatar 630 is associated with lists 652, 654 in the content layer, and the headings above the lists 652, 654 in layer 612 ("Xbox Live" and "Requests," respectively). Avatar 630 can provide a visual cue to indicate a relationship between or draw attention to parts of the content layer (e.g., lists 652, 654). In Figure 6B, avatar 630 is positioned between list 652 and list 654. In Figure 6C, avatar 630 floats behind the text of list 654, but remains completely within display area 300. In Figure 6D, avatar 630 is only partially within display area 300, and the part that is within display area 300 floats behind game icons 640, 642, 644. The positioning of avatar 630 at the left edge of display area 300 can indicate to the user 302 that information associated with avatar 630 (e.g., lists 652, 654) is available if the user 302 navigates in the direction of avatar 630. Avatar 630 can move at varying speeds. For example, avatar 630 moves faster in the transition between Figures 6B and 6C than it does in the transition between Figures 6C and 6D.

Alternatively, avatar 630 can move in different ways, or exhibit other functionality. For example, avatar 630 can be locked to particular position (e.g., a lock point) in content layer 614 or in some other layer, such that avatar 630 moves at the same horizontal rate as the layer to which it is locked. As another alternative, avatar 630 can be associated with a list that can be scrolled up or down, such as list 650, and move up or down as the associated list is scrolled up or down.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000538

Example 9 – Background Layer

Figures 8A-8C are diagrams showing a GUI presented by a multi-layer UI system with three layers 310, 312, 314 and a background layer 850. In this example, a user 302 (represented by the hand icon) interacts with content layer 314 by interacting with a touchscreen having a display area 300.

Background layer 850 floats behind the other layers. Data to be presented visually in background layer 850 can include, for example, an image that extends beyond the boundaries of display area 300. The content layer 314 includes content elements (e.g., content images 330A-H). Layers 310, 312 include text information ("Category" and "Selected Subcategory," respectively). The length of content layer 314 is indicated to be approximately twice the length of layer 312, which is in turn indicated to be approximately twice the length of layer 310. The length of background layer 850 is indicated to be slightly less than the length of layer 312.

In Figures 8A-8C, the direction of motion that can be caused in the layers 310, 312, 314, 850 by user 302 is indicated by a left-pointing arrow and a right-pointing arrow. These arrows indicate possible movements (left or right horizontal movements) of layers 310, 312, 314, 850 in response to user movements. In this example, the system interprets user movements to the left or right, even diagonal movements extending above or below the horizontal plane, as a valid leftward or rightward motion of a layer. Although Figures 8A-8C show user 302 interacting with a portion of display area 300 that corresponds to content layer 314, the system also allows interaction with other parts of the touchscreen (e.g., parts that correspond to portions of display area 300 occupied by other layers) to cause movement in layers 310, 312, 314, 850.

When user input indicates a motion to the right or left, the system produces a rightward or leftward movement of the layers 310, 312, 314, 850 relative to display area 300. The amount of movement of layers 310, 312, 314, 850 is a function of the data in the layers and the size or movement rate (or velocity) of the motion made by the user.

In Figures 8A-8C, example left-edge lock points "A," "B" and "C" are indicated for layers 310, 312, 314, 850. The left-edge lock points indicate the corresponding position of the left edge of the display area 300 on each layer. For example, when a user navigates to a position on content layer 314 such that the left edge of display area 300 is at lock point "A," the left edge of display area 300 will also be aligned at lock point "A" of the other layers 310, 312, 850, as shown in Figure 8A. In Figure 8B, the left edge of display area 300 is at lock point "B" in each of the layers 310, 312, 314, 850. In Figure

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000539

8C, the left edge of the display area 300 is at lock point "C" in each of the layers 310, 312, 314, 850.

The lock points shown in Figures 8A-8C are not generally representative of a complete set of lock points, and are limited to lock points "A," "B" and "C" only for brevity. For example, left-edge lock points can be set for each of the content images 330A-330H. Alternatively, fewer lock points can be used, or lock points can be omitted. As another alternative, lock points can indicate other kinds of alignment. For example, right-edge lock points can indicate alignment with the right edge of display area 300, or center lock points can indicate alignment with the center of display area 300.

In this example, layers 310, 312, 314, 850 move according to the following rules, except during wrapping animations:

1. Content layer 314 will move at approximately twice the rate of layer 312, which is approximately half the length of layer 314.
2. Layer 312 will move at approximately twice the rate of layer 310, which is approximately half the length of layer 312.
3. Content layer 314 will move at approximately four times the rate of layer 310, which is approximately 1/4 the length of layer 314.
4. Background layer 850 will move slower than layer 310. Although background layer 850 is longer than layer 310, the distance to be moved between neighboring lock points (e.g., lock points "A" and "B") in layer 310 is greater than the distance between the corresponding lock points in background layer 850.

Movement of layers 310, 312, 314, 850 may differ from the rules described above in some circumstances. In this example, wrapping is permitted. User 302 can navigate left from the beginning of content layer 314 (the position shown in Figure 8A), and can navigate right from the end of content layer 314 (the position shown in Figure 8C). During a wrapping animation, some layers may move faster or slower than during other kinds of movements. In this example, the image in background layer 850 and the text in layers 310 and 312 moves faster when user input causes wrapping back to the beginning of content layer 314. In Figure 8C, display area 300 shows portions of one and two letters, respectively, in layers 310 and 312, at the end of the respective text strings. Display area 300 also shows the rightmost portion of the image in background layer 850. A wrapping animation to return to the state shown in Figure 8A can include bringing the leftmost portion of the image in background layer 850 and the beginning of the text in layers 310, 312 into view from the right. This results in a more rapid movement in layers 310, 312

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000540

and 850 than in other contexts, such as the transition from the state shown Figure 8A to the state shown in Figure 8B.

Example 10 – Multi-layer UI System

Figure 9 is a system diagram showing an example multi-layer UI system 900 that presents multiple UI layers on a device (e.g., a smartphone or other mobile computing device). The system 900 can be used to implement functionality described in other examples, or other functionality.

In this example, the system 900 includes a hub module 910 that provides a declarative description of a hub page to layer control 920, which controls display of parallel UI layers. Layer control 920 also can be referred to as a "panorama" or "pano" control. Such a description can be used when the UI layers move in a panoramic, or horizontal, fashion. Alternatively, layer control 920 controls UI layers that move vertically, or in some other fashion. Layer control 920 includes markup generator 930 and motion module 940.

In this example, layer control 920 controls several layers of UI elements: e.g., a background layer, a title layer, a section header layer, and a content layer. The content layer includes a set of content panes. Content panes can include, for example, images, graphical icons, lists, text, or other information to be presented visually. A set of content panes in a content layer can be referred to as a "generation" of content panes. Alternatively, layer control 920 controls greater than or less than three layers, or different kinds of layers. The declarative description of the hub page includes information that defines UI elements. In a multi-layer UI system, UI elements can include multiple layers, such as a background layer, a title layer, a section header layer, and a content layer. The declarative description of the hub page is provided to markup generator 930, along with other information such as style information and/or configuration properties. Markup generator 930 generates markup that can be used to render the UI layers. Motion module 940 accepts events (e.g., direct UI manipulation events) generated in response to user input and generates motion commands. The motion commands are provided along with the markup to a UI framework 950. In the UI framework 950, the markup and motion commands are received in layout module 952, which generates UI rendering requests to be sent to device operating system (OS) 960. The device OS 960 receives the rendering requests and causes a rendered UI to be output to a display on the device. System components such as hub module 910, layer control 920, and UI framework 950 also can be

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000541

implemented as part of device OS 960. In one implementation, the device OS 960 is a mobile computing device OS.

A user (not shown) can generate user input that affects the way the UI is presented. In the example shown in Figure 9, the layer control 940 listens for direct UI manipulation events generated by UI framework 950. In UI framework 950, direct UI manipulation events are generated by interaction module 954, which receives gesture messages (e.g., messages generated in response to panning or flick gestures by a user interacting with a touchscreen on the device) from device OS 960. Device OS 960 includes functionality for recognizing user gestures and creating messages than can be used by UI framework 950. UI framework 950 translates gesture messages into direction UI manipulation events to be sent to layer control 920. Interaction module 954 also can accept and generate direct UI manipulation events for navigation messages generated in response to other kinds of user input, such as voice commands, directional buttons on a keypad or keyboard, trackball motions, etc.

Example 11 – Detailed Implementation

This example describes a detailed implementation comprising aspects of examples described above, along with other aspects. This detailed implementation can be implemented by a multi-layer UI system such as system 900 described above, or by some other system.

In this example, the system 900 presents multiple parallel UI layers (e.g., a background layer, a title layer, a section header layer, and a content layer) that move horizontally. The content layer includes several content panes. Each content pane includes a right lock point and a left lock point.

A. Initialization

To initialize the parallel UI layers, the system 900 obtains information about the effective length of the background layer, the title layer, the section header layer and the content layer. (For UI layers that move horizontally, the effective length can be considered to be the effective width of the UI layers.) The system 900 can reduce memory and processing demands by dynamically creating content panes as they approach the display area, but this makes it more difficult to determine the effective width of the content layer. In this example, to determine an effective width of the content layer at initialization, the system 900 determines a maximum content layer width based on a maximum width for each content pane, and calculates a sum of the maximum widths of all content panes, which are non-overlapping.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000542

Lock points in the content layer (for content panes) can be set automatically, for example, by dividing the content layer in increments of the width of the display area, to yield non-overlapping content panes. Alternatively, lock points can be set in the content layer by determining how many whole content images *n* fit in a content pane and starting a new content pane every *n* content images until each content image is in at least one content pane, which potentially yield overlapping content panes.

Motion in the layers is calculated based on motion ratios. For example, the system 900 calculates motion ratios for the background layer and the title layer by dividing the width of the background layer and the width of the title layer, respectively, by the maximum width of the content layer. Taking into account the widths of the background layer and the title layer, the system 900 maps locations of lock points in the background layer and the title layer, respectively, based on the locations of corresponding lock points in the content layer. An example of such a mapping of locations in a background layer is shown in Figure 1.

The lock points are used when moving the corresponding layers. For example, when the system 900 animates a transition to a pane in the content layer, the system looks up appropriate lock point positions for the background layer and the title layer and issues a command for the layers to scroll to those positions, setting relative motion rates depending on distances between lock points in the respective layers.

Motion ratios that are based on a maximum length of a content layer will only be approximate when compared with an actual rendered content layer. Because the ratios are approximate (the final width of the content panes is still unknown), the system 900 can perform lock animations to adjust layers such as the background layer or the title layer so that they align with corresponding lock points in a rendered final content layer.

Once initialization is complete, the system 900 can render the UI layers and begin accepting user input.

B. User Input

In this example, the system 900 accepts user input from a user interacting with a touchscreen on a mobile computing device. The system 900 can distinguish between different gestures on the touchscreen, such as drag gestures, pan gestures and flick gestures. The system 900 can also detect a tap gesture, such as where the user touches the touchscreen in a particular location, but does not move the finger, stylus, etc. before breaking contact with the touchscreen. As an alternative, some movement is permitted,

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000543

within a small threshold, before breaking contact with the touchscreen in a tap gesture. The system 900 also can detect multi-touch gestures, such as pinch-and-stretch gestures.

The system 900 interprets an interaction as a particular gesture depending on the nature of the interaction with the touchscreen. The system 900 obtains one or more discrete inputs from a user's interaction. A gesture can be determined from a series of inputs. For example, when the user touches the touchscreen and begins a movement in a horizontal direction while maintaining contact with the touchscreen, the system 900 fires a pan input and begins a horizontal movement in the layers. The system 900 can continue to fire pan inputs while the user maintains contact with the touchscreen and continues moving. For example, the system 900 can fire a new pan input each time the user moves N pixels while maintaining contact with the touch screen. In this way, a continuous physical gesture on a touchscreen can be interpreted by the system 900 as a series of pan inputs. The system can continuously update the contact position and rate of movement.

When the physical gesture ends (e.g., when user breaks contact with the touchscreen), the system 900 can determine whether to interpret the motion at the end as a flick by determining how quickly the user's finger, stylus, etc., was moving when it broke contact with the touchscreen, and whether the rate of movement exceeds a threshold.

C. Responding to User Gestures

The system 900 can render motion (e.g., motion in a layer, list, or other UI element) on the display differently depending on the type of gesture. For example, in the case of a horizontal drag gesture (in which the user is currently maintaining contact with the touchscreen), the system 900 moves the content layer in a horizontal direction by the same distance as the horizontal distance of the drag. The title layer and background layer also move in response to the drag. The amount of movement is determined by multiplying the motion ratio for the respective layer by the horizontal movement of the drag. For example, if a motion ratio of 0.5 has been determined for the title layer, and the horizontal distance of the drag is 100 pixels, the movement in the title layer is 50 pixels in the direction of the drag.

In the case of a pan gesture (in which the user was moving more slowly, or was stopped, when the user broke contact with the touchscreen), moves the content layer in the amount of the pan, and checks the current position of the content pane relative to the display area of the device to determine whether to perform an additional movement in the content layer. For example, the system can perform a locking animation (i.e., an animation of a movement in the content layer to snap to a lock point) and move the

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000544

content layer to a left or right lock point associated with a current content pane. The system 900 can determine which lock point associated with the current pane is closer, and transition to the closer lock point. As another example, the system 900 can move the content layer in order to bring a content pane that is in partial view on the display area into full view. Other gestures also can cause a content pane to be brought into full view. For example, if the left or right side of a vertically scrollable list is outside the display area, a gesture on the list (e.g., a vertical or substantially vertical gesture) can cause a horizontal movement in the content layer (and horizontal movement in other layers, as appropriate) so that the whole list becomes visible. The horizontal movement of the layers may be in addition to any vertical movement in the list caused by the vertical gesture, but the vertical position of the content layer and any other layers are not affected. Alternatively, the system 900 can maintain the current position of the content layer.

In one implementation, the system 900 performs the following steps:

1. In the content layer, check how much area of the current, previous and next content panes are visible, and check the locations of the edges.
2. If the right edge of the previous pane has been moved further into the display area (relative to the left screen edge) than a threshold number of pixels, then transition to the previous pane. In one implementation, the threshold is referred to as a "bump threshold displacement."
3. If the left edge of the next pane has been moved further into the display area (relative to the right screen edge) than threshold number of pixels, then transition to the next pane.
4. Otherwise, determine whether the content layer can be moved to align left or right edges of current panes with lock points or "bumps." If the left edge of the current pane is close enough to the left lock location, lock the current pane to the left edge. Otherwise, if the right edge of current pane is close enough to the right lock location, and the current pane is wider than screen, lock it to the right edge.

In the case of a flick gesture (in which the user was moving more rapidly when the user broke contact with the touchscreen), the system 900 initiates a transition animation that can advance the content layer to the next content pane or the previous content pane, depending on the direction and velocity of the flick gesture. If the velocity of the flick is large enough, the system 900 can transition to the next content pane in that direction. If the velocity isn't strong enough, or if a current content pane is wide, the system 900 can move the content layer in the direction of the flick without actually transitioning to the

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000545

next content pane. The threshold velocity for a flick to be detected (i.e., to distinguish a flick gesture from a pan gesture) can vary depending on implementation. The threshold velocity for a flick to cause a transition to another content pane also can vary depending on implementation.

D. Non-linear Motion

UI layers exhibit non-linear movement rates in some circumstances. For example, entire layers can move at different rates depending on context, or parts of layers can move at different rates than other parts of the same layer depending on context. One layer that can exhibit non-linear movement rates is a section header layer. A section header layer can be divided into several section headers, and each header can be associated with one or more content panes in the content layer.

In this example, the system 900 provides a section header layer, and each section header is associated with a content pane. The section header layer in this example moves according to the following rules:

1. If the content pane is no wider than the display area, the header remains locked to the content pane. Otherwise rules 2-4 apply where the content pane is wider than the display area.
2. The left edge of each header aligns with the left edge of the content pane, when the layer is locked on the left side lock point for the pane.
3. The header moves slower than the content pane when the user pans the content pane to the left. This can be useful, for example, to allow the user to still see some portion of the header when panning.
4. The header moves faster than the content pane when the user pans to the right. This can be useful, for example, to allow a transition effect where, when there is a transition from the current pane to the previous pane, the header moves a little faster than the content pane but both align on the left lock point.

In performing movements according to these rules, system 900 calculates a displacement value. First, a maximum displacement is calculated by taking the difference between the content pane width and the header width. In calculating the maximum displacement, the system 900 also can include an additional margin for buttons or other functional items in the header, and not just the width of text in the header.

The system 900 then calculates an actual displacement by determining the location of the left edge of the current pane relative to the left lock point. If the pane's left edge is to the right of the left lock point, the system 900 subtracts the horizontal position (x

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000546

coordinate) of the left lock point from the horizontal position (x coordinate) of the left edge of the pane, which will be a positive value *a*. If the pane's left edge is to the left of the left lock point, the system 900 subtracts the horizontal position (x coordinate) of the left edge of the pane from the horizontal position (x coordinate) of the left lock point, which will be a positive value *b*. Adjustments can be made to the value (*a* or *b*), such as by multiplying the value by a constant. After any adjustments, if the value (*a* or *b*) is greater than the maximum displacement, the value is capped at the maximum displacement.

Displacement calculations also can be used for panning and transition animations. In the latter case, before the transition starts, the final locations of the panes are calculated and, based on that, final locations of the headers to be used in the transition animations are calculated.

E. Edge Taps

The system 900 also can implement edge tap functionality. In an edge tap, a user can tap within a given margin (e.g, 40 pixels) of edges (e.g., left or right edges) of the display area to cause a transition (e.g., to a next content pane or a previous content pane). This can be useful for example, where the next pane or previous pane is partially in view in the display area. The user can tap near the next or previous pane to cause the system to bring that pane completely into the display area.

II. Extensions and Alternative Implementations

Various extensions and alternatives to the embodiments described herein are possible.

In described examples, content layers are typically described as being longer than other layers, such as a background layer. A multi-layer UI system such as system 900 also can handle scenarios where layers such as a title layer or background layers are actually wider than the content layer. In such scenarios, the speed of the motion in the layers can be adjusted automatically adjusted to compensate. For example, where a content layer is shorter than a title layer, the content layer can move slower than the title layer.

In described examples, some layers are described as being locked to other layers. For example, in Figures 6A-6E, portions of layer 612 are indicated as being locked to parts of content layer 614. In other described examples, some layers are described moving more flexibly. For example, in Figures 5A-5D, sections of section header layer 512 are indicated as being associated with particular parts of content layer 514, but the sections are able to move independently from one another and float over parts of content layer 514. A

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000547

multi-layer UI system can combine such functionality. For example, a multi-layer UI system can lock some parts of a layer (e.g., a section header layer or a title layer) to content in a content layer, while allowing other parts of the layer to move independently.

A multi layer system also can lock layers together to improve transition or wrapping effects. For example, a background layer can be locked to a title layer such that the background layer and title layer move at the same speed during wrapping. Such locking can be done even when the effective length of the layers is different.

Described examples show different positions of layers that may be of interest to a user, such as content layers. A user can begin navigation in multi-layer UI system at the beginning of layers, or use different entry points to begin UI layer navigation. For example, a user can begin navigation in the middle of a content layer, at the end of a content layer, etc. This can be useful, for example, where a user has previously exited at a position other than the beginning of a layer (e.g., the end of a layer), so that the user can return to the prior location (e.g., after a user uses an application invoked by actuating a content image). As another example, default lock points may be based on a prior state of the UI layers. For example, a user can return to a layer at lock point corresponding to a part of a layer that was being viewed previously. As another example, a multi-layer UI system can save states or make adjustments in more than one layer to allow different entry points. For example, if a user makes an entry where a content layer and a feature layer are visible as shown in Figure 5C, a multi-layer UI system can adjust layer 510 such that the beginning of the "Application" text in layer 510 is aligned with the beginning of the "Feature 2" text in layer 512.

III. Example Computing Environment

Figure 10 illustrates a generalized example of a suitable computing environment 1000 in which several of the described embodiments may be implemented. The computing environment 1000 is not intended to suggest any limitation as to scope of use or functionality, as the techniques and tools described herein may be implemented in diverse general-purpose or special-purpose computing environments.

With reference to Figure 10, the computing environment 1000 includes at least one CPU 1010 and associated memory 1020. In Figure 10, this most basic configuration 1030 is included within a dashed line. The processing unit 1010 executes computer-executable instructions and may be a real or a virtual processor. In a multi-processing system, multiple processing units execute computer-executable instructions to increase processing power. Figure 10 shows a second processing unit 1015 (e.g., a GPU or other co-

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000548

processing unit) and associated memory 1025, which can be used for video acceleration or other processing. The memory 1020, 1025 may be volatile memory (e.g., registers, cache, RAM), non-volatile memory (e.g., ROM, EEPROM, flash memory, etc.), or some combination of the two. The memory 1020, 1025 stores software 1080 for implementing a system with one or more of the described techniques and tools.

A computing environment may have additional features. For example, the computing environment 1000 includes storage 1040, one or more input devices 1050, one or more output devices 1060, and one or more communication connections 1070. An interconnection mechanism (not shown) such as a bus, controller, or network interconnects the components of the computing environment 1000. Typically, operating system software (not shown) provides an operating environment for other software executing in the computing environment 1000, and coordinates activities of the components of the computing environment 1000.

The storage 1040 may be removable or non-removable, and includes magnetic disks, magnetic tapes or cassettes, CD-ROMs, DVDs, memory cards, or any other medium which can be used to store information and which can be accessed within the computing environment 1000. The storage 1040 stores instructions for the software 1080 implementing described techniques and tools.

The input device(s) 1050 may be a touch input device such as a keyboard, mouse, pen, trackball or touchscreen, an audio input device such as a microphone, a scanning device, a digital camera, or another device that provides input to the computing environment 1000. For video, the input device(s) 1050 may be a video card, TV tuner card, or similar device that accepts video input in analog or digital form, or a CD-ROM or CD-RW that reads video samples into the computing environment 1000. The output device(s) 1060 may be a display, printer, speaker, CD-writer, or another device that provides output from the computing environment 1000.

The communication connection(s) 1070 enable communication over a communication medium to another computing entity. The communication medium conveys information such as computer-executable instructions, audio or video input or output, or other data in a modulated data signal. A modulated data signal is a signal that has one or more of its characteristics set or changed in such a manner as to encode information in the signal. By way of example, and not limitation, communication media include wired or wireless techniques implemented with an electrical, optical, RF, infrared, acoustic, or other carrier.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000549

The techniques and tools can be described in the general context of computer-readable media. Computer-readable media are any available media that can be accessed within a computing environment. By way of example, and not limitation, with the computing environment 1000, computer-readable media include memory 1020, 1025, storage 1040, and combinations thereof.

The techniques and tools can be described in the general context of computer-executable instructions, such as those included in program modules, being executed in a computing environment on a target real or virtual processor. Generally, program modules include routines, programs, libraries, objects, classes, components, data structures, etc. that perform particular tasks or implement particular abstract data types. The functionality of the program modules may be combined or split between program modules as desired in various embodiments. Computer-executable instructions for program modules may be executed within a local or distributed computing environment. Any of the methods described herein can be implemented by computer-executable instructions encoded on one or more computer-readable media (e.g., computer-readable storage media or other tangible media).

For the sake of presentation, the detailed description uses terms like "select" and "determine" to describe computer operations in a computing environment. These terms are high-level abstractions for operations performed by a computer, and should not be confused with acts performed by a human being. The actual computer operations corresponding to these terms vary depending on implementation.

IV. Example Implementation Environment

Figure 11 illustrates a generalized example of a suitable implementation environment 1100 in which described embodiments, techniques, and technologies may be implemented.

In example environment 1100, various types of services (e.g., computing services 1112) are provided by a cloud 1110. For example, the cloud 1110 can comprise a collection of computing devices, which may be located centrally or distributed, that provide cloud-based services to various types of users and devices connected via a network such as the Internet. The cloud computing environment 1300 can be used in different ways to accomplish computing tasks. For example, with reference to described techniques and tools, some tasks, such as processing user input and presenting a user interface, can be performed on a local computing device, while other tasks, such as storage of data to be used in subsequent processing, can be performed elsewhere in the cloud.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000550

In example environment 1100, the cloud 1110 provides services for connected devices with a variety of screen capabilities 1120A-N. Connected device 1120A represents a device with a mid-sized screen. For example, connected device 1120A could be a personal computer such as desktop computer, laptop, notebook, netbook, or the like. Connected device 1120B represents a device with a small-sized screen. For example, connected device 1120B could be a mobile phone, smart phone, personal digital assistant, tablet computer, and the like. Connected device 1120N represents a device with a large screen. For example, connected device 1120N could be a television (e.g., a smart television) or another device connected to a television or projector screen (e.g., a set-top box or gaming console).

A variety of services can be provided by the cloud 1110 through one or more service providers (not shown). For example, the cloud 1110 can provide services related to mobile computing to one or more of the various connected devices 1120A-N. Cloud services can be customized to the screen size, display capability, or other functionality of the particular connected device (e.g., connected devices 1120A-N). For example, cloud services can be customized for mobile devices by taking into account the screen size, input devices, and communication bandwidth limitations typically associated with mobile devices.

V. Example Mobile Device

Figure 12 is a system diagram depicting an exemplary mobile device 1200 including a variety of optional hardware and software components, shown generally at 1202. Any components 1202 in the mobile device can communicate with any other component, although not all connections are shown, for ease of illustration. The mobile device can be any of a variety of computing devices (e.g., cell phone, smartphone, handheld computer, personal digital assistant (PDA), etc.) and can allow wireless two-way communications with one or more mobile communications networks 1204, such as a cellular or satellite network.

The illustrated mobile device can include a controller or processor 1210 (e.g., signal processor, microprocessor, ASIC, or other control and processing logic circuitry) for performing such tasks as signal coding, data processing, input/output processing, power control, and/or other functions. An operating system 1212 can control the allocation and usage of the components 1202 and support for one or more application programs 1214. The application programs can include common mobile computing

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000551

applications (e.g., include email applications, calendars, contact managers, web browsers, messaging applications), or any other computing application.

The illustrated mobile device can include memory 1220. Memory 1220 can include non-removable memory 1222 and/or removable memory 1224. The non-removable memory 1222 can include RAM, ROM, flash memory, a disk drive, or other well-known memory storage technologies. The removable memory 1224 can include flash memory or a Subscriber Identity Module (SIM) card, which is well known in GSM communication systems, or other well-known memory storage technologies, such as smart cards. The memory 1220 can be used for storing data and/or code for running the operating system 1212 and the applications 1214. Example data can include web pages, text, images, sound files, video data, or other data sets to be sent to and/or received from one or more network servers or other mobile devices via one or more wired or wireless networks. The memory 1220 can be used to store a subscriber identifier, such as an International Mobile Subscriber Identity (IMSI), and an equipment identifier, such as an International Mobile Equipment Identifier (IMEI). Such identifiers can be transmitted to a network server to identify users and equipment.

The mobile device can support one or more input devices 1230, such as a touchscreen 1232, microphone 1234, camera 1236, physical keyboard 1238 and/or trackball 1240 and one or more output devices 1250, such as a speaker 1252 and a display 1254. Other possible output devices (not shown) can include a piezoelectric or other haptic output device. Some devices can serve more than one input/output function. For example, touchscreen 1232 and display 1254 can be combined in a single input/output device.

Touchscreen 1232 can accept input in different ways. For example, capacitive touchscreens detect touch input when an object (e.g., a fingertip or stylus) distorts or interrupts an electrical current running across the surface. As another example, touchscreens can use optical sensors to detect touch input when beams from the optical sensors are interrupted. Physical contact with the surface of the screen is not necessary for input to be detected by some touchscreens.

A wireless modem 1260 can be coupled to an antenna (not shown) and can support two-way communications between the processor 1210 and external devices, as is well understood in the art. The modem 1260 is shown generically and can include a cellular modem for communicating with the mobile communication network 1204 and/or other radio-based modems (e.g., Bluetooth or Wi-Fi). The wireless modem 1260 is typically

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000552

configured for communication with one or more cellular networks, such as a GSM network for data and voice communications within a single cellular network, between cellular networks, or between the mobile device and a public switched telephone network (PSSTN).

The mobile device can further include at least one input/output port 1280, a power supply 1282, a satellite navigation system receiver 1284, such as a global positioning system (GPS) receiver, an accelerometer 1286, a transceiver 1288 (for wirelessly transmitting analog or digital signals) and/or a physical connector 1290, which can be a USB port, IEEE 1394 (firewall) port, and/or RS-232 port. The illustrated components 1202 are not required or all-inclusive, as components can be deleted and other components can be added.

The technologies from any example can be combined with the technologies described in any one or more of the other examples. In view of the many possible embodiments to which the principles of the disclosed technology may be applied, it should be recognized that the illustrated embodiments are examples of the disclosed technology and should not be taken as a limitation on the scope of the disclosed technology. Rather, the scope of the disclosed technology includes what is covered by the following claims. We therefore claim as our invention all that comes within the scope and spirit of these claims.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000553

We claim:

1. In a computer system, a method comprising:

displaying a graphical user interface comprising at least first and second layers, wherein a first portion of visual information in the first layer is within a display area of a touchscreen, and wherein the first layer comprises a user interface element operable to move in a second direction substantially orthogonal to the first direction;

receiving first user input corresponding to a first gesture on the touchscreen;

calculating a first movement based at least in part on the first user input, the first movement comprising a movement of the first layer from an initial first-layer position in which a second portion of visual information in the first layer is outside the display area to a current first-layer position in which the second portion of visual information in the first layer is within the display area, wherein the first movement is in a first direction at a first movement rate; and

calculating a second movement substantially parallel to the first movement based at least in part on the first user input, the second movement comprising a movement of visual information in the second layer from an initial second-layer position to a current second-layer position, wherein the second movement is in the first direction at a second movement rate;

receiving second user input corresponding to a second gesture on the touchscreen; and

calculating a substantially orthogonal movement based at least in part on the second user input, the substantially orthogonal movement comprising a movement of visual information in the user interface element from an initial element position to a current element position;

wherein the second movement rate differs from the first movement rate.

2. The method of claim 1, the first gesture having a gesture movement rate, wherein the first movement rate is based on the gesture movement rate.

3. The method of claim 2 wherein the first movement rate is substantially equal to the gesture movement rate.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000554

4. The method of claim 1 wherein a direction indicated by the first gesture differs from the first direction, wherein the direction indicated by the first gesture is a diagonal direction, and wherein the first direction is a horizontal direction.

5. The method of claim 1 wherein the first direction is a horizontal direction, and wherein the second direction is a vertical direction.

6. The method of claim 5 wherein the user interface element is a vertically scrollable element.

7. The method of claim 6 wherein a direction of the second gesture differs from the vertical direction, and wherein the direction indicated by the second gesture is a diagonal direction.

8. The method of claim 6 further comprising:

performing a vertical locking animation in the vertically scrollable element, wherein the vertical locking animation comprises moving the vertically scrollable element such that a lock point in the vertically scrollable element is vertically aligned with a part of the display area.

9. The method of claim 8 wherein the vertically scrollable element is a list of items, and wherein the lock point is associated with an item in the list.

10. The method of claim 9 wherein the list of items is a list of links, and wherein the lock point is associated with a link in the list.

11. The method of claim 1 wherein calculating the substantially orthogonal movement comprises:

calculating the current element position based at least in part on the initial element position and a velocity of the second gesture.

12. The method of claim 1 further comprising rendering the first movement, the second movement and the substantially orthogonal movement for display on a mobile phone comprising the touchscreen.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000555

13. A computing device comprising:

one or more processors;

a touchscreen having a display area; and

one or more computer readable storage media having stored therein computer-executable instructions for performing a method comprising:

displaying a graphical user interface comprising a content layer, a section header layer, and a title layer, wherein each layer comprises at least first and second portions of visual information in the respective layer, wherein the first portion of visual information in the respective layer is in a display area, wherein the second portion of visual information in the respective layer is outside of the display area, and wherein the content layer comprises at least one scrollable element having a first portion of visual information in the display area and a second portion of visual information outside of the display area;

receiving first user input via the touchscreen;

calculating a content-layer movement based at least in part on the first user input, the content-layer movement comprising a movement of the content layer from (a) an initial content-layer position in which the second portion of visual information in the content layer is outside the display area, to (b) a current content-layer position in which the second portion of visual information in the content layer is within the display area;

animating the movement from (a) to (b), wherein the content-layer movement is in a first direction at a content-layer movement rate;

calculating a section-header-layer movement based at least in part on the first user input, the section-header-layer movement comprising a movement of the section header layer from (c) an initial section-header-layer position in which the second portion of visual information in the section header layer is outside the display area, to (d) a current section-header-layer position in which the second portion of visual information in the section header layer is within the display area;

animating the movement from (c) to (d), wherein the section-header-layer movement is in the first direction at a section-header-layer movement rate;

calculating a title-layer movement based at least in part on the first user input, the title-layer movement comprising a movement of the title layer from (e) an initial title-layer position in which the second portion of visual information in the title layer is outside the display area, to (f) a current title-layer position in which the second portion of visual information in the title layer is within the display area;

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000556

animating the movement from (e) to (f), wherein the title-layer movement is in the first direction at a title-layer movement rate;

receiving second user input via the touchscreen;

calculating a scrollable-element movement based at least in part on the second user input, the scrollable-element movement comprising a movement of visual information in the scrollable element from (g) an initial scrollable-element position in which the second portion of visual information in the scrollable element is outside of the display area, to (h) a current scrollable-element position in which the second portion of visual information in the scrollable element is within the display area; and

animating the movement from (g) to (h), wherein the scrollable-element movement is in a second direction substantially orthogonal to the first direction;

wherein the title-layer movement rate differs from the content-layer movement rate and from the section-header-layer movement rate, and wherein the content layer, the section header layer and the title layer are substantially parallel to each other and non-overlapping with respect to each other.

14. The computing device of claim 18 wherein the first user input corresponds to a first gesture on the touchscreen, and wherein the second user input corresponds to a second gesture on the touchscreen.

15. One or more computer-readable media having stored thereon computer-executable instructions for performing a method comprising:

displaying a graphical user interface on a touchscreen operable to receive user input via gestures on the touchscreen, the graphical user interface comprising a content layer, a section header layer, a title layer and a background layer, wherein each layer comprises at least first and second portions of visual information in the respective layer, wherein the first portion of visual information in the respective layer is in a display area of the touchscreen, wherein the second portion of visual information in the respective layer is outside of the display area, and wherein the content layer comprises at least one scrollable element having a first portion of visual information in the display area and a second portion of visual information outside of the display area;

receiving first user input corresponding to a gesture on the touchscreen;

calculating a content-layer movement based at least in part on the first user input, the content-layer movement comprising a movement of the content layer from (a) an

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000557

initial content-layer position in which the second portion of visual information in the content layer is outside the display area, to (b) a current content-layer position in which the second portion of visual information in the content layer is within the display area;

animating the movement from (a) to (b), wherein the content-layer movement is in a first direction at a content-layer movement rate;

calculating a section-header-layer movement based at least in part on the first user input, the section-header-layer movement comprising a movement of the section header layer from (c) an initial section-header-layer position in which the second portion of visual information in the section header layer is outside the display area, to (d) a current section-header-layer position in which the second portion of visual information in the section header layer is within the display area;

animating the movement from (c) to (d), wherein the section-header-layer movement is in the first direction at a section-header-layer movement rate;

calculating a title-layer movement based at least in part on the first user input, the title-layer movement comprising a movement of the title layer from (e) an initial title-layer position in which the second portion of visual information in the title layer is outside the display area, to (f) a current title-layer position in which the second portion of visual information in the title layer is within the display area;

animating the movement from (e) to (f), wherein the title-layer movement is in the first direction at a title-layer movement rate;

calculating a background-layer movement based at least in part on the first user input, the background-layer movement comprising a movement of the background layer from (g) an initial background-layer position in which the second portion of visual information in the background layer is outside the display area, to (h) a current background-layer position in which the second portion of visual information in the background layer is within the display area;

animating the movement from (g) to (h), wherein the background-layer movement is in the first direction at a background-layer movement rate;

receiving second user input corresponding to a second gesture on the touchscreen;

calculating a scrollable-element movement based at least in part on the second user input, the scrollable-element movement comprising a movement of visual information in the scrollable element from (i) an initial scrollable-element position in which the second portion of visual information in the scrollable element is outside of the display area, to (j)

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000558

a current scrollable-element position in which the second portion of visual information in the scrollable element is within the display area; and

animating the movement from (i) to (j), wherein the scrollable-element movement is in a second direction substantially orthogonal to the first direction;

wherein the content-layer movement rate is equal to the section-header-layer movement rate, wherein the title-layer movement rate differs from the content-layer movement rate and from the section-header-layer movement rate, wherein the content layer, the section header layer and the title layer are substantially parallel to each other and non-overlapping with respect to each other, and wherein each of the content layer, the section header layer and the title layer overlaps the background layer.

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000559

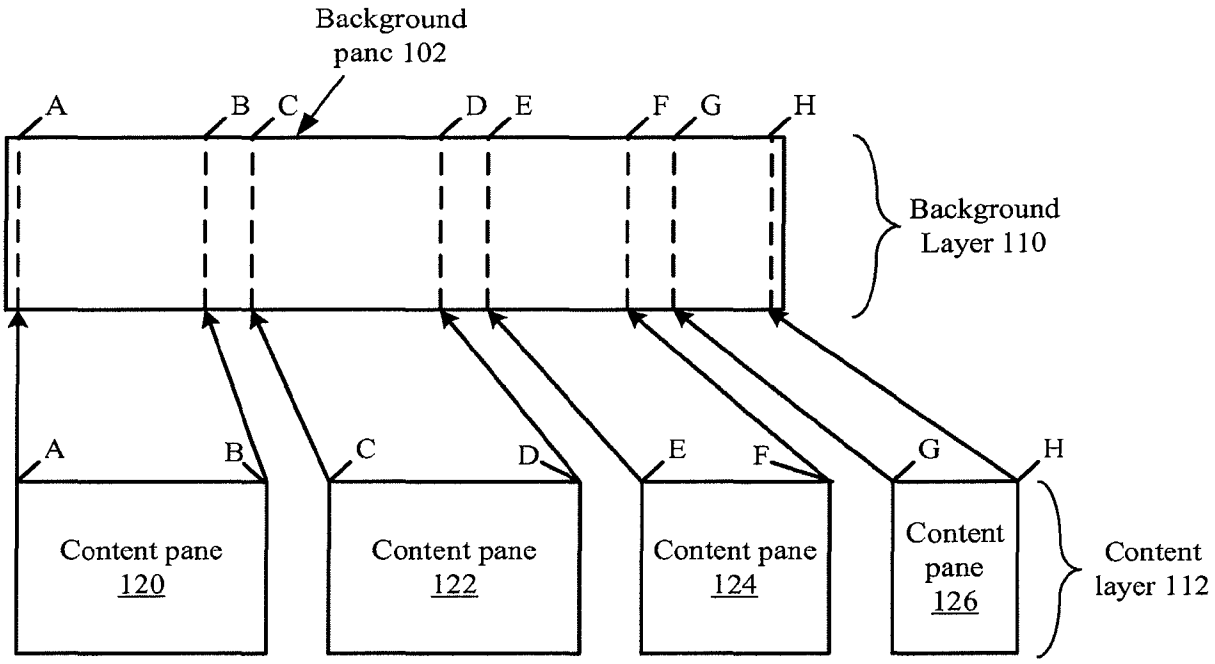

Background
panc 102
A
B
C
D
E
F
G
H
Background
Layer 110
A
B
C
D
E
F
G
H
Content pane
120
Content pane
122
Content pane
124
Content
pane
126
Content
layer 112

Figure 1

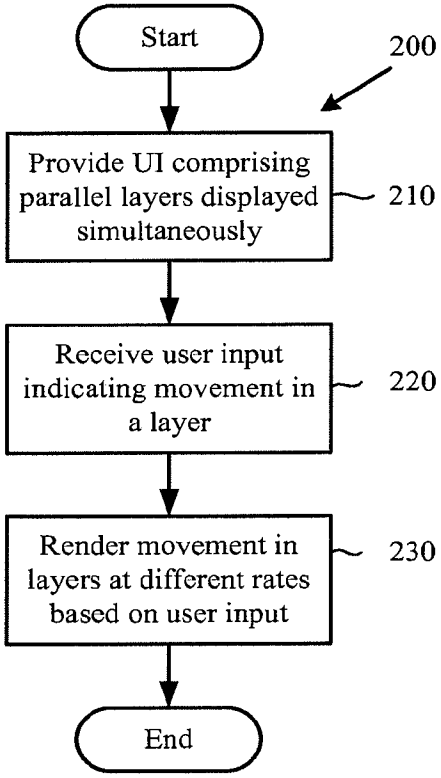

Start
200
Provide UI comprising parallel layers displayed simultaneously
210
Receive user input indicating movement in a layer
220
Render movement in layers at different rates based on user input
230
End

Figure 2

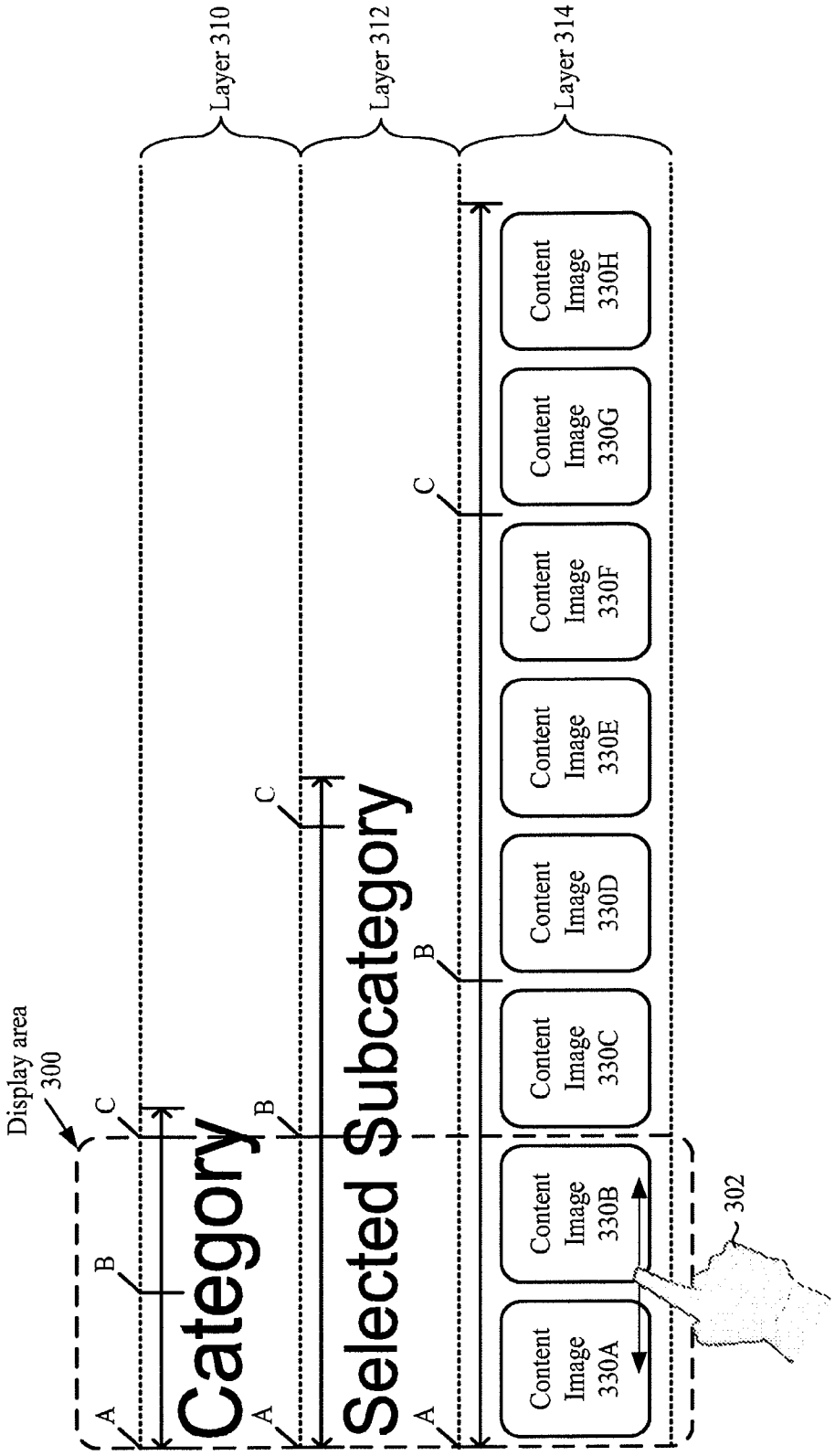

Layer 310
Layer 312
Layer 314
Display area
300
A
B
C
Category
Selected Subcategory
Content Image 330A
Content Image 330B
Content Image 330C
Content Image 330D
Content Image 330E
Content Image 330F
Content Image 330G
Content Image 330H
302

Figure 3A

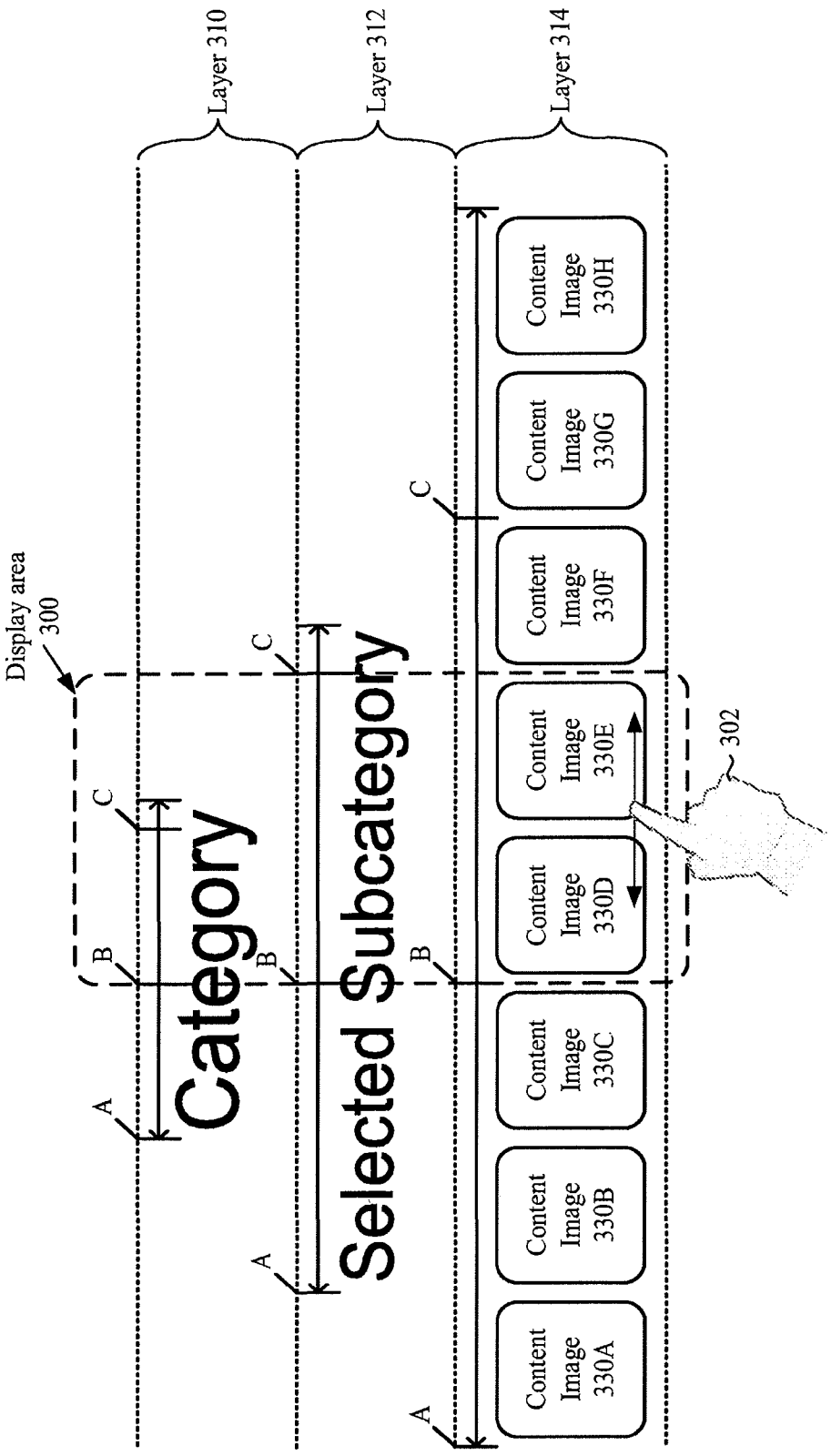

Layer 310
Layer 312
Layer 314
Display area
300
Category
Selected Subcategory
A
B
C
Content Image 330A
Content Image 330B
Content Image 330C
Content Image 330D
Content Image 330E
Content Image 330F
Content Image 330G
Content Image 330H
302

Figure 3B

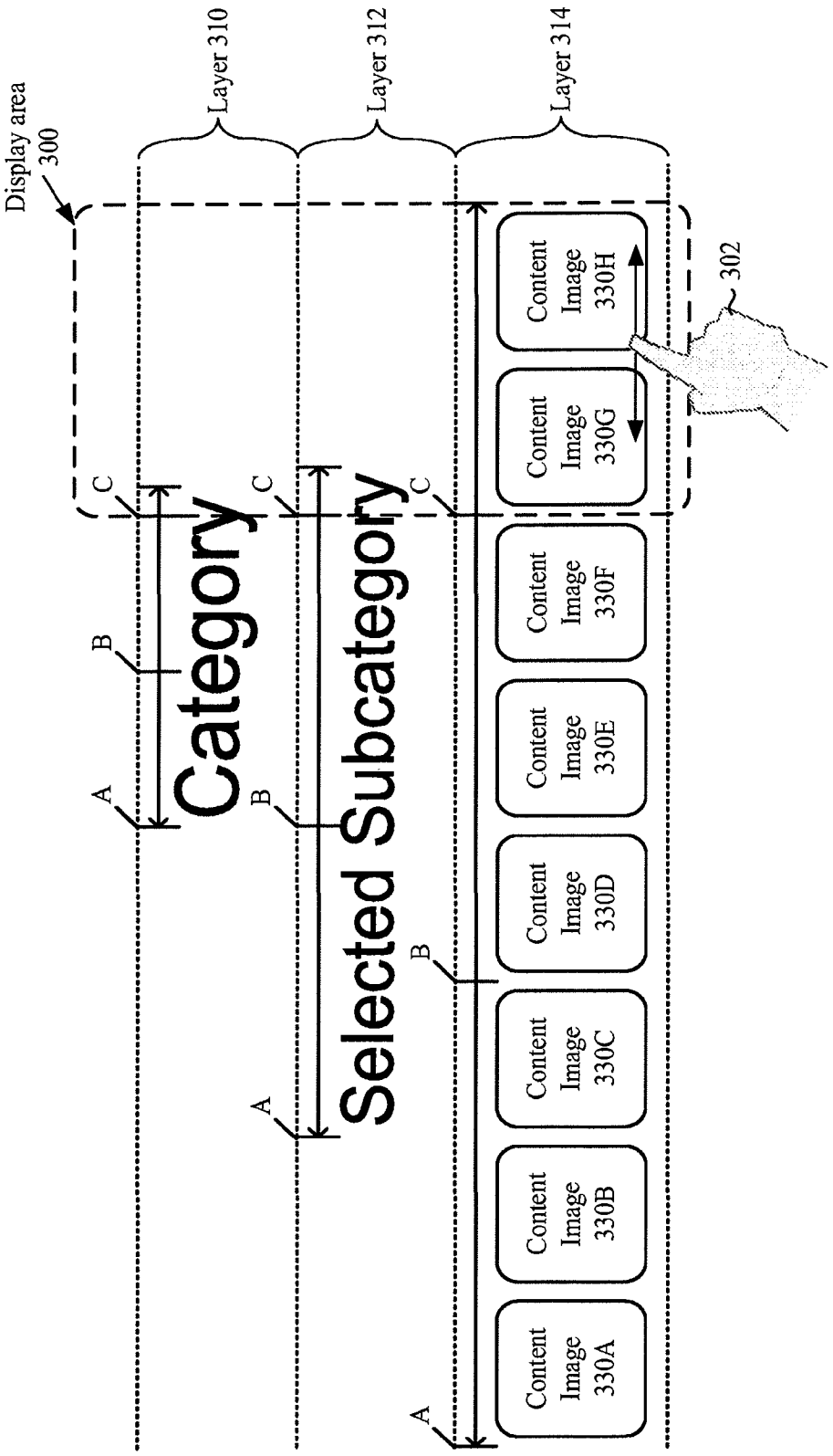

Display area 300
Layer 310
Layer 312
Layer 314
Category
Selected Subcategory
A
B
C
Content Image 330A
Content Image 330B
Content Image 330C
Content Image 330D
Content Image 330E
Content Image 330F
Content Image 330G
Content Image 330H
302

Figure 3C

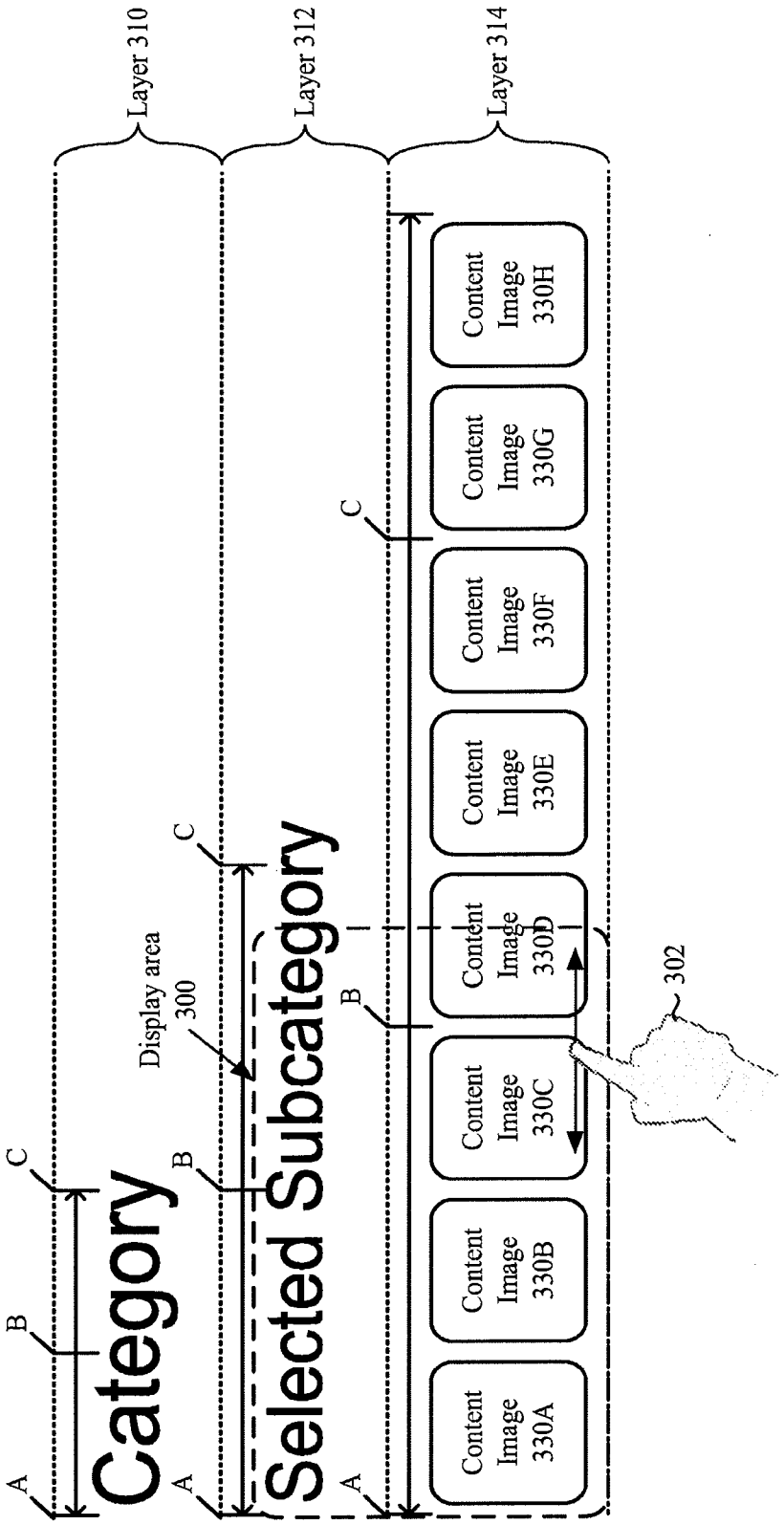

Layer 310
Layer 312
Layer 314
Category
Selected Subcategory
Display area 300
A
B
C
Content Image 330A
Content Image 330B
Content Image 330C
Content Image 330D
Content Image 330E
Content Image 330F
Content Image 330G
Content Image 330H
302

Figure 3D

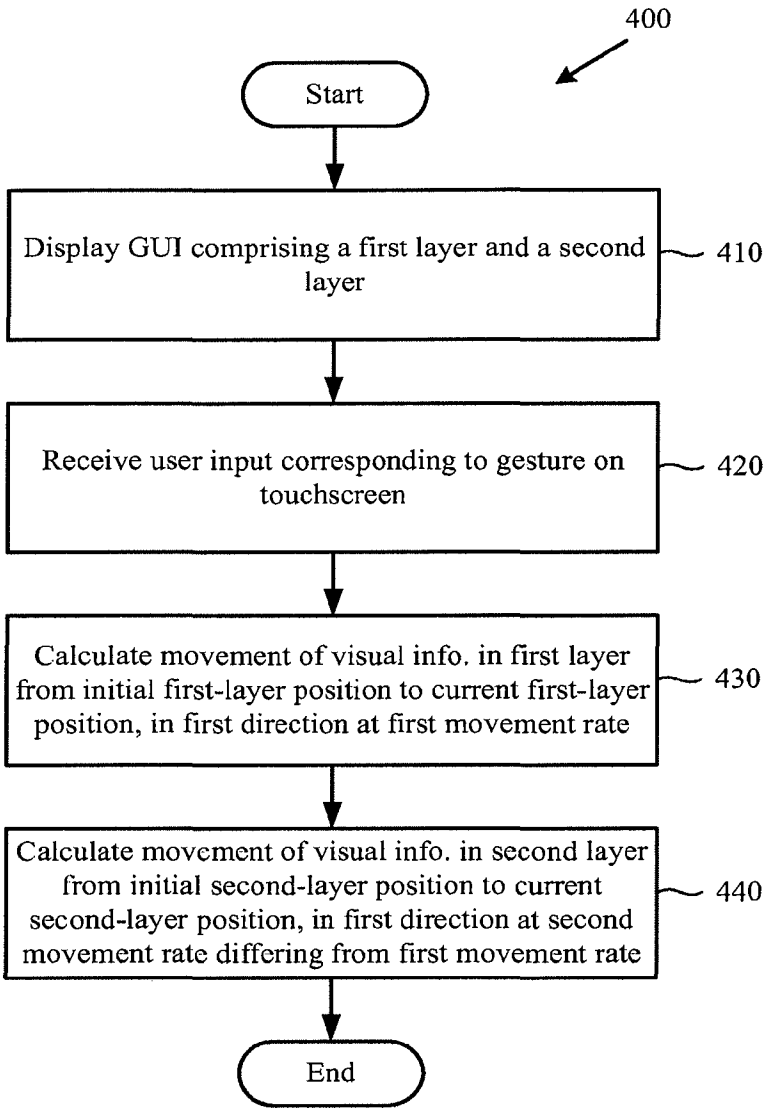

400
Start
Display GUI comprising a first layer and a second layer
410
Receive user input corresponding to gesture on touchscreen
420
Calculate movement of visual info. in first layer from initial first-layer position to current first-layer position, in first direction at first movement rate
430
Calculate movement of visual info. in second layer from initial second-layer position to current second-layer position, in first direction at second movement rate differing from first movement rate
440
End

Figure 4

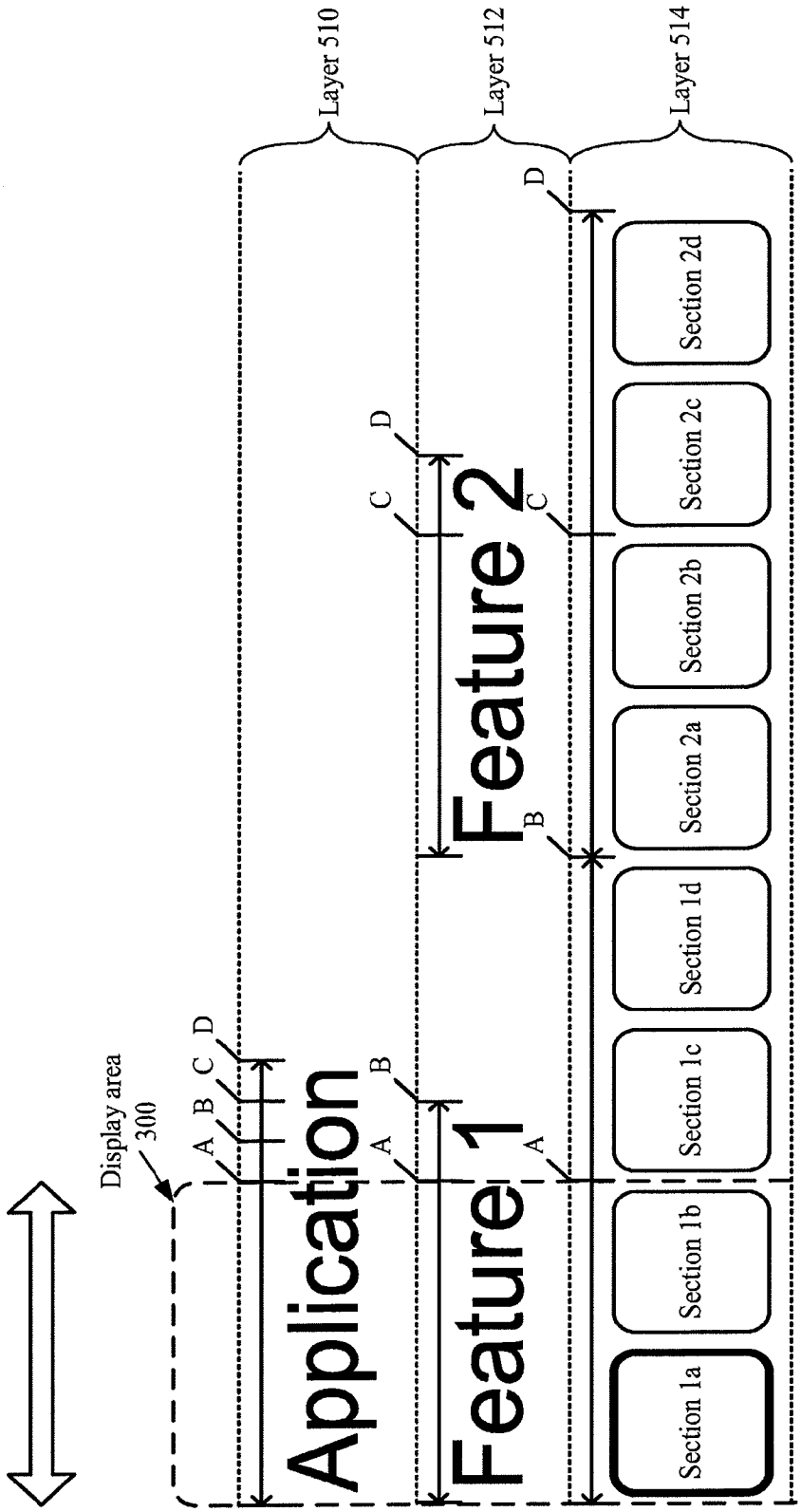

Layer 510
Layer 512
Layer 514
Display area
300
A
B
C
D
Application
Feature 1
Feature 2
Section 1a
Section 1b
Section 1c
Section 1d
Section 2a
Section 2b
Section 2c
Section 2d

Figure 5A

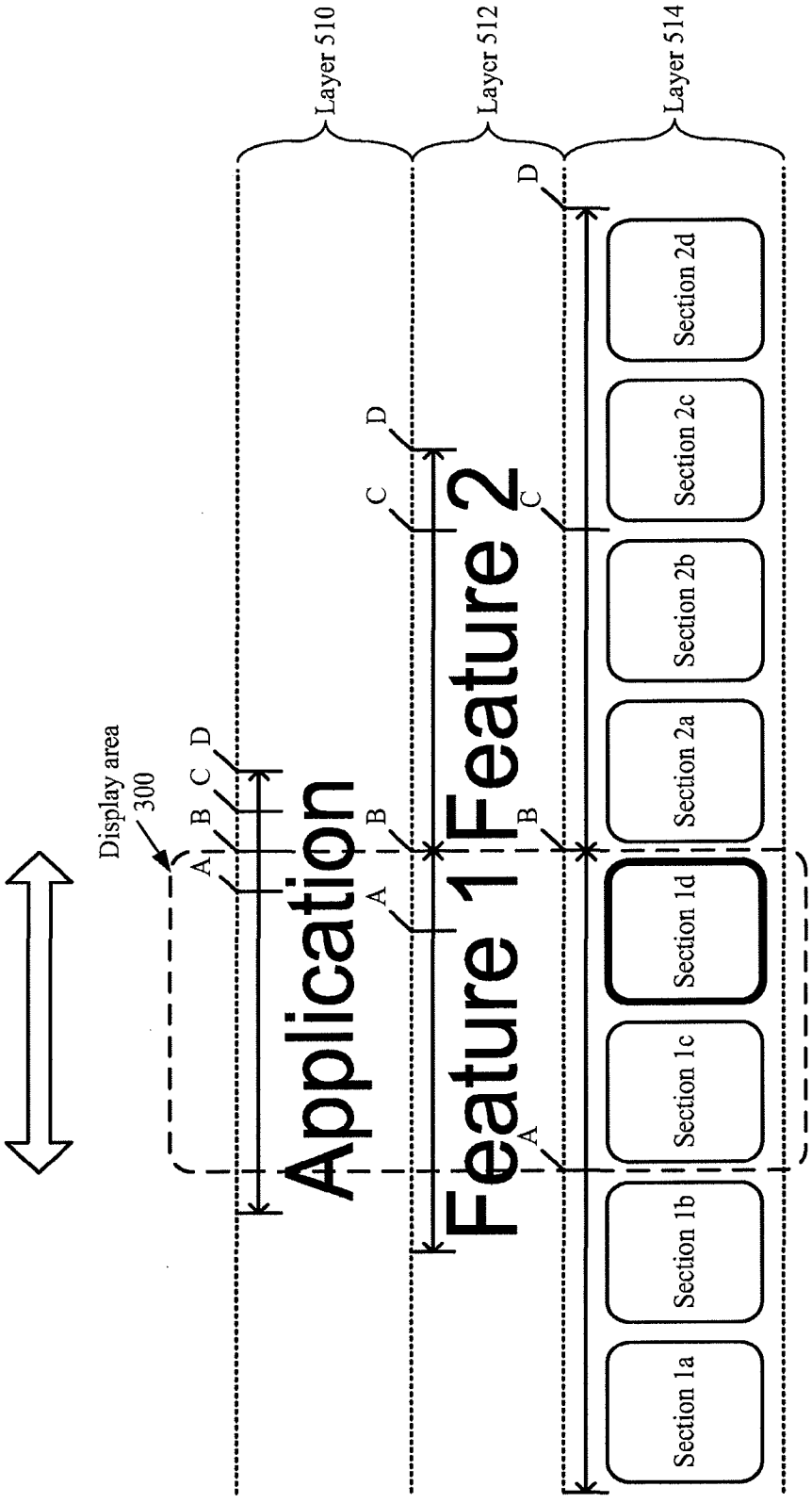

Layer 510
Layer 512
Layer 514
Display area
300
A
B
C
D
Application
Feature 1
Feature 2
Section 1a
Section 1b
Section 1c
Section 1d
Section 2a
Section 2b
Section 2c
Section 2d

Figure 5B

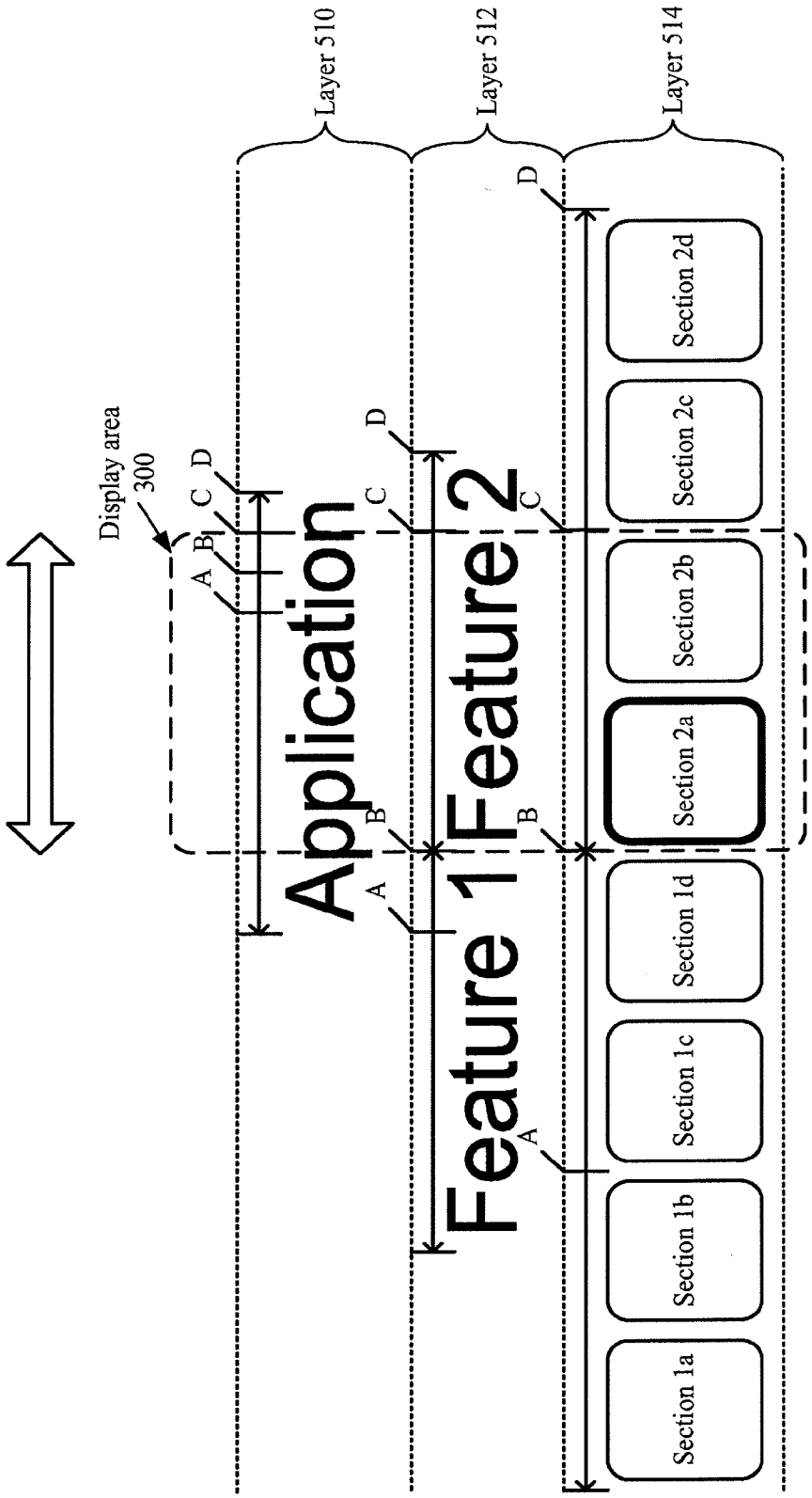

Layer 510
Layer 512
Layer 514
Display area
300
A
B
C
D
Application
Feature 1
Feature 2
Section 1a
Section 1b
Section 1c
Section 1d
Section 2a
Section 2b
Section 2c
Section 2d

Figure 5C

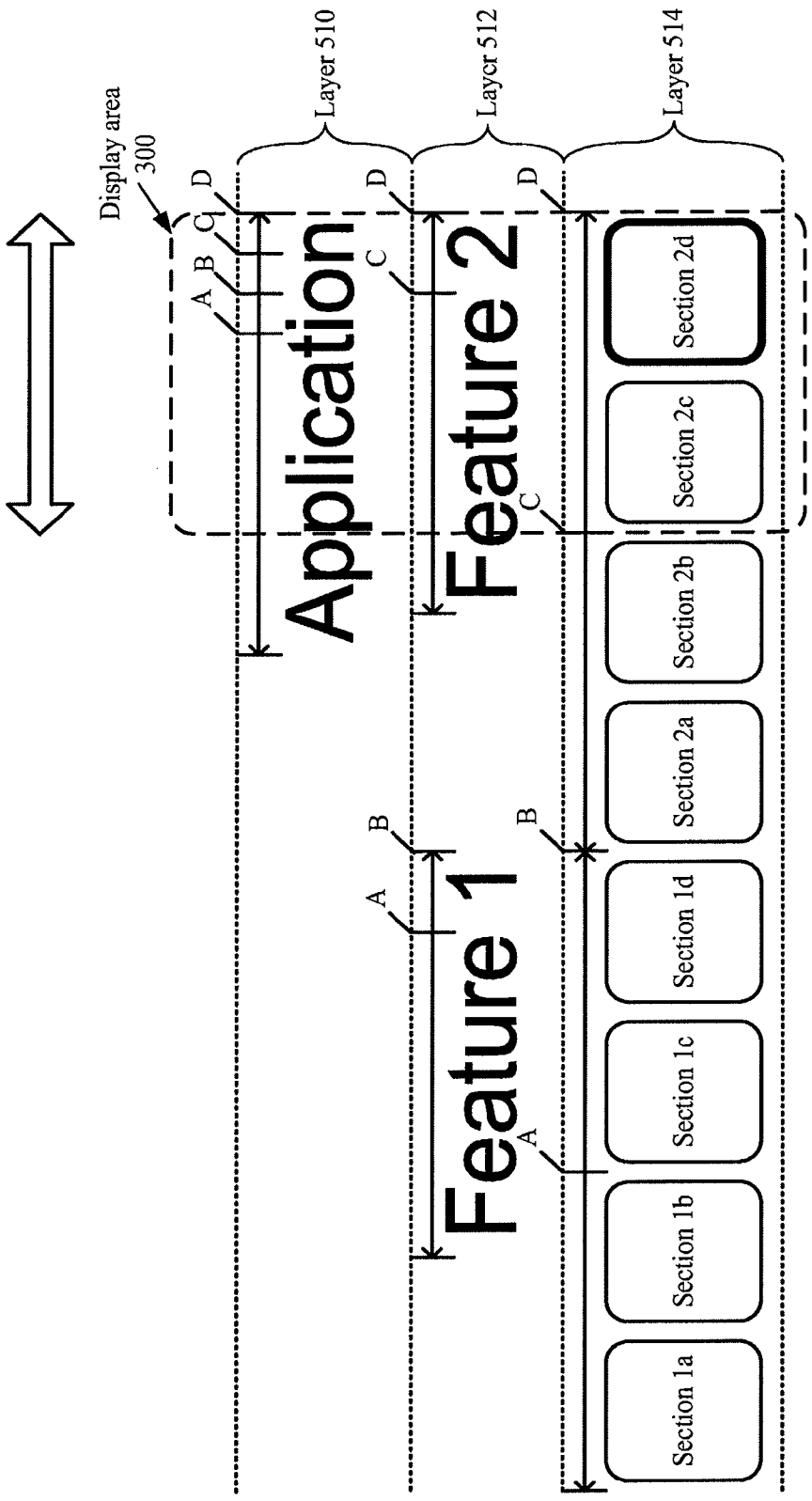


Figure 5D

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000570

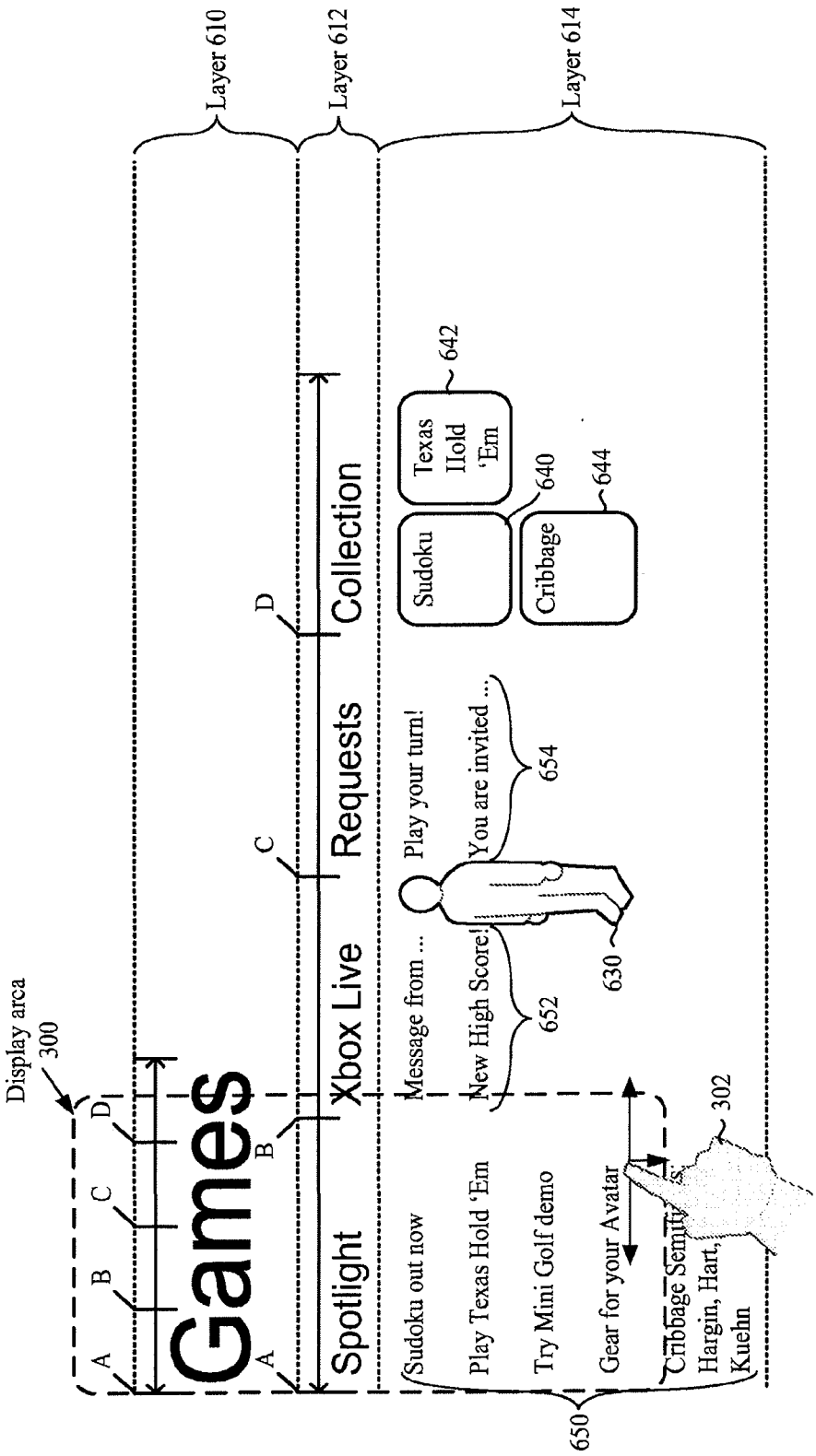

Layer 610
Layer 612
Layer 614
Display area
300
A
B
C
D
Games
Spotlight
Xbox Live
Requests
Collection
Sudoku out now
Play Texas Hold 'Em
Try Mini Golf demo
Gear for your Avatar
Cribbage Smith, Hargin, Hart, Kuehn
Message from ...
New High Score!
Play your turn!
You are invited ...
Sudoku
Texas Hold 'Em
Cribbage
630
640
642
644
650
652
654
302

Figure 6A

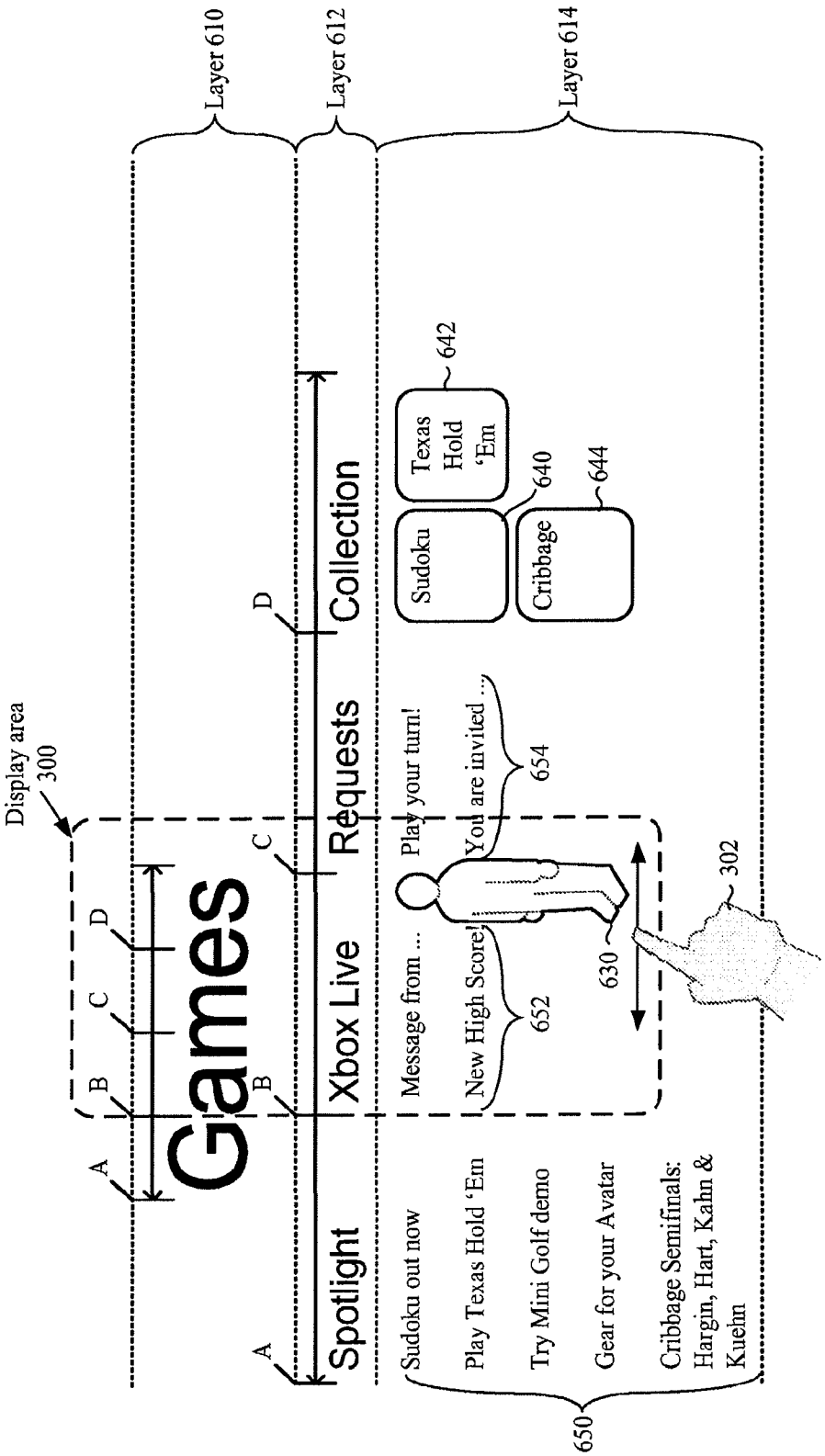

Layer 610
Layer 612
Layer 614
Display area
300
Games
Spotlight
Xbox Live
Requests
Collection
A
B
C
D
Sudoku out now
Play Texas Hold 'Em
Try Mini Golf demo
Gear for your Avatar
Cribbage Semifinals: Hargin, Hart, Kahn & Kuehn
650
Message from ...
New High Score!
652
Play your turn!
You are invited ...
654
630
302
Sudoku
640
Texas Hold 'Em
642
Cribbage
644

Figure 6B

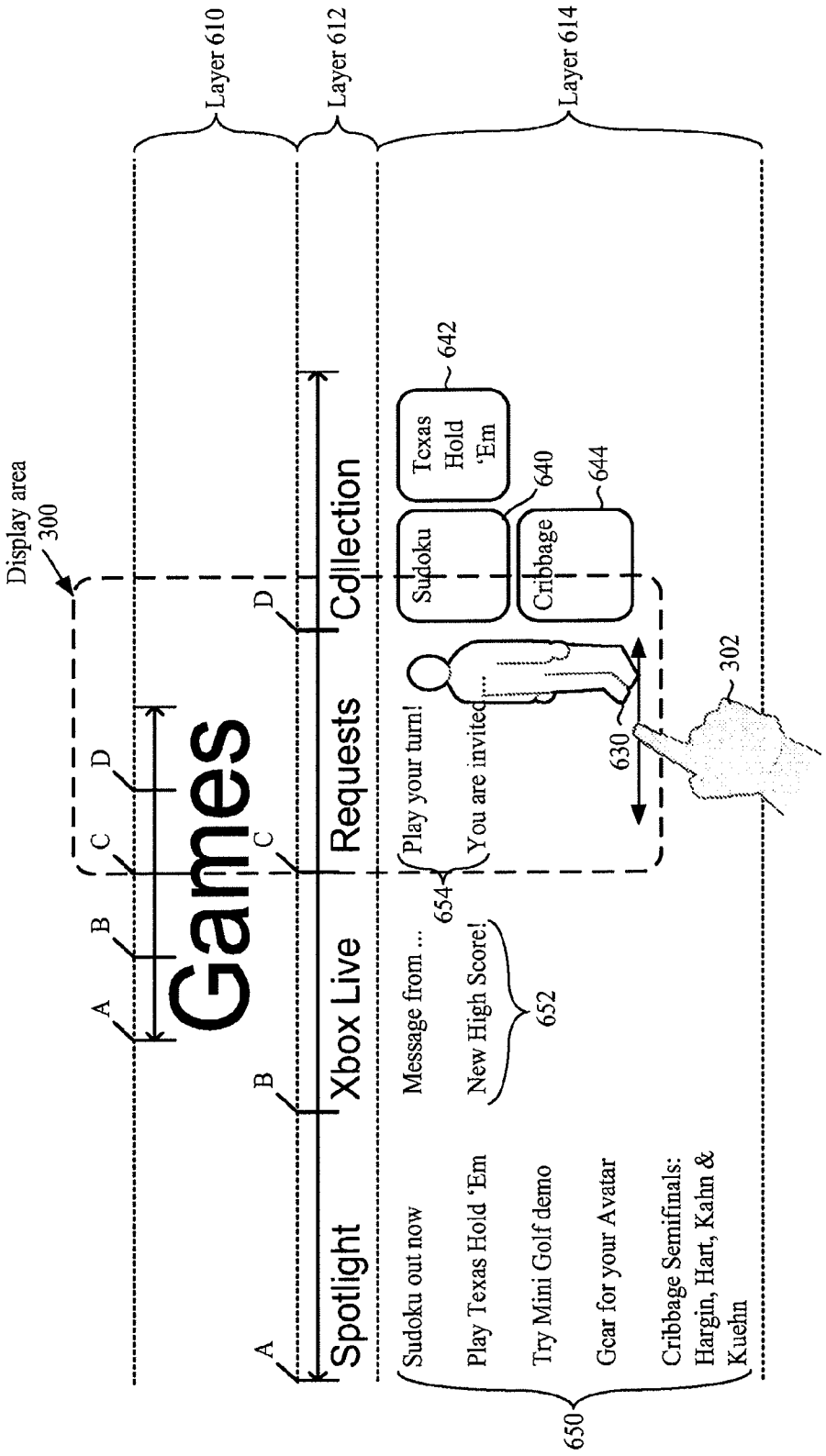

Layer 610
Layer 612
Layer 614
Display area
300
Games
Spotlight
Xbox Live
Requests
Collection
A
B
C
D
Sudoku out now
Play Texas Hold 'Em
Try Mini Golf demo
Gear for your Avatar
Cribbage Semifinals: Hargin, Hart, Kahn & Kuehn
650
Message from ...
New High Score!
652
Play your turn!
You are invited ...
654
Sudoku
640
Texas Hold 'Em
642
Cribbage
644
630
302

Figure 6C

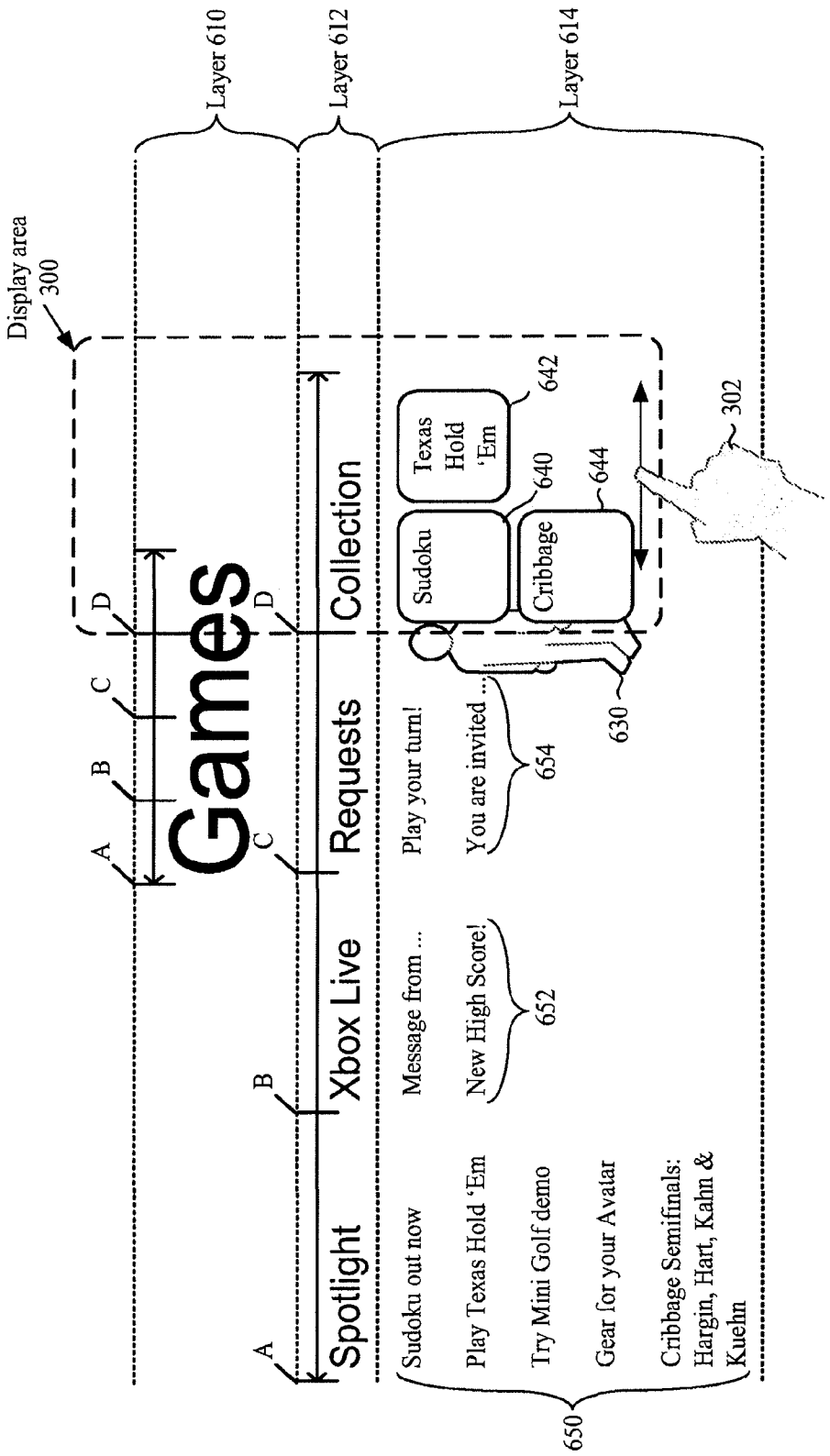


Figure 6D

Amazon.com, Inc., Amazon.com Services LLC - Ex. 1002, Page 000574

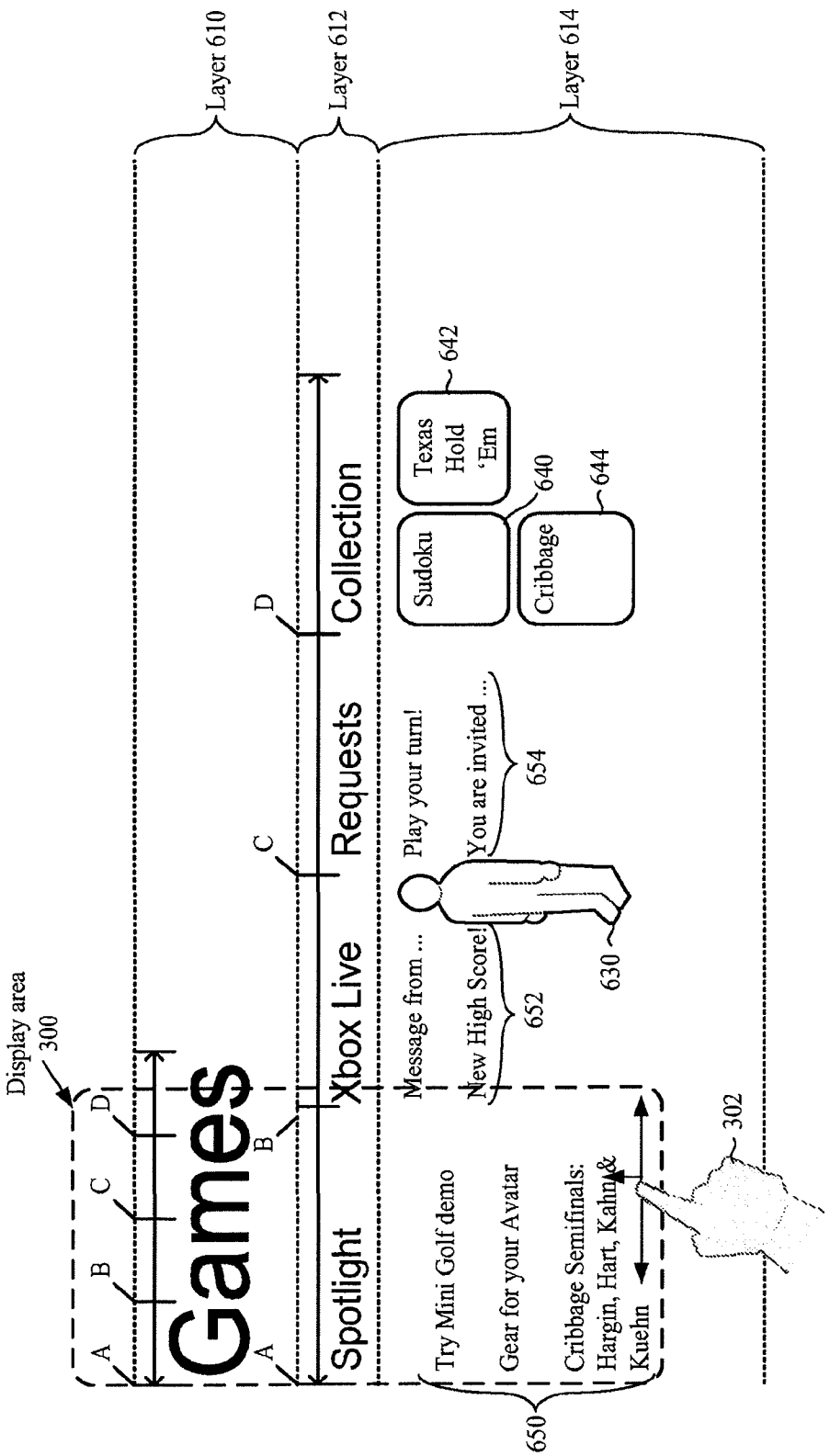

Layer 610
Layer 612
Layer 614
Display area
300
Games
Spotlight
Xbox Live
Requests
Collection
A
B
C
D
Try Mini Golf demo
Gear for your Avatar
Cribbage Semifinals: Hargin, Hart, Kahn & Kuehn
650
Message from ...
New High Score!
652
Play your turn!
You are invited ...
654
630
302
Sudoku
640
Texas Hold 'Em
642
Cribbage
644

Figure 6E

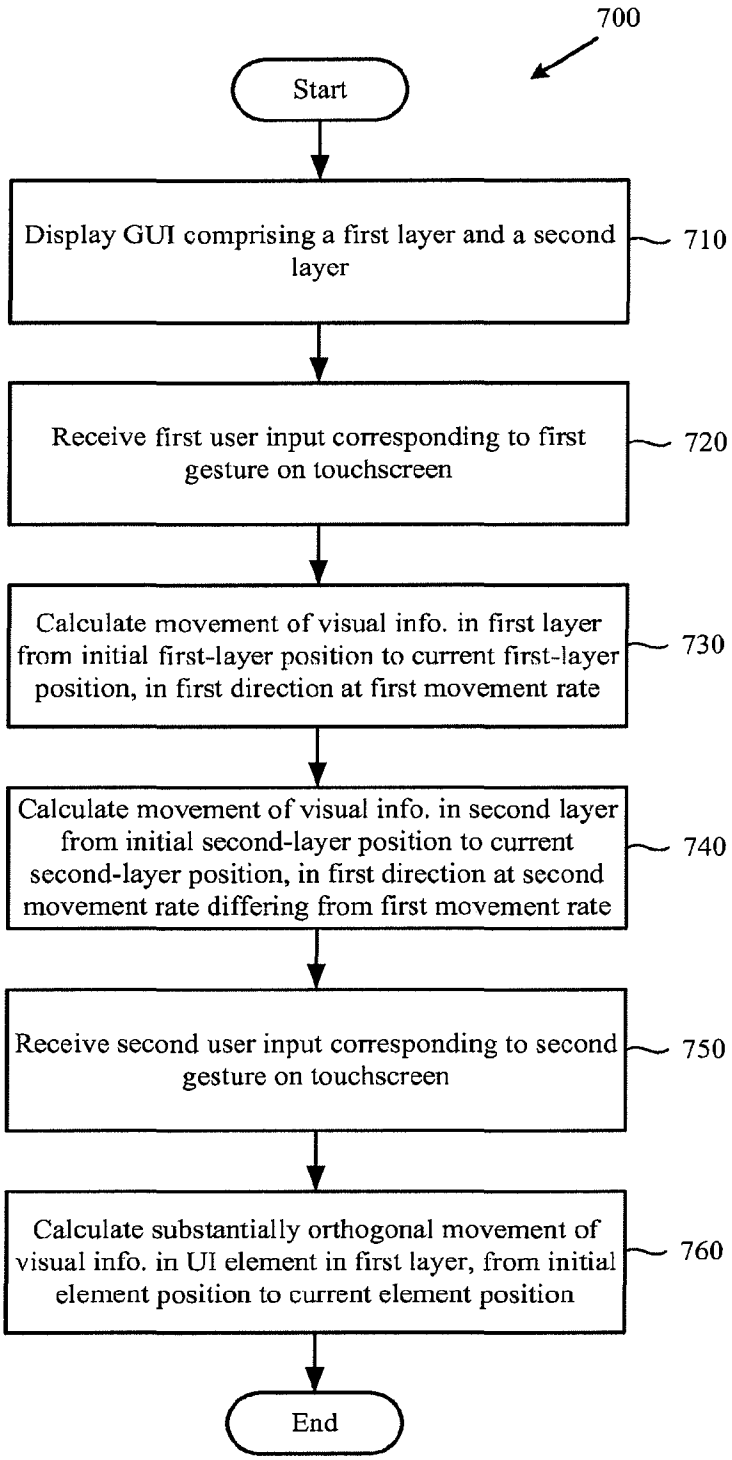

700
Start
Display GUI comprising a first layer and a second layer
710
Receive first user input corresponding to first gesture on touchscreen
720
Calculate movement of visual info. in first layer from initial first-layer position to current first-layer position, in first direction at first movement rate
730
Calculate movement of visual info. in second layer from initial second-layer position to current second-layer position, in first direction at second movement rate differing from first movement rate
740
Receive second user input corresponding to second gesture on touchscreen
750
Calculate substantially orthogonal movement of visual info. in UI element in first layer, from initial element position to current element position
760
End

Figure 7

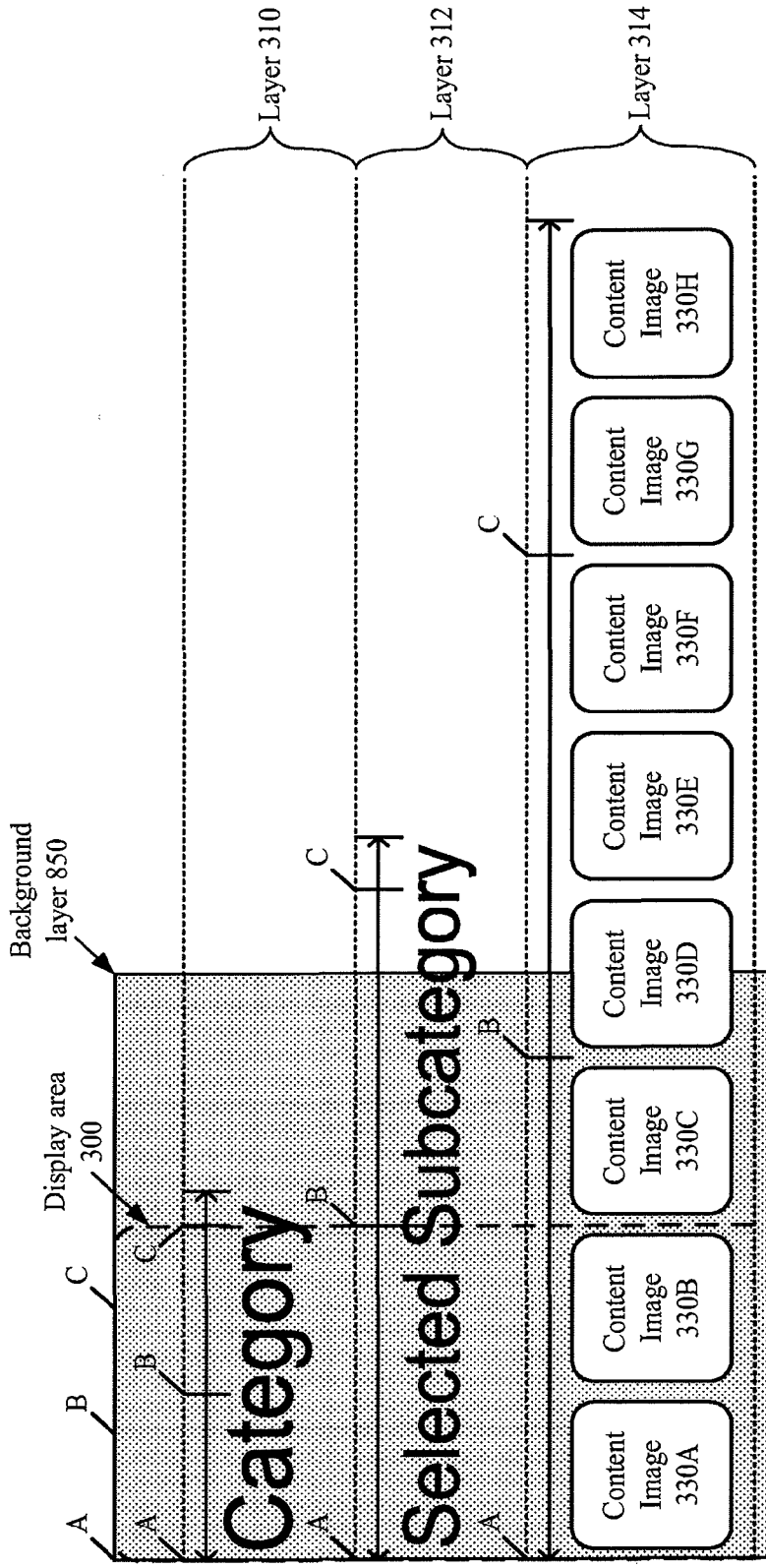

Layer 310
Layer 312
Layer 314
Background layer 850
Display area 300
Category
Selected Subcategory
A
B
C
Content Image 330A
Content Image 330B
Content Image 330C
Content Image 330D
Content Image 330E
Content Image 330F
Content Image 330G
Content Image 330H

Figure 8A

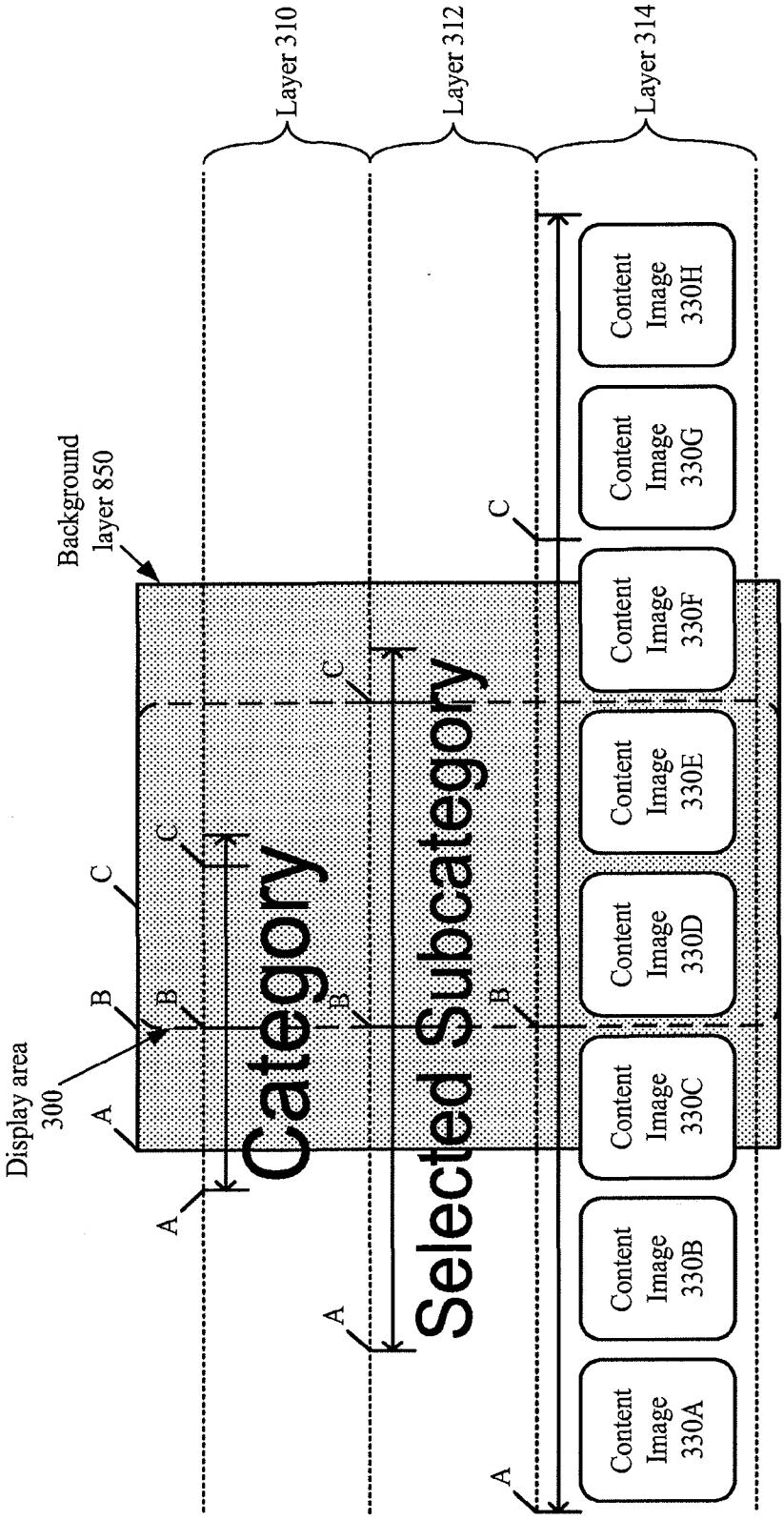

Layer 310
Layer 312
Layer 314
Background layer 850
Display area 300
Category
Selected Subcategory
Content Image 330A
Content Image 330B
Content Image 330C
Content Image 330D
Content Image 330E
Content Image 330F
Content Image 330G
Content Image 330H
A
B
C

Figure 8B

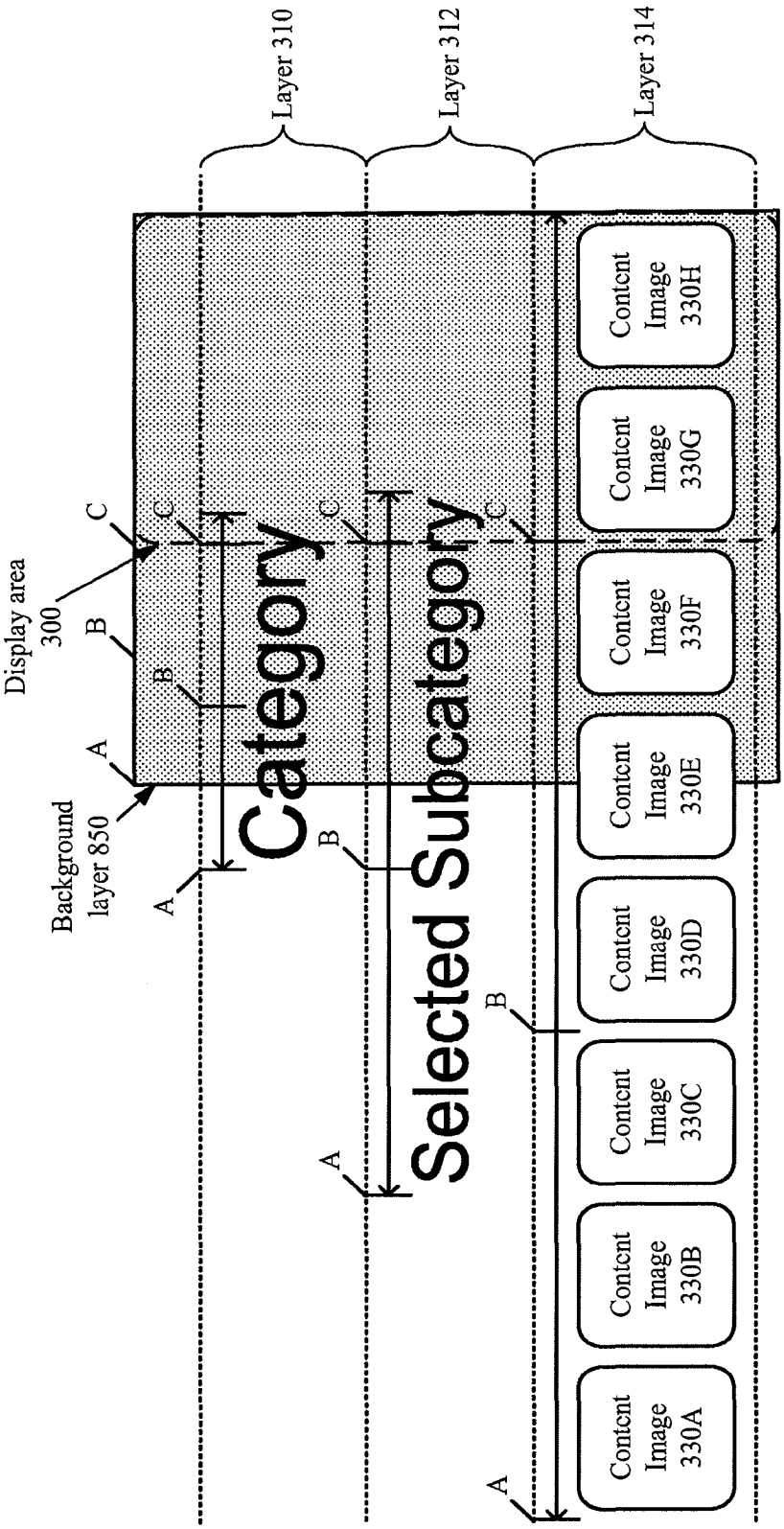

Layer 310
Layer 312
Layer 314
Display area 300
Background layer 850
A
B
C
Category
Selected Subcategory
Content Image 330A
Content Image 330B
Content Image 330C
Content Image 330D
Content Image 330E
Content Image 330F
Content Image 330G
Content Image 330H

Figure 8C

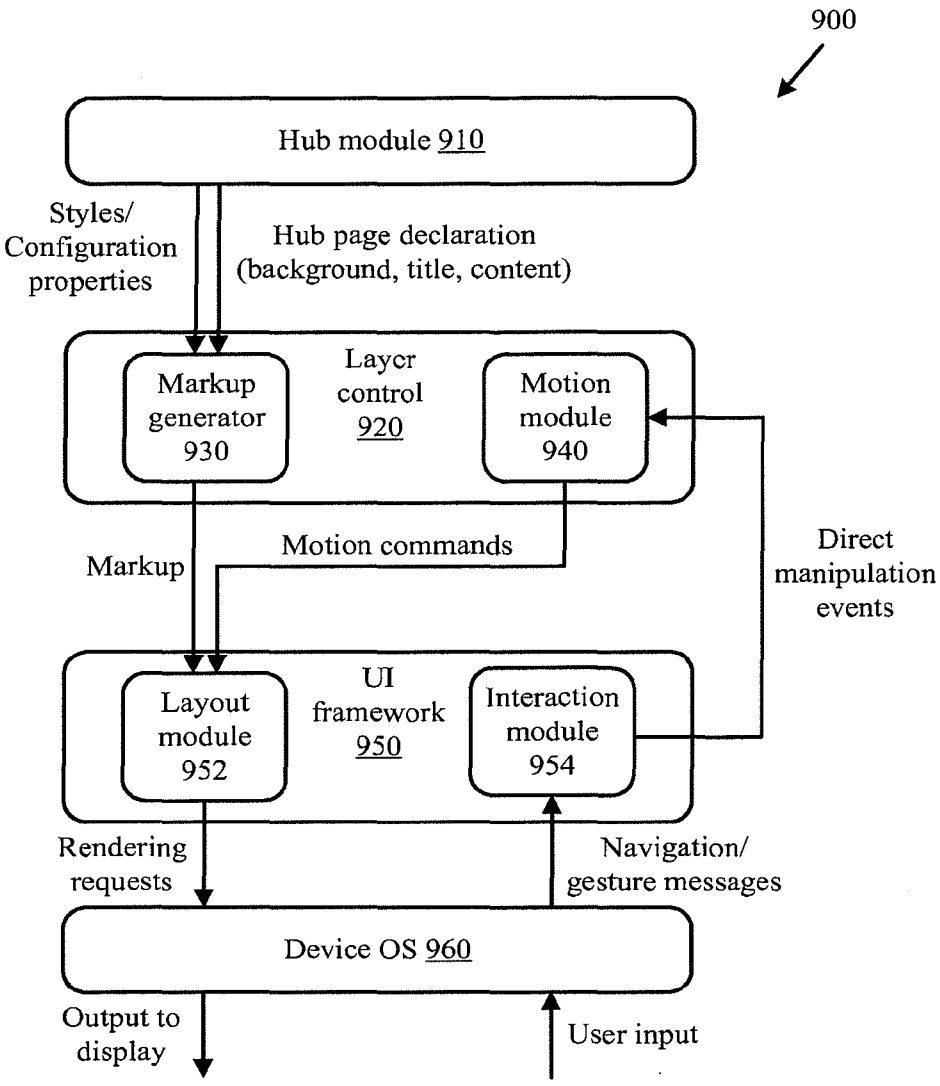

900
Hub module 910
Styles/
Configuration
properties
Hub page declaration
(background, title, content)
Markup
generator
930
Layer
control
920
Motion
module
940
Markup
Motion commands
Direct
manipulation
events
Layout
module
952
UI
framework
950
Interaction
module
954
Rendering
requests
Navigation/
gesture messages
Device OS 960
Output to
display
User input

Figure 9

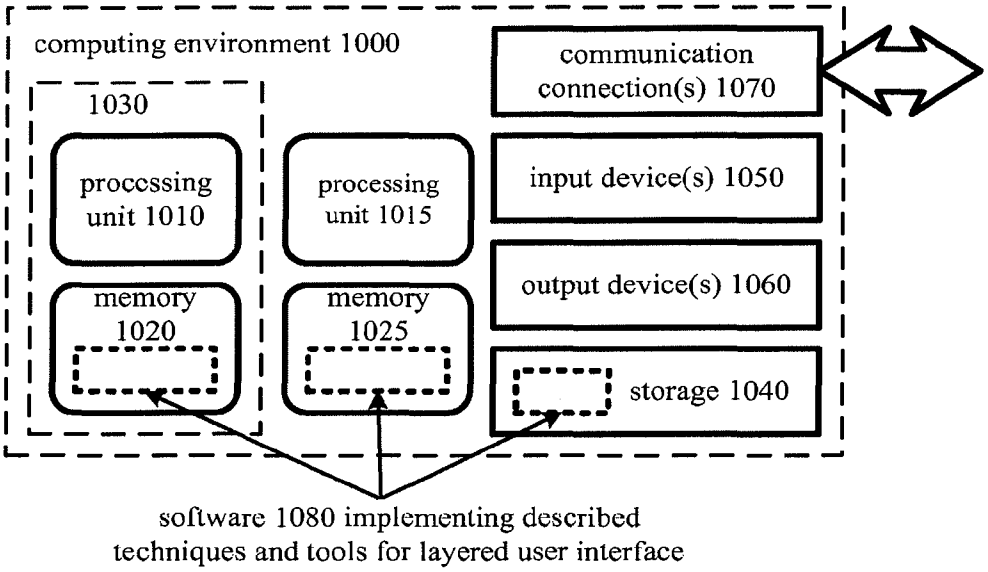

computing environment 1000
1030
processing unit 1010
processing unit 1015
memory 1020
memory 1025
communication connection(s) 1070
input device(s) 1050
output device(s) 1060
storage 1040
software 1080 implementing described techniques and tools for layered user interface

Figure 10

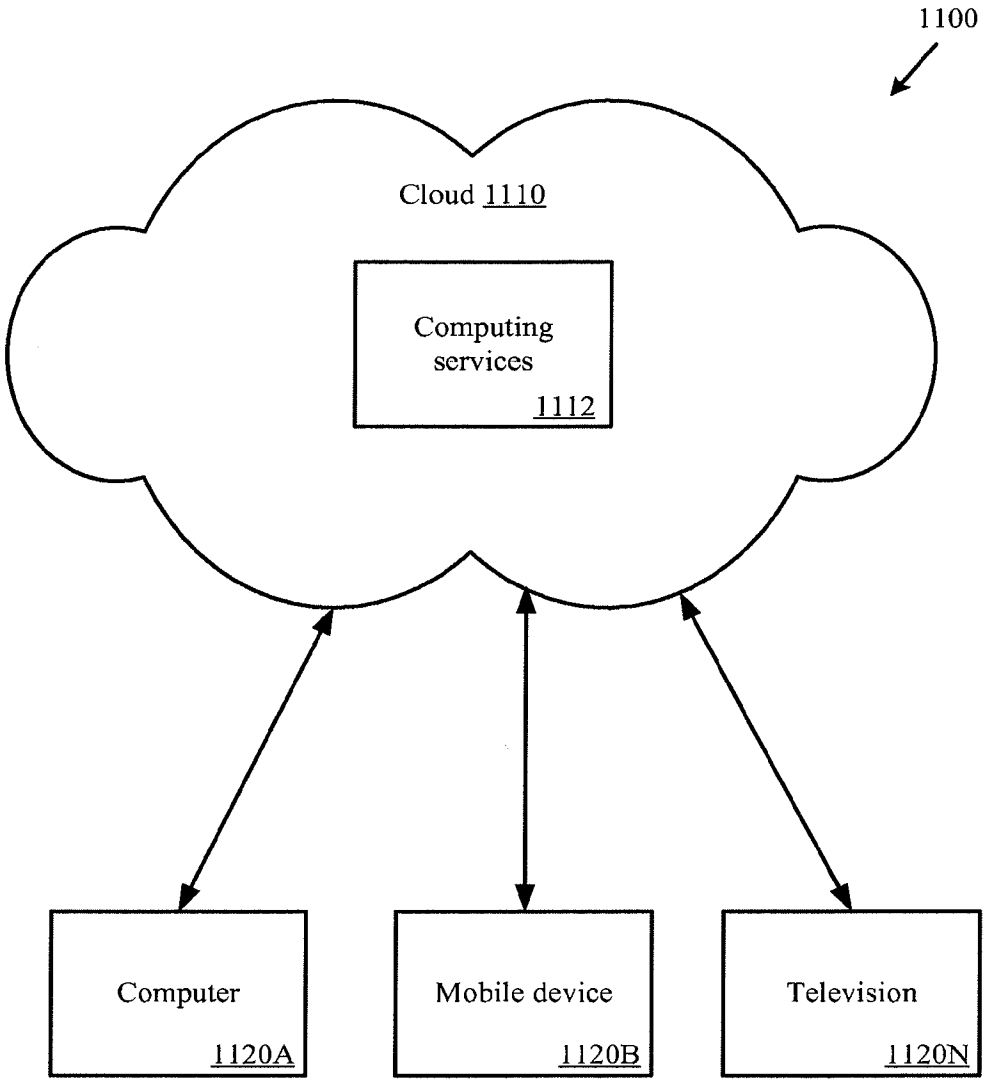

1100
Cloud 1110
Computing services 1112
Computer 1120A
Mobile device 1120B
Television 1120N

Figure 11

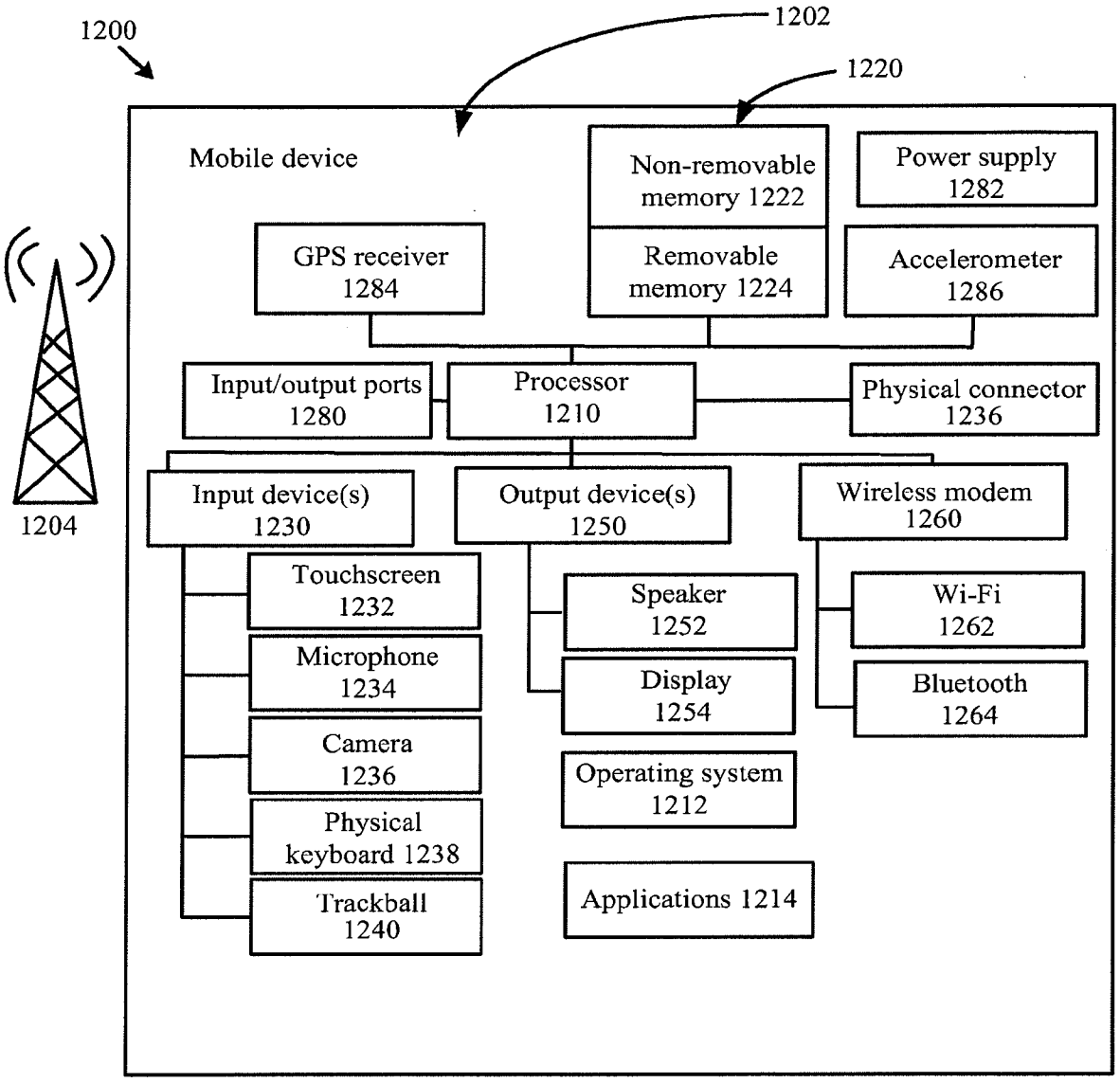

1200
1202
1220
Mobile device
Non-removable memory 1222
Power supply 1282
GPS receiver 1284
Removable memory 1224
Accelerometer 1286
Input/output ports 1280
Processor 1210
Physical connector 1236
1204
Input device(s) 1230
Output device(s) 1250
Wireless modem 1260
Touchscreen 1232
Speaker 1252
Wi-Fi 1262
Microphone 1234
Display 1254
Bluetooth 1264
Camera 1236
Operating system 1212
Physical keyboard 1238
Trackball 1240
Applications 1214

Figure 12

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WEDNESDAY, JUNE 23, 2010

5 Best Things About iOS4

Apple just released iPhone 4 and along with it (2 days before) they rolled out iOS4 as well.

When you have an iphone, you know who among your friends own iphones as well (perhaps because you all have the same message and ring tones). It's amusing how we were all giddy with anticipation. And why not, it's a free upgrade to a better OS promising long-awaited features in the wraps.

The best features of the upgrade:



1. **General improvement in speed, transition + wallpaper** The icons seem to pop out of the screen more. The transitions between pages (when you scroll to the left or right) is smoother. When going back to home screen the icons have a different effect, like they're popping in from the outside. They seem like small improvement, but they are what you see most of the time so it matters.

The new wallpaper option is just dandy. It also helps make those icons pop out.

(iphone pickup line: hey, that's a nice wallpaper. they really bring out the color of your apps).

2. **Folders** I used to have about 8 pages on my iphone. Now, I only have 5 with ample space on each page for new apps. That's almost a 50% decrease! All the games I don't play are now cluttered into a folder (2 actually), apps I use for travel are stowed away, the default iphone apps I never use are out of sight, and in general I feel more in control. My phone seems less cluttered.

3. **Spell Check, Undo, and User Dictionary** When you first start using an iphone/itouch keyboard you worry a bit. But as your brain learns what your (fat) fingers are pressing, you learn to appreciate the keyboard. One thing you struggle with a bit longer is auto-correct.

Somehow, the phone thinks it knows what you want to type more than you do. If you're typing a word and it has a suggestion (which it hurriedly tries to prompt) and you ignore it (or just don't see it) and continue to type, it keeps ITS suggestion.

But now, we have an *undo*. When the phone suggests something, and you continue to type causing it to accept its suggestion, just hit backspace and the

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► 2011 (11)
▼ 2010 (23)
► July (7)
▼ June (16)
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New Music Weekend
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edited word pops up. Tap it and you just undid the auto-correct. Nice.

Even better is *Integrated spell check*. As how you would think it would work, red squiggly lines indicate an unrecognized word. Tap it and the alternate suggestions appear.

Last is the *user dictionary*. This can be a bit tricky to find. You have to select another keyboard aside from your probably default US-English one. After doing that, you will have another option in the keyboard settings which is *User Dictionary*. What's the big deal? Well, if you have words that the phone usually corrects (especially non-English words) put it in the user dictionary and the phone stops prompting to correct it.

3. **Threaded Emails + Google Calendar & Notes Sync** Following in the barely visible footprints of Google (read: finally), you can now see connected messages via threads. It's not as pretty as how Gmail does it, but that's expected. Google Calendar & Notes can now also be supposedly synced (even without MobileMe). Google Calendar sync works on the fly almost real-time and is great. I haven't really figured out how to sync Google Notes yet.

The **Unified Inbox** I suppose is also a good thing, but I don't really mix nor have multiple email addresses.

4. **Cellular Data Off Switch** I no longer have to edit the Cellular Data Network everytime I want to turn off mobile internet. There's now a switch in the Network settings that can turn off Cellular Data.

Curiously though, I don't know when they ended it, but Globe Telecoms no longer provides per kb data charging. I reckoned that I could save money moving back to per kb charging with such easy switching, but well, P5 for 15 minutes will do I guess.

5. **Multi-tasking** You'll probably first notice it when you use Safari. Web pages load in Safari even if you're in another 'tab' and even when you 'close' Safari. When you go back, the page has loaded already. Finally!

I'm not sure though how many other apps already know how to use this feature though. I know it works with Foursquare and Safari. It doesn't work with TweetDeck yet.

You'll know it's multi-tasking cause of an isosceles triangle near the time at the top of the iphone.

Also, when the app can multi-task, if you tap the home button, it will give you a list of previously opened apps so you can switch with ease. If it doesn't work, you go back to home.

Other notable new features:

- Digital Zoom for the camera
- Improved picture importing (uploaded pictures are clearer when zoomed in)
- Quick Search / Spotlight Search (the search that comes up when you swipe to the left from home) now includes internet, Wikipedia, **and** SMS search.

Post upgrade, I've been on my iphone as much as I was on it when I first got it. It's fun trying to figure out all the new features and trying to make them work. It's a good thing that Apple gives free OS upgrades, even for their consoles. And these aren't just geeky, technical updates we're so used to in

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► 2008 (10)
► 2007 (23)
► 2006 (28)
► 2005 (116)
► 2004 (110)

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the PC world. Consumers actually look forward to something new in their upgrades.

Again, the new things aren't really new in the real world--they're available elsewhere also for free and for quite a while now--but in the ever growing closed almost autistic world Apple users live in, it's a good thing. At the end of the day we're happy that we've been given more choices on how to modify our shackles.

Should you upgrade to iphone4? From what I gather, if you've a 3GS, you're crazy to want to upgrade. But if you're using a 3G and below, go ahead, don't feel guilty thinking about it. Or better yet, get a discounted 3GS and then wait for the iphone 5. You lose out on the gyroscope and the front facing camera, but you can live without those.

3G users have lived without a compass and voice dial (two things which I use a lot) and just a year and a half after the 3GS was released, they can now upgrade to iphone 4.

If you're not an iphone user, should you get an iphone? See, I'm an Apple hater but I have an iphone. As far as I'm concerned, as of last year (when I got my phone) it was the best option. I think it still is. It has the best hardware, pretty decent software, and still the best apps store.

Given a few more years though, I'm switching to an Android phone. I reckon they would have caught up with the hardware by then. The Android app store is growing exponentially by the week and in a year or so they would have already caught up with Apple. This is not to mention that the Droid apps currently do a lot more than iphone apps do.

But I'm also pretty sure that in a few years time, when Android finally catch up with Apple, the evil geniuses at Apple would have already come up with something that makes smartphones obsolete.

Posted by sanpao at 7:27 PM 

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Tuesday, March 09, 2010

A little optional extra: iPod Touch 64Gb Review

NOTES: Before you get stuck in I'll point out two minor facts:

1. my iPod has a blue plastic backing plate on it to stop the rear getting scratched, which is visible in most of the photos - this is not included with the iPod and was bought seperately (though it only cost £3 with free postage so it may as well not be considered an extra cost. I recommend it, it's quite good...

2. Not all iPod Touch models have the same capabilities. While a lot of these features are present on all/most iPod Touches, I am reviewing the 3rd Generation 64Gb model - currently the top of the range of iPods.

Anyway...

As I mentioned in my last entry, for various reasons (not the least of which are that the hard drive is full, and the internal battery needs replacing), my beloved but venerable 30gb iPod Video has been "retired",or held in reserve for use in times/places when I wouldn't want to risk carrying its replacement. This replacement being a shiny (for now) iPod Touch 64gb.

I figured I'd do a little review of it. I'm going to try to avoid going into the more technical discussions about video formats and encoding bitrates and display refresh times for a variety of reasons, not the least of which is that that's the first thing that most other reviewers got their teeth into as soon as the thing hit the market.
Instead, I'm going to try to look at the thing from the point of view of a user/owner, instead of the point of view of someone who's comparing it against its competitors/predecessors etc.

So let's see how it goes.

HISTORY AND BACKGROUNDY BIT: Big chunky plastic iPods from days of yore:

It seems that when Apple released the original iPhone, enough people went off and had orgasms about the interface to convince Apple that they really were onto a good thing. Whether this was their motivation behind the development of the IPod Touch - itself essentially an iPhone with the "Phone" bit ripped out - or simply a favourable public attitude to a project already in progress, I'm not sure and haven't bothered to find out.
Regardless of how apple felt at the time, eventually in late 2007, the iPod touch, hit the market.

Then, as now, flash memory storage compared to a hard drive of equivalent capacity, was prohibitively expensive (At current prices, 64gb of flash memory sells for anything up to £150, making up a huge chunk of the iPod Touch 64's £250-£300 price tag. So the first generation of iPod Touch devices had small capacities of only eight or 16 gb. Not a huge leap from, or in the case of the 8gb model, not even an improvement on, the then already available iPod Nano.

Despite this, because the iPod Touch offered the functionality of a "decent" mp3 player, and the incredibly popular and widely praised iPhone touchscreen interface, the sales hysteria from the original iPhone seemed to have rubbed off a little onto the new iPod Touch, and even though it was much (and later models still are) more expensive than other iPods in Apple's lineup, so many people were having orgasms about it that it didn't matter, and for the second time in the space of three short months, Apple were once again onto a major winner.

Time marches on, of course, and though despite upgrades in storage memory, the iPod Touch could never feasibly hope to match the capacity of its much more spacious (and much cheaper) hard drive based cousins, this was accepted as an acceptable tradeoff for what you actually get for your money. Later iterations of the iPod Touch came with more storage capacity and a longer features list, and while storage-wise they never really (to date) closed the gap with their more conventional siblings, they still had the same (if not more, thanks to the burgeoning market for downloadable software, referred to in an infuriatingly annoying way by almost everyone as "apps" (pronounced "ayapps", more often than not, apparently) appeal as they did when they were first released.

A LITTLE NOTE ABOUT BUILD QUALITY: How easy is it to break?:

Yeah, like I'd know that considering I've carried the thing around in at least one case since I bought it, sometimes even two (a sturdy one to protect it, and a softer one to prevent the sturdy one from scratching it (Look, it's damned expensive and looks easy to break (I'm doing that nested sentences thing again, see? (oh no not again))).

The device itself is beautifully crafted with only love and care and fairy dust, and as such isn't too shabby at all. The glass (not plastic, not tempered, and - if similar to the iPhone's - not unsmashable!) front of the device covers the screen, which itself appears further recessed slightly into the unit. I spose if you're lucky (though not lucky enough to have avoided dropping it, obviously) and you drop it, you might smash the front while avoiding damaging the screen itself, but frankly I don't ever want to put that to the test.



The back of the unit is made of beautifully curved and beautifully shiny and polished stainless steel. Something it shares with many of the other IPod models. (The square thing is a holographic sticker - I can only assume the previous owner stuck it on for some bizarre reason).
Unsurprisingly though, something else it shares as a result of this, is that the back will attract tiny scratches and fingerprints until it's practically matte in appearance. I strongly recommend at least a plastic case (like the one in most of the images) that clips onto the back of the unit to protect it from scratches *and* dints, as other metal-backed IPods I've owned have been susceptible to both.

As far as the glass front of the iPod is concerned, a smooth glass surface that doubles as a touchscreen, VERY quickly becomes quite disgustingly messy, covered in fingerprints, smudges, even food (if you eat with your hands/are a careless eater). It's a bugger to get polished and shiny again, and unless it is perfectly shiny it eventually becomes a tiny bit of a sod to use, as dragging your fingers across layers of fingerprints isn't the most pleasant way to use a music player or any other device for that matter.

For this reason, you can buy screen protectors that resist fingerprints. Apple sell two different types both designed to protect the display; one that is great at resisting fingerprints and reducing glare, while reducing the clarity of the display slightly, and one that preserves the colour and the clarity of the screen while being slightly less good at resisting fingerprints, and no good whatsoever at resisting glare.

Whichever of these you plump for, Apple will want to charge you the "expensive but it's worth it (apparently)" price of £9.99 for two. I bought a pack of six generic (very very slightly matte) screen protectors for £1.30, that are much less scratch resistant, but are resistant to glare, and make fingerprints a very minor problem, generally making the device much more pleasant to use.
Fact is, that if a screen protector isn't included with the iPod, it bloody well should be, and for Apple to charge people anything up to £300 (for a 64gb model) and NOT include a screen protector, is taking bloody liberties a bit. They may as well not include earphones, while they're at it.

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▶ Septemb
▶ August (
▶ July (4)
▶ June (1)
▶ May (3)
▶ April (2)
▼ March (2
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▶ 2009 (59)
▶ 2008 (84)
▶ 2007 (42)
▶ 2006 (12)

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