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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
10/723,778	11/26/2003	Henry DaCosta	

CONFIRMATION NO. 4196

95000
MILES & STOCKBRIDGE P.C.
Immersion Corporation
1751 Pinnacle Drive
Suite 1500
Tysons Corner, VA 22102-3833

POA ACCEPTANCE LETTER

OC000000080768167

Date Mailed: 02/22/2016

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 02/18/2016.

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.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/dtvernon/

Valve Exhibit 1021
Valve v. Immersion

UNITED STATES PATENT AND TRADEMARK OFFICE

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Address: COMMISSIONER FOR PATENTS
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
10/723,778	11/26/2003	Henry DaCosta	IMM174

CONFIRMATION NO. 4196

34300
Kilpatrick Townsend and Stockton, LLP
1001 W Fourth Street
Winston-Salem, NC 27101

POWER OF ATTORNEY NOTICE



Date Mailed: 02/22/2016

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 02/18/2016.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/dtvernon/

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82B (07-13)
Approved for use through 11/30/2014. OMB 0651-0051
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number

POWER OF ATTORNEY BY APPLICANT

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

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☑ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 95000

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

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

☐ The address associated with the above-mentioned Customer Number

OR

☑ The address associated with Customer Number: 95000

OR

Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

Immersion Corporation

☐ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature	Catherine Maresh	Date (Optional)	
Name	Catherine Maresh		
Title	Senior IP Patent Counsel, Immersion 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. If more than one applicant, use multiple forms.

☐ Total of forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

Electronic Acknowledgement Receipt

EFS ID:	24947610
Application Number:	10723778
International Application Number:	
Confirmation Number:	4196
Title of Invention:	SYSTEMS AND METHODS FOR ADAPTIVE INTERPRETATION OF INPUT FROM A TOUCH-SENSITIVE INPUT DEVICE
First Named Inventor/Applicant Name:	Henry DaCosta
Customer Number:	34300
Filer:	Barry S. Goldsmith/Hilary Shannon
Filer Authorized By:	Barry S. Goldsmith
Attorney Docket Number:	IMM174
Receipt Date:	18-FEB-2016
Filing Date:	26-NOV-2003
Time Stamp:	12:03:44
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		T9047-22171US01-POAFILE.pdf	128752 0f97c0c2251c14e810818d2853f7cdc3ca49642c	yes	3

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Assignee showing of ownership per 37 CFR 3.73	1	2
	Power of Attorney	3	3
Warnings:			
Information:			
	Total Files Size (in bytes):	128752	

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.

PTO/SB/96 (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(b)

Applicant/Patent Owner: Henry DACOSTA et al.

Application No./Patent No.: 8,164,573 Filed/Issue Date: April 24, 2012

Titled: SYSTEMS AND METHODS FOR ADAPTIVE INTERPRETATION OF INPUT FROM A TOUCH-SENSITIVE INPUT DEVICE

Immersion Corporation , a corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.

states that it is:

1. ☒ the assignee of the entire right, title, and interest in;

2. ☐ an assignee of less than the entire right, title, and interest in (The extent (by percentage) of its ownership interest is _____ %); or

3. ☐ the assignee of an undivided interest in the entirety of (a complete assignment from one of the joint inventors was made)

the patent application/patent identified above, by virtue of either:

A. ☒ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 015840, Frame 0243, or for which a copy therefore is attached.

OR

B. ☐ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

2. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ As required by 37 CFR 3.73(b)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (*i.e.*, a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Barry S. Goldsmith/ February 18, 2016

Signature Date

Barry S. Goldsmith, Reg. No. 39,690 Attorney of Record

Printed or Typed Name Title

This collection of information is required by 37 CFR 3.73(b). 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 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

Privacy Act Statement

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

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

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

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO.	: 8,164,573 B2
APPLICATION NO.	: 10/723778
DATED	: April 24, 2012
INVENTOR(S)	: Henry DaCosta et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Title page 3, item [56], Line 62, Please delete "Vwiker," please insert -- Wiker, --.

Column 8, Line 45, Please delete "(A Z)", please insert -- (Δ Z) --.

Signed and Sealed this
Twenty-seventh Day of November, 2012

David J. Kappos

David J. Kappos
Director of the United States Patent and Trademark Office

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patentees	:	Henry DaCosta et al.
Patent No.	:	8,164,573 B2
Issued	:	April 24, 2012
Title of Invention	:	SYSTEMS AND METHODS FOR ADAPTIVE INTERPRETATION OF INPUT FROM A TOUCH-SENSITIVE INPUT DEVICE

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

REQUEST FOR CERTIFICATE OF CORRECTION OF PATENT FOR PATENT OFFICE MISTAKES (37 C.F.R. § 1.322)

Dear Sir:

U.S. Patent Application Number 10/723,778, from which the above-referenced patent issued, was filed on November 26, 2003. This communication is being submitted to request Certificate of Correction under 37 C.F.R. § 1.322 be issued for the above-referenced U.S. Patent to correct errors made by the Patent Office.

Attached is Form PTO/SB/44 stating the text of the corrections. The exact column and line numbers where the errors are in the patent and in the application as filed for the USPTO errors are enumerated below.

Patent Office Errors:

1. Under "OTHER PUBLICATIONS"

	PATENT	APPLICATION
a.	Page 3, Column 2 Line 62	Information Disclosure Statement Page 7 of 7 considered by Examiner 11/19/2006

2. Under "DETAILED DESCRIPTION"

PATENT		APPLICATION
a.	Column 8, Line 45	Page 17, Line 21

Please direct any questions regarding this request, and send the Certificate of Correction, to the undersigned.

Respectfully submitted,

Dated: October 25, 2012

Carl E. Sanders (Reg. 57,203)

Kilpatrick Townsend & Stockton LLP
1001 West Fourth Street
Winston-Salem, NC 27101
(336) 607-7300 phone
(336) 607-7500 facsimile

PTO/SB/44 (09-07)
Approved for use through 08/31/2013. OMB 0651-0033
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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(Also Form PTO-1050)

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 8,164,573

APPLICATION NO.: 10/723,778

ISSUE DATE : April 24, 2012

INVENTOR(S) : Henry DaCosta et al.

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Page 3, Column 1, Line 62, Please delete "Vwiker," please insert, - - Wiker, - -.

Column 8, Line 45, Please delete "(A Z)", please insert - - (Δ Z) - -.

MAILING ADDRESS OF SENDER (Please do not use customer number below):

Kilpatrick Townsend & Stockton LLP, 1001 West Fourth Street, Winston-Salem, NC 27101-2400

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.0 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

Electronic Acknowledgement Receipt

EFS ID:	14072200
Application Number:	10723778
International Application Number:	
Confirmation Number:	4196
Title of Invention:	SYSTEMS AND METHODS FOR ADAPTIVE INTERPRETATION OF INPUT FROM A TOUCH-SENSITIVE INPUT DEVICE
First Named Inventor/Applicant Name:	Henry DaCosta
Customer Number:	34300
Filer:	Carl E. Sanders/Renee Prevette
Filer Authorized By:	Carl E. Sanders
Attorney Docket Number:	IMM174
Receipt Date:	25-OCT-2012
Filing Date:	26-NOV-2003
Time Stamp:	11:20:33
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	Miscellaneous Incoming Letter	TransmittalCOC.pdf	39605 39122820ae4a647d8f0eab9b5c71f295560a9f89	no	1

Warnings:	
Information:	

2	Request for Certificate of Correction	RequestCOC.pdf	55555 e1d4cacf708d40d150afdcac332dff42d787803b	no	2
Warnings:					
Information:					
3	Request for Certificate of Correction	CertificateCorrection.pdf	46240 9301f7179c599539823df920e64fb7c9d19f6be1	no	1
Warnings:					
Information:					
			Total Files Size (in bytes):	141400	

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

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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

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

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of:	:	Henry DaCosta et al.
Patent No.	:	8,164,573 B2
Issued	:	April 24, 2012
Application No.	:	10/723,778
Filing Date	:	November 26, 2003
Title	:	SYSTEMS AND METHODS FOR ADAPTIVE INTERPRETATION OF INPUT FROM A TOUCH-SENSITIVE INPUT DEVICE
Confirmation No.	:	4196

Commissioner for Patents
Office of Patent Publication
ATTN: Certificate of Correction Branch
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL

Sir:

Transmitted herewith are copies of the following documents for filing in the above-identified application:

(1) Request for Certificate of Correction of Patent for Patent Office mistakes Under 37 C.F.R. § 1.322; and
(2) Form PTO/SB/44.

The Commissioner is hereby authorized to charge any deficiency to Deposit Account Number 20-1430.

Respectfully submitted,

Date: October 25, 2012

By: _____
Carl E. Sanders (Reg. No. 57,203)

KILPATRICK TOWNSEND &
STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101-2400
Tel. (336) 607-7300
Fax. (336) 607-7500

Certificate of Electronic Filing
I hereby certify that this correspondence is being electronically filed with The United States Patent Office via EFS-Web on October 25, 2012.

_____
Renée S. Prevette

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/723,778	04/24/2012	8164573	IMM174	4196

34300 7590 04/04/2012

PATENT DEPARTMENT (51851)
KILPATRICK TOWNSEND & STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

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

The Patent Term Adjustment is 1560 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

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

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

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

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

Henry DaCosta, Montreal, CANADA;
Christophe Ramstein, San Francisco, CA;
Danny Grant, Montreal, CANADA;

EV 315 183 263 US

PTO/SB/08A (10-01)
Approved for use through 10/31/2002. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
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Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

Sheet 1 of 7

Complete if Known	
Application Number	Unassigned
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Unassigned
Examiner Name	Unassigned
Attorney Docket Number	IMM174 (51851/279589)

U.S. PATENT DOCUMENTS

Examiner	Cite No.[1]	Document Number Number Kind Code[2] (*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
XW	1	2,972,140	2/14/1961	Hirsch	
	2	3,157,853	11/17/1964	Hirsch	
	3	3,220,121	11/30/1965	Cutler	
	4	3,497,668	2/24/1970	Hirsch	
	5	3,517,446	6/30/1970	Corlyon et al.	
	6	3,623,064	11/23/~~1970~~ 1971	Kagan	
	7	3,902,687	~~9/25/1973~~	Hightower	9/1975
	8	3,903,614	9/9/1975	Diamond et al	
	9	3,911,416	10/7/1995	Feder	
	10	4,127,752	11/28/1978	Lowthorp	
	11	4,160,508	7/10/1979	Salsbury	
	12	4,236,325	12/~~0~~2/1980	Hall et al.	
	13	4,262,549	4/21/1981	Schwellenbach	
	14	4,333,070	6/1/1982	Barnes	
	15	4,464,117	8/7/1984	Forest	
	16	4,484,191	11/20/1984	Vavra	
	17	4,513,235	4/23/1985	Acklam et al.	
	18	4,581,491	4/8/1986	Boothroyd	
	19	4,599,070	7/8/1986	Hladky et al.	
	20	4,708,656	11/24/1987	De Vries et al.	
	21	4,713,007	12/15/1987	Alban	
	22	4,794,392	12/27/1988	Selinko	
	23	4,885,565	12/5/1989	Embach	
	24	4,891,764	1/2/1990	McIntosh	
	25	4,930,770	6/5/1990	Baker	
	26	4,934,694	6/19/1990	McIntosh	
	27	5,019,761	5/28/1991	Kraft	
	28	5,022,384	6/11/1991	Freels	
	29	5,022,407	6/11/1991	Horch et al.	
	30	5,035,242	7/30/1991	Franklin	
	31	5,038,089	8/6/1991	Szakaly	
	32	5,078,152	1/7/1992	Bond	
	33	5,165,897	11/24/1992	Johnson	
	34	5,175,459	12/29/1992	Danial et al.	
	35	5,186,695	2/16/1993	Mangseth et al.	
	36	5,240,417	8/31/1993	Smithson et al.	

Change(s) applied to document,
/M.C.E./
2/14/2012

Examiner Signature	/Xiao Wu/	Date Considered	06/19/2006

*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.

[1] Applicant's unique citation designation number (optional). [2] Kind Codes of U.S. Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

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PTO/SB/08a (08-03)
Approved for use through 07/31/2006. OMB 0851-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 7

Complete if Known	
Application Number	10/723,778
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Not yet assigned
Examiner Name	Not yet assigned
Attorney Docket Number	IMM174 (51851/279589)

OIPE MAR 14 OCT 0 2 2006 PATENT & TRADEMARK OFFICE

U.S. PATENT DOCUMENTS

Examiner Initials *	Cite No.[1]	Document Number Number - Kind Code[2] (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
XW	1	2,972,140	2/14/1961	Hirsch	
	2	3,157,853	11/17/1964	Hirsch	
	3	3,220,121	11/30/1965	Cutler	
	4	3,497,668	2/24/1970	Hirsch	
	5	3,517,446	6/30/1970	Corlyon et al.	
	6	3,623,064	11/23/~~1970~~ 1971	Kagan	
	7	3,902,687	~~6/25/1973~~ 9/1975	Hightower	
	8	3,903,614	9/9/1975	Diamond et al	
	9	3,911,416	~~10/7/1995~~ 10/1975	Feder	
	10	4,127,752	11/28/1978	Lowthorp	
	11	4,160,508	7/10/1979	Salsbury	
	12	4,236,325	12/~~10~~/2/1980	Hall et al.	
	13	4,262,549	4/21/1981	Schwellenbach	
	14	4,333,070	6/1/1982	Barnes	
	15	4,464,117	8/7/1984	Forest	
	16	4,484,191	11/20/1984	Vavra	
	17	4,513,235	4/23/1985	Acklam et al.	
	18	4,581,491	4/8/1986	Boothroyd	
	19	4,599,070	7/8/1986	Hladky et al.	
	20	4,708,656	11/24/1987	De Vries et al.	
	21	4,713,007	12/15/1987	Alban	
	22	4,758,165	7/19/1988	Tieman, et al.	
	23	4,772,205	9/20/1988	Chlumsky, et al.	
	24	4,794,392	12/27/1988	Selinko	
	25	4,885,565	12/5/1989	Embach	
	26	4,891,764	1/2/1990	McIntosh	
	27	4,926,879	5/22/1990	Sevrain, et al.	
	28	4,930,770	6/5/1990	Baker	
	29	4,934,694	6/19/1990	McIntosh	
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	34	5,038,089	8/6/1991	Szakaly	
	35	5,078,152	1/7/1992	Bond	
	36	5,121,091	6/9/1992	Fujiyama	
	37	5,165,897	11/24/1992	Johnson	
	38	5,175,459	12/29/1992	Danial et al.	
↓	39	5,186,695	2/16/1993	Mangseth et al.	

Change(s) applied to document, /M.C.E/

~~Change(s)~~ applied to document, /D.A.M./ 2/17/2012

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

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

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

34300 7590 12/28/2011
PATENT DEPARTMENT (51851)
KILPATRICK TOWNSEND & STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

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

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

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/723,778	11/26/2003	Henry DaCosta	IMM174	4196

TITLE OF INVENTION: SYSTEMS AND METHODS FOR ADAPTIVE INTERPRETATION OF INPUT FROM A TOUCH-SENSITIVE INPUT DEVICE

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1740	$300	$0	$2040	03/28/2012

EXAMINER	ART UNIT	CLASS-SUBCLASS
LIANG, REGINA	2629	345-173000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

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

1 ~~Kilpatrick Townsend~~ &
2 Stockton LLP
3

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

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

(A) NAME OF ASSIGNEE: Immersion Corporation

(B) RESIDENCE: (CITY and STATE OR COUNTRY): San Jose, CA

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

4a. The following fee(s) are submitted:
☒ Issue Fee
☒ Publication Fee (No small entity discount permitted)
☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
☐ A check is enclosed.
☒ Payment by credit card. Form PTO-2038 is attached.
☒ The Director is hereby authorized to charge the ~~required fee(s)~~, any deficiency, or credit any overpayment, to Deposit Account Number ~~20-1430~~ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.
☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature Carl Sanders Date March 21, 2012

Typed or printed name ~~Carl Sanders~~ Registration No. ~~57,203~~

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Electronic Patent Application Fee Transmittal

Application Number:	10723778
Filing Date:	26-Nov-2003
Title of Invention:	SYSTEMS AND METHODS FOR ADAPTIVE INTERPRETATION OF INPUT FROM A TOUCH-SENSITIVE INPUT DEVICE
First Named Inventor/Applicant Name:	Henry DaCosta
Filer:	Carl E. Sanders/Laura Smith
Attorney Docket Number:	IMM174

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:				
Utility Appl issue fee	1501	1	1740	1740
Publ. Fee- early, voluntary, or normal	1504	1	300	300

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**2040**

Electronic Acknowledgement Receipt

EFS ID:	12354710
Application Number:	10723778
International Application Number:	
Confirmation Number:	4196
Title of Invention:	SYSTEMS AND METHODS FOR ADAPTIVE INTERPRETATION OF INPUT FROM A TOUCH-SENSITIVE INPUT DEVICE
First Named Inventor/Applicant Name:	Henry DaCosta
Customer Number:	34300
Filer:	Carl E. Sanders/Laura Smith
Filer Authorized By:	Carl E. Sanders
Attorney Docket Number:	IMM174
Receipt Date:	21-MAR-2012
Filing Date:	26-NOV-2003
Time Stamp:	15:00:35
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$2040
RAM confirmation Number	1448
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Transmittal Letter	Transmittal279589.pdf	38928 b14ae194b5e8588ba14a99e8399b9aaa416d3a13	no	1
Warnings:					
Information:					
2	Issue Fee Payment (PTO-85B)	PartB279589.pdf	127248 65415cad153c247e2540f7cc607deb6a410d2e19	no	1
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	31787 caa926ec2a632fb7b48bf10c37d355c2463fd4db	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	197963		

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

<u>New Applications Under 35 U.S.C. 111</u>
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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

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

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of	:	Henry DaCosta et al.
Application No.	:	10/723,778
Filed	:	November 26, 2003
For	:	**SYSTEMS AND METHODS FOR ADAPTIVE INTERPRETATION OF INPUT FROM A TOUCH-SENSITIVE INPUT DEVICE**
Examiner	:	Regina Liang
Art Unit	:	2629
Conf. No.	:	4196

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

TRANSMITTAL

Sir:

Transmitted herewith is a copy of the following document(s) for filing in the above-identified application:

1. Transmittal;
2. Part B – Fees Transmittal (Form PTOL-85B); and
3. EFS-Web Payment in the amount of $2,040.00

The Commissioner is hereby authorized to charge any additional fees required by this action, or credit any overpayment, to Deposit Account Number 20-1430.

Respectfully submitted,

Date: March 21, 2012

By: _____
Carl E. Sanders (Reg. No. 57,203)

KILPATRICK TOWNSEND &
STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101
(336) 607-7300

Certificate of Electronic Filing

I hereby certify that this correspondence is being electronically filed with the United States Patent Office via EFS-Web, on March 21, 2012.

_____
Laura J. Smith

US2000 12393107.1

Express Mail Cert. No. 315 183 263 US
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Henry da Costa, et al.
Serial No.:	Unassigned
Filing Date:	November 26, 2003
For:	**Systems and Methods for Adaptive Interpretation of Input From a Touch-Sensitive Input Device**
Art Unit:	Unassigned

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

Sir:

INFORMATION DISCLOSURE STATEMENT

Pursuant to 37 C.F.R. §§ 1.56, 1.97, and 1.98, Applicants submit herewith on Form PTO-1449 a listing of documents known to the Applicants and/or their attorney. Applicants respectfully request consideration of the cited documents and making the same of record in the prosecution of the above-identified application. In so doing, Applicants do not waive any rights to take appropriate action to establish patentability over the listed documents should they be applied as references against the claims of the present application. Copies of One Hundred Forty-one documents listed on the enclosed CD.

This Information Disclosure Statement is being submitted with the application, and, therefore, no certification or fee is required (37 C.F.R. § 1.97b(1)). However, should any fees be due, the Commissioner is authorized to charge such fees to Deposit Account No. 16-1435. A duplicate of this sheet is attached for that purpose.

Respectfully submitted,

John C. Alemanni
Reg. No. 47,384

KILPATRICK STOCKTON LLP
1001 West Fourth Street
Winston-Salem, North Carolina 27101-2400
Telephone: (336) 607-7311
Facsimile: (336) 734-2621

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /RL/

EV 315 183 263 US

PTO/SB/08A (10-01)
Approved for use through 10/31/2002. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

Sheet 1 of 7

Complete if Known	
Application Number	Unassigned
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Unassigned
Examiner Name	Unassigned
Attorney Docket Number	IMM174 (51851/279589)

U.S. PATENT DOCUMENTS

Examiner	Cite No.[1]	Document Number Number Kind Code[2] (*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
	1	2,972,140	2/14/1961	Hirsch	
	2	3,157,853	11/17/1964	Hirsch	
	3	3,220,121	11/30/1965	Cutler	
	4	3,497,668	2/24/1970	Hirsch	
	5	3,517,446	6/30/1970	Corlyon et al.	
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	7	3,902,687	6/25/1973	Hightower	
	8	3,903,614	9/9/1975	Diamond et al	
	9	3,911,416	10/7/1995	Feder	
	10	4,127,752	11/28/1978	Lowthorp	
	11	4,160,508	7/10/1979	Salsbury	
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	13	4,262,549	4/21/1981	Schwellenbach	
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	15	4,464,117	8/7/1984	Forest	
	16	4,484,191	11/20/1984	Vavra	
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	18	4,581,491	4/8/1986	Boothroyd	
	19	4,599,070	7/8/1986	Hladky et al.	
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	22	4,794,392	12/27/1988	Selinko	
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	34	5,175,459	12/29/1992	Danial et al.	
	35	5,186,695	2/16/1993	Mangseth et al.	
	36	5,240,417	8/31/1993	Smithson et al.	

Examiner Signature	/Regina Liang/	Date Considered	02/22/2012

*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.

[1] **Applicant's** unique citation designation number **(optional)**. [2] Kind Codes of U.S. Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

Burden Hour Statement: This form is estimated to take 2.0 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /RL/

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PTO/SB/08A (10-01)
Approved for use through 10/31/2002. OMB 0651-0031
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Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

Sheet 2 of 7

Complete if Known	
Application Number	Unassigned
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Unassigned
Examiner Name	Unassigned
Attorney Docket Number	IMM174 (51851/279589)

U.S. PATENT DOCUMENTS

Examiner	Cite No.[1]	Document Number Number Kind Code[2] (*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
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	38	5,275,174	1/4/1994	Cook	
	39	5,283,970	2/8/1994	Aigner	
	40	5,299,810	4/5/1994	Pierce	
	41	5,309,140	5/3/1994	Everett	
	42	5,334,027	8/2/1994	Wherlock	
	43	5,547,382	8/20/1996	Yamasaki	
	44	5,212,473	5/18/1993	Louis	
	45	5,436,622	7/25/1995	Gutman et al.	
	46	5,437,607	8/1/1995	Taylor	
	47	5,466,213	11/14/1995	Hogan	
	48	5,575,761	11/19/1996	Hajianpour	
	49	5,613,137	3/18/1997	Bertram et al.	
	50	5,627,567	5/6/1997	Davidson	
	49	5,766,016	6/16/1998	SInclair	
	50	5,785,630	7/28/1998	Bobick et al.	
	51	5,880,411	3/9/1999	Gillespie et al.	
	52	5,887,995	3/30/1999	Holehan	
	53	5,917,906	6/29/1999	Thronton	
	54	5,977,867	11/2/1999	Bouin	
	55	5,995,084	11/30/1999	Chan et al.	
	56	6,057,830	5/0/2000	Chan et al.	
	57	6,111,577	8/29/2000	Zilles et al.	
	58	6,118,435	9/12/2000	Fujita et al.	
	59	6,160,489	12/12/2000	Perry et al.	
	60	6,198,206	3/6/2001	Saarmaa et al.	
	61	6,215,478	4/10/2001	Yeh et al.	
	62	6,218,966	4/17/2001	Goodwin et al.	
	63	6,219,034	4/17/01	Elbing, et al.	
	64	6,307,465	10/23/2001	Kayma et al.	
	65	6,373,463	4/16/2002	Beeks	
	66	6,380,931	4/30/2002	Gillespie et al.	
	67	6,388,655	5/14/2002	Leung	
	68	6,414,671	7/2/2002	Gillespie et al.	
	69	6,422,941	7/23/2002	Thorner et al.	
	70	6,424,338	7/23/2002	Anderson	

Examiner Signature	/Regina Liang/	Date Considered	02/22/2012

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.

[1] **Applicant's** unique citation designation number **(optional)**. [2] Kind Codes of U.S. Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 3 of 7

Complete if Known	
Application Number	Unassigned
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Unassigned
Examiner Name	Unassigned
Attorney Docket Number	IMM174 (51851/279589)

U.S. PATENT DOCUMENTS

Examiner	Cite No.[1]	Document Number: Number Kind Code[2] (*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
	74	6,429,846	8/6/2002	Rosenberg, et al.	
	75	US 2002/0149561 A1	10/17/2002	Fukumoto et al.	
	76	6,610,936	8/26/03	Gillespie	
	77	US 6,639,584 B1	10/28/2003	Gillespie, David W., et al.	

Examiner Initials*	Cite No.[1]	Foreign Patent Document: Country Code[3]	Number[4]	Kind Code[5] (*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
	77	EP	0349086		1/3/1990	Stork Kwant B.V.	√
	78	JP	01-003664		7/19/1990	Taito Corporation	√
	79	JP	02-109714		1/13/1992	Epoch Co. and Key-Planning Co.	√
	80	JP	04-007371		8/3/1993	Taito Corporation	√
	81	JP	05-193862		1/27/1995	Sega Corporation	√
	82	WO	97/18546 A1		5/22/1997	Gerpheide	√
	83	JP	2001-350593A		12/21/2001	Ryo et al.	√
	84	WO	02/12991 A1		2/14/2002	Fukumoto et al.	√
	85	EP	1182851 A1		2/27/2002	Becker	√
	86	WO	02/27645		4/4/2002	Franzen	√
	87	WO	02/31807 A1		4/18/2002	Hwang et al.	√
	88	JP	2002-259059A		9/13/2002	Motoyama et al.	√

Examiner Signature	/Regina Liang/	Date Considered	02/22/2012

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 4 of 7

Complete if Known	
Application Number	Unassigned
Filing Date	August 27, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Unassigned
Examiner Name	Unassigned
Attorney Docket Number	IMM174 (51851/279889)

OTHER DOCUMENTS

Examiner Initials *	Cite No.[1]	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.	
	89	ADELSTEIN, "A Virtual Environment System For The Study of Human Arm Tremor," Ph.D. Dissertation, Dept. of Mechanical Engineering, MIT, June 1989.	
	90	ADELSTEIN, " Design and Implementation of a Force Reflecting Manipulandum for Manual Control research," DSC-Vol. 42, Advances in Robotics, Edited by H. Kazerooni, pp. 1-12, 1992.	
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	94	BEJCZY, "Sensors, Controls, and Man-Machine Interface for Advanced Teleoperation," Science, Vol. 208, No. 4450, pp. 1327-1335, 1980.	
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	99	BROOKS et al., "Hand Controllers for Teleoperation - A State-of-the-Art Technology Survey and Evaluation," JPL Publication 85-11; NASA-CR-175890; N85-28559, pp. 1-84, 03/1/1985.	
	100	BURDEA et al., "Distributed Virtual Force Feedback, Lecture Notes for Workshop on Force Display in Virtual Environments and its Application to Robotic Teleoperation," 1993 IEEE International Conference on Robotics and Automation, pp. 25-44, 05/02/1993.	
	101	CALDER, "Design of A Force-Feedback Touch-Introducing Actuator For Teleoperator Robot Control," Bachelor of Science Thesis, MIT, June 23, 1983.	
	102	CALDWELL et al., " Enhanced Tactile Feedback (Tele-Taction) Using a Multi-Functional Sensory System," 1050-4729/93, pp. 955-960, 1993.	

Examiner Signature	/Regina Liang/	Date Considered	02/22/2012

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 5 of 7

Complete if Known	
Application Number	Unassigned
Filing Date	August 27, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Unassigned
Examiner Name	Unassigned
Attorney Docket Number	IMM174 (51851/279889)

OTHER DOCUMENTS			
Examiner Initials *	Cite No.[1]	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.	
	103	"Cyberman Technical Specification," Logitech Cyberman SWIFT Supplement, 4/5/1994.	
	104	EBERHARDT et al., "OMAR - A Haptic display for speech perception by deaf and deaf-blind individuals," IEEE Virtual Reality Annual International Symposium, Seattle, WA, Sep. 18-23, 1993.	
	105	EBERHARDT et al., "Including Dynamic Haptic Perception by The Hand: System Description and Some Results," DSC-Vol. 55-1, Dynamic Systems and Control: Volume 1, ASME, 1994.	
	106	FOKUMOTO, "Active Click: Tactile Feedback For Touch Panels," ACM CHI2001 Extended Abstracts, pp. 121-122, April 2001.	
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	112	JACOBSEN et al., "High Performance, Dextrous Telerobotic Manipulator With Force Reflection," Intervention/ROV '91 Conference & Exposition, Hollywood, Florida, May 21-23, 1991.	
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Examiner Signature	/Regina Liang/	Date Considered	02/22/2012

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 6 of 7

Complete if Known	
Application Number	Unassigned
Filing Date	August 27, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Unassigned
Examiner Name	Unassigned
Attorney Docket Number	IMM174 (51851/279889)

OTHER DOCUMENTS

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	117	KONTARINIS et al., "Tactile Display of Vibratory Information in Teleoperation and Virtual Environments," PRESENCE, 4(4):387-402, 1995.	
	118	LAKE, "Cyberman from Logitech," GameBytes, 1994.	
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	129	RUSSO, "The Design and Implementation of a Three Degree of Freedom Force Output Joystick," MIT Libraries Archives 08/14/1990, pp. 1-131, May 1990.	
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Examiner Signature	/Regina Liang/	Date Considered	02/22/2012

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 7 of 7

Complete if Known	
Application Number	Unassigned
Filing Date	August 27, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Unassigned
Examiner Name	Unassigned
Attorney Docket Number	IMM174 (51851/279889)

OTHER DOCUMENTS

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	131	Safe Flight Instruments Corporation, "Coaxial Control Shaker," Part No. C-25502, 1 July 1967.	
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	137	STANLEY et al., " Computer Simulation of Interacting Dynamic Mechanical Systems Using Distributed Memory Parallel Processors," DSC-Vol. 42, Advances in Robotics, pp. 55-61, ASME 1992.	
	138	TADROS, " Control System Design for a Three Degree of Freedom Virtual Environment Simulator Using Motor/Brake Pair Actuators", MIT Archive © Massachusetts Institute of Technology, pp. 1-88, February 1990.	
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	140	WIKER, "Teletouch Display Development: Phase 1 Report," Technical Report 1230, Naval Ocean Systems Center, San Diego, April 17, 1989.	
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Examiner Signature	/Regina Liang/	Date Considered	02/22/2012

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NOTICE OF ALLOWANCE AND FEE(S) DUE

34300 7590 12/28/2011

PATENT DEPARTMENT (51851)
KILPATRICK TOWNSEND & STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

EXAMINER	
LIANG, REGINA	
ART UNIT	PAPER NUMBER
2629	

DATE MAILED: 12/28/2011

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/723,778	11/26/2003	Henry DaCosta	IMM174	4196

TITLE OF INVENTION: SYSTEMS AND METHODS FOR ADAPTIVE INTERPRETATION OF INPUT FROM A TOUCH-SENSITIVE INPUT DEVICE

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1740	$300	$0	$2040	03/28/2012

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

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

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I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

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

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PTOL-85 (Rev. 02/11)

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PATENT DEPARTMENT (51851)
KILPATRICK TOWNSEND & STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

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(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/723,778	11/26/2003	Henry DaCosta	IMM174	4196

TITLE OF INVENTION: SYSTEMS AND METHODS FOR ADAPTIVE INTERPRETATION OF INPUT FROM A TOUCH-SENSITIVE INPUT DEVICE

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nonprovisional	NO	$1740	$300	$0	$2040	03/28/2012

EXAMINER	ART UNIT	CLASS-SUBCLASS
LIANG, REGINA	2629	345-173000

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

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

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

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3 _____

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

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

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

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

4a. The following fee(s) are submitted:

❑ Issue Fee

❑ Publication Fee (No small entity discount permitted)

❑ Advance Order - # of Copies _____

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

❑ A check is enclosed.

❑ Payment by credit card. Form PTO-2038 is attached.

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

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

❑ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.

❑ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/723,778	11/26/2003	Henry DaCosta	IMM174	4196

34300 7590 12/28/2011

PATENT DEPARTMENT (51851)
KILPATRICK TOWNSEND & STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

EXAMINER	
LIANG, REGINA	

ART UNIT	PAPER NUMBER
2629	

DATE MAILED: 12/28/2011

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

The Patent Term Adjustment to date is 1468 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 1468 day(s).

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

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

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

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

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

Notice of Allowability	Application No.	Applicant(s)	
	10/723,778	DACOSTA ET AL.	
	Examiner	Art Unit	
	REGINA LIANG	2629	

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

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

1. ☒ This communication is responsive to *BPAI Decision on 12/14/11*.

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

3. ☒ The allowed claim(s) is/are *1-5,7-13,16-19,21-23 and 26-32*.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

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

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

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

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

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☐ Examiner's Amendment/Comment
8. ☐ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

/REGINA LIANG/
Primary Examiner, Art Unit 2629

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	10723778	DACOSTA ET AL.
	Examiner	**Art Unit**
	REGINA LIANG	2629

ORIGINAL		INTERNATIONAL CLASSIFICATION									
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED				
345	173	G	0	9	G	5 / 00 (2006.01.01)					

CROSS REFERENCE(S)					
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
178	18.01				

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

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	10	17												
14	2	11	18												
15	3	18	19												
16	4		20												
17	5	19	21												
	6	20	22												
2	7	21	23												
3	8		24												
4	9		25												
5	10	22	26												
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7	12	24	28												
8	13	12	29												
	14	25	30												
	15	13	31												
9	16	26	32												

NONE (Assistant Examiner) (Date)	**Total Claims Allowed:** 26	
/REGINA LIANG/ Primary Examiner.Art Unit 2629 12/20/2011 (Primary Examiner) (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 2

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BIB DATA SHEET

CONFIRMATION NO. 4196

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
10/723,778	11/26/2003	345	2629	IMM174

APPLICANTS

Henry DaCosta, Montreal, CANADA;
Christophe Ramstein, San Francisco, CA;
Danny Grant, Montreal, CANADA;

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

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

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****
07/15/2004

Foreign Priority claimed ☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☑ No Verified and Acknowledged /REGINA LIANG/ Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		CANADA	4	28	2

ADDRESS

PATENT DEPARTMENT (51851)
KILPATRICK TOWNSEND & STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101
UNITED STATES

TITLE

Systems and methods for adaptive interpretation of input from a touch-sensitive input device

FILING FEE RECEIVED		
1044	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

Receipt date: 02/25/2011

PTO/SB/08a (01-10)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	10/723,778
Filing Date	November 26, 2003
First Named Inventor	DaCosta et al.
Art Unit	2629
Examiner Name	Liang, R
Attorney Docket Number	IMM174

U.S. PATENT DOCUMENTS

Examiner Initials *	Cite No.[1]	Document Number Number - Kind Code[2] *(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
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3] - Number[4] - Kind Code[5] *(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	T[6]
	1.	EP 0 536 715 A2	04-14-1993	Fujitsu Limited		

NON PATENT LITERATURE DOCUMENTS

Examiner Initials *	Cite No.[1]	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.	T[2]
	2.	European Patent Office, Communication, Application No. 10010754, dated November 8, 2010.	
	3.	European Patent Office, Communication Pursuant to Article 94(3) EPC, Application No. 04779422, dated November 9, 2010.	

Examiner Signature	/Regina Liang/	Date Considered	12/20/2011

*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. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours 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.

US2000 12015276.1

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /RL/

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	10723778	DACOSTA ET AL.
	Examiner	Art Unit
	Regina Liang	2629

SEARCHED			
Class	Subclass	Date	Examiner
update search		11/18/2006	x.w.
345	173-179	2/26/08	rl
178	18.01,18.03-18.09	2/16/08	rl
updated	above	12/20/2011	RL

SEARCH NOTES		
Search Notes	Date	Examiner
East, inventor name and interference searched	12/20/2011	RL

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner
	see East Search History printout	12/20/2011	RL

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1	"6660936".pn.	US-PGPUB; USPAT	OR	OFF	2011/12/20 19:01
L2	1	"6610936".pn.	US-PGPUB; USPAT	OR	OFF	2011/12/20 19:02
L3	15	"536715"	EPO; JPO; DERWENT	OR	OFF	2011/12/20 19:02
L4	10067	threshold with velocity	US-PGPUB; USPAT	OR	ON	2011/12/20 19:06
L5	2254	4 with (vari$4 or adjust$3 chang$3)	US-PGPUB; USPAT	OR	ON	2011/12/20 19:07
L6	22	5 and 345/173-179.ccls.	US-PGPUB; USPAT	OR	ON	2011/12/20 19:07
L7	3	5 and 178/18.01-18.09.ccls.	US-PGPUB; USPAT	OR	ON	2011/12/20 19:10
L14	72	dacosta-h$.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/12/20 19:20
L15	0	14 and velocity adj threshold	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/12/20 19:21
L16	4	14 and threshold	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2011/12/20 19:21

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L8	530	(velocity with threshold with (vari$4 adjust$3 chang$3)).clm.	US-PGPUB; USPAT; UPAD	OR	ON	2011/12/20 19:15
L9	2	(velocity with threshold with (vari$4 adjust$3 chang$3) and (touchpad touch adj pad)).clm.	US-PGPUB; USPAT; UPAD	OR	ON	2011/12/20 19:16
L10	29	(velocity with threshold with (vari$4 adjust$3 chang$3) and pressure and input).clm.	US-PGPUB; USPAT; UPAD	OR	ON	2011/12/20 19:16
L11	100	(velocity with threshold with (vari$4 adjust$3 chang$3) and pressure).clm.	US-PGPUB; USPAT; UPAD	OR	ON	2011/12/20 19:17
L12	22876	(velocity with threshold with (vari$4 adjust$3 chang$3) and pressure pseudo).clm.	US-PGPUB; USPAT; UPAD	OR	ON	2011/12/20 19:18
L13	0	(velocity with threshold with (vari$4 adjust$3 chang$3) and pressure and pseudo).clm.	US-PGPUB; USPAT; UPAD	OR	ON	2011/12/20 19:18

12/20/2011 7:21:46 PM
C:\Users\rliang\Documents\EAST\Workspaces\10723778.wsp

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/723,778	11/26/2003	Henry DaCosta	IMM174	4196

34300 7590 12/14/2011

PATENT DEPARTMENT (51851)
KILPATRICK TOWNSEND & STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

EXAMINER	
LIANG, REGINA	
ART UNIT	**PAPER NUMBER**
2629	

MAIL DATE	DELIVERY MODE
12/14/2011	PAPER

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.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte HENRY DACOSTA, CHRISTOPHE RAMSTEIN,
and DANNY GRANT

Appeal 2009-015440
Application 10/723,778
Technology Center 2600

Before ERIC S. FRAHM, KALYAN K. DESHPANDE, and JASON V. MORGAN, *Administrative Patent Judges*.

DESHPANDE, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF CASE[1]

The Appellants seek review under 35 U.S.C. § 134(a) of a final rejection of claims 1-5, 7-13, 16-20, 21-23, and 26-32, the only claims pending in the application on appeal. We have jurisdiction over the appeal pursuant to 35 U.S.C. § 6(b).

We REVERSE.

The Appellants invented the adaptive interpretation of input received from a touch-sensitive input device. Specification ¶ 0002.

An understanding of the invention can be derived from a reading of exemplary claim 1, which is reproduced below [bracketed matter and some paragraphing added]:

> 1. A method comprising:
> [1] receiving a pressure signal indicating a pressure from an input device;
> [2] determining a change in pressure based at least in part on the pressure signal;
> [3] determining a velocity associated with the pressure signal; and
> [4] outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed.

REFERENCES

The Examiner relies on the following prior art:

Gillespie	US 5,880,411	Mar. 9, 1999
Fujita	US 6,118,435	Sep. 12, 2000

[1] Our decision will make reference to the Appellants' Appeal Brief ("App. Br.," filed Apr. 23, 2009) and Reply Brief ("Reply Br.," filed Aug. 24, 2009), and the Examiner's Answer ("Ans.," mailed June 24, 2009), and Final Rejection ("Final Rej.," mailed Sep. 24, 2008).

Astala	US 6,590,568 B1	Jul. 8, 2003
Geaghan	US 2003/0063073 A1	Apr. 3, 2003

REJECTIONS[2]

Claims 1-5, 7-13, 16-19, 21-23, and 26-32 stand rejected under 35 U.S.C §112 first paragraph as failing to comply with the written description requirement.

Claims 1-3, 5, 7-13, 16, 17, 19, 21-23, 26, 27, and 29-32 stand rejected under 35 U.S.C §103(a) as being unpatentable over Gillespie and Astala.

Claim 4 stands rejected under 35 U.S.C §103(a) as being unpatentable over Gillespie, Astala, and Geaghan.

Claims 18 and 28 stand rejected under 35 U.S.C §103(a) as being unpatentable over Gillespie, Astala, and Fujita.

ISSUES

The issue of whether the Examiner erred in rejecting claims 1-5, 7-13, 16-20, 21-23, and 26-32 turns on whether the Appellants conveyed to a person with ordinary skill in the art that the Appellants were in possession of the claimed invention and whether the cited prior art describes limitation [4] of claim 1 and as recited in claim 19.

---

[2] We have decided the appeal before us. However, should there be further prosecution of these claims, the Examiner's attention is directed to recently issued guidance from the Director and our reviewing court, as follows below.

Specifically, should there be further prosecution with respect to claims 19-28, 30, and 32, the Examiner's attention is directed to *In re Nuijten*, 500 F.3d 1346 (Fed. Cir. 2007), and *Subject Matter Eligibility of Computer Readable Media*, 1351 Off. Gaz. Pat. Office 212 (Feb. 23, 2010).

ANALYSIS

Claims 1-5, 7-13, 16-19,21-23, and 26-32 rejected under 35 U.S.C §112 first paragraph as failing to comply with the written description requirement

The Examiner found that the Specification describes that a threshold value is a constant and therefore fails to support the feature "a change in pressure threshold" that is recited in independent claims 1 and 19. Ans. 4. The Appellants contend that the Examiner has misconstrued independent claims 1 and 19 in that these claims require that the change in pressure threshold is a constant value that the change in pressure is compared to. App. Br. 5 and Reply Br. 2.

We agree with the Appellants. The claims recite "the change in pressure is greater than a change in pressure threshold" and it is clear from this language that the change is pressure is measured against a constant threshold value. Although the claims recite a "change in pressure" threshold value, the label "change in pressure" does not change the fact that the threshold value is constant. Moreover, the Specification discloses that "the change in pseudo pressure is compared to a [change in pressure] threshold value 322." Specification ¶ 0046 and Fig.3. As such, we find that the Appellants have conveyed to those skilled in the art that the Appellants were in possession of the claimed invention.

Claims 1-3, 5, 7-13, 16, 17, 19, 21-23, 26, 27, and 29-32 rejected under 35 U.S.C §103(a) as being unpatentable over Gillespie and Astala

The Appellants contend that the combination of Gillespie and Astala fails to teach or suggest "outputting a press signal if the velocity is less than

a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed," as required by limitation [4] of claim 1 and as recited in claim 19. App. Br. 6-8 and Reply Br. 3-4. The Appellants specifically argue that Gillespie teaches or suggests comparing a pressure value against a pressure threshold, but fails to teach or suggest comparing a change in pressure (ΔP) to a change in pressure threshold (ΔP threshold). Reply Br. 3.

We agree with the Appellants. As discussed *supra*, limitation [4] of claim 1 requires a "change in pressure" value to be evaluated against a "change in pressure threshold" value. That is, the claims are not concerned with the actual pressure value, but require the *change in pressure* value to be compared to a threshold.

Gillespie teaches that as a finger pressure increases past a threshold, a virtual button is pressed. Gillespie 49:12-13. The Examiner found that this "increase" in pressure is the same as a change in pressure. Ans. 9. However, this description merely teaches comparing a pressure value against a threshold value. As argued by the Appellants, this is not the same as evaluating a change in pressure against a change in pressure threshold. While in some instances the pressure value and the change in pressure value may be the same (e.g. an increase in pressure from 0 to 5 results is a change in pressure of 5), these values are not synonymous and they do not always represent the same value (e.g., an increase in pressure from 1 to 5 results in a change in pressure of 4). As such, we agree with the Appellants that the Examiner has failed to establish a prima facie case of obviousness.

Claim 4 rejected under 35 U.S.C §103(a) as being unpatentable over Gillespie, Astala, and Geaghan

The Appellants contend that the cited prior art fails to teach or suggest claim 4 for the same reasons asserted in support of claim 1. App. Br. 8-9. We agree with the Appellants. The Appellants contentions in support of claim 1 are found to be persuasive *supra* and are persuasive here for the same reasons.

Claims 18 and 28 rejected under 35 U.S.C §103(a) as being unpatentable over Gillespie, Astala, and Fujita

The Appellants contend that the cited prior art fails to teach or suggest claim 4 for the same reasons asserted in support of claims 1 and 19. App. Br. 9-10. We agree with the Appellants. The Appellants contentions in support of claims 1 and 19 are found to be persuasive *supra* and are persuasive here for the same reasons.

CONCLUSIONS OF LAW

The Examiner erred in rejecting claims 1-5, 7-13, 16-19,21-23, and 26-32 under 35 U.S.C §112 first paragraph as failing to comply with the written description requirement.

The Examiner erred in rejecting claims 1-3, 5, 7-13, 16, 17, 19, 21-23, 26, 27, and 29-32 under 35 U.S.C. § 103(a) as unpatentable over Gillespie and Astala.

The Examiner erred in rejecting claim 4 under 35 U.S.C. § 103(a) as unpatentable over Gillespie, Astala, and Geaghan.

The Examiner erred in rejecting claims 18 and 28 under 35 U.S.C. § 103(a) as unpatentable over Gillespie, Astala, and Fujita.

DECISION

To summarize, our decision is as follows.

- The rejection of claims 1-5, 7-13, 16-19, 21-23, and 26-32 under 35 U.S.C §112 first paragraph as failing to comply with the written description requirement is not sustained.
- The rejection of claims 1-3, 5, 7-13, 16, 17, 19, 21-23, 26, 27, and 29-32 under 35 U.S.C. § 103(a) as unpatentable over Gillespie and Astala is not sustained.
- The rejection of claims 4 under 35 U.S.C. § 103(a) as unpatentable over Gillespie, Astala, and Geaghan is not sustained.
- The rejection of claims 18 and 28 under 35 U.S.C. § 103(a) as unpatentable over Gillespie, Astala, and Fujita is not sustained.

REVERSED

ELD

PTO/SB/08a (01-10)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 1 of 1

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Examiner Initials *	Cite No.[1]	Document Number Number - Kind Code[2] (*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
		US-			
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FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3] - Number[4] - Kind Code[5] (*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	T[6]
	1.	EP 0 536 715 A2	04-14-1993	Fujitsu Limited		

NON PATENT LITERATURE DOCUMENTS

Examiner Initials *	Cite No.[1]	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.	T[2]
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	3.	European Patent Office, Communication Pursuant to Article 94(3) EPC, Application No. 04779422, dated November 9, 2010.	

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. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

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(54) An apparatus for manipulating an object displayed on a display device.

(57) In an apparatus for manipulating an object displayed on a display devices (3),

a touch screen (11) which is sensitive at least to a position thereon at which a body touches, outputs touch screen information representing a motion of the body,

a plurality of data files store object data for displaying the object in different states,

a display information table (17) stores object information including an object type which specifies the shape and physical properties of the object, display position information which specifies a position where the object is displayed on the display device, file information which specifies the size and location of a part of the object data stored in one said plurality of data files, and a file name which specifies one of said plurality of data files, and

a display controller (52) recognizes a manipulation to be conducted on the object based on the touch screen information from the touch screen and on the object information included in the display information table, and displays the object on the display device in accordance with the recognition.

EP 0 536 715 A2

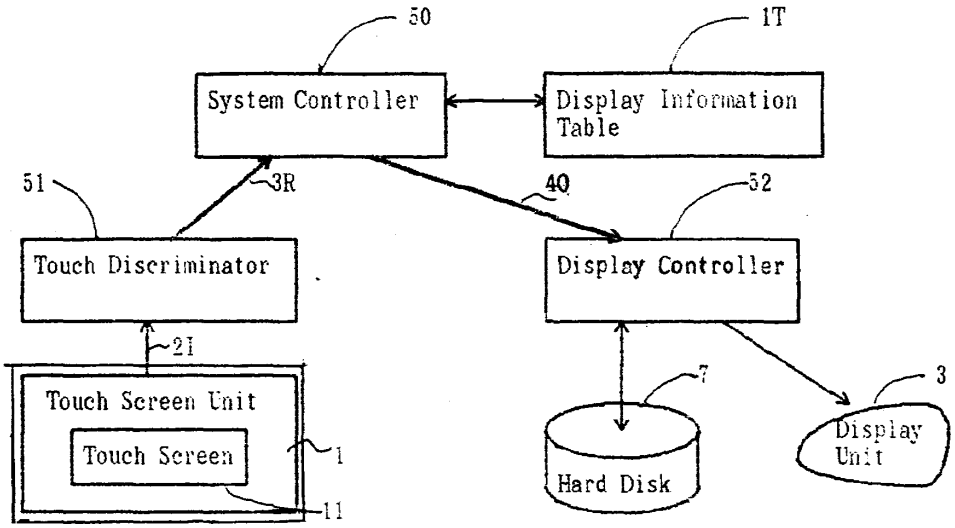

50
1T
System Controller
Display Information Table
51
3R
40
52
Touch Discriminator
Display Controller
2I
7
3
Touch Screen Unit
Touch Screen
1
Hard Disk
Display Unit
11

FIG. 3

The present invention relates to an apparatus for manipulating an object displayed on a display device.

As use of computer systems for data processing has become widespread in recent years, more and more users are being required to input data to and converse with data processors such as work stations and personal computers. A vast range of application programs are available for recent data processors and even a complicated application can be processed by using such application programs in combination. However, there is a problem that such data processors are very difficult to handle, especially to manipulate an object displayed on a display device, for those who have little knowledge of computers.

Therefore, an apparatus for manipulating an object displayed on a display device, which is easy to use even for a person who has no special knowledge of computers, is in great demand.

Fig. 1 illustrates a computer system with a conventional user interface.

A computer system with a conventional user interface consists mainly of a central processing unit (CPU) 4, a main memory 5, a keyboard/mouse 2, a frame memory 60 and a hard disk interface 71, which are interconnected via a system bus interface, and also a hard disk 7 and a display unit 3, which are connected to system bus interface via the hard disk interface and the frame memory 6, respectively. The main memory 5 stores a system control program and application programs which handle graphics processing, and provides a work area for use by the programs. The CPU 4 performs display operations under control of the programs. The hard disk 7 stores a data file for graphics to be displayed on the display unit 3. The frame memory 6 stores a frame of picture (or object) data to be displayed on the display unit 3.

To manipulate an object displayed on a display unit 3 in the above system, an operator is required to input a command for manipulating the object by using a keyboard/mouse 2 or to select an icon (a symbolic representation of a computer function) displayed on a display unit 3 by using the keyboard/mouse 2 in order to command a desired function. However, it is troublesome and annoying to use a keyboard/mouse and icons and a person with less knowledge of computers tends to be allergic to even touching a keyboard/mouse.

Therefore, it is a great problem that such data processors are very difficult to handle for those who have less knowledge of computers.

It is therefore desirable to provide an apparatus which can easily manipulate an object displayed on a display unit.

It is also desirable to provide a user interface with which a user can easily manipulate an object displayed on a display unit.

The present invention provides a touch-sensitive panel (e.g. touch screen), means storing a plurality of data files, display information storage means and display control means.

In the apparatus of the present invention, the touch panel, which may for example be provided on a display surface of the display device and is sensitive at least to a position thereon at which a body (e.g. finger) touches, outputs touch panel information representing motion of the body. The plurality of data files store object data for displaying the object in different states. The display information storage means stores object information including at least an object type which specifies the shape and physical properties of the object, display position information which specifies a position where the object is displayed on the display device, file information which specifies the size and location of a part of the object data stored in one of said plurality of data files, and a file name which specifies one of said plurality of data files. The display control means recognizes a manipulation to be conducted on the object based on the touch panel information from the touch panel and on the object information included in the display information storage means, and displays the object on the display device in accordance with the recognition.

Reference is made, by way of example, to the accompanying drawings, in which:-

Fig. 1 illustrates a computer system with a conventional user interface;

Fig. 2 is a configuration diagram of a touch-screen-equipped workstation, to which the present invention may be applied;

Fig. 3 is a schematic diagram illustrating the principle of the present invention;

Fig. 4(a) shows a display information table;

Fig. 4(b) shows touch screen information;

Fig. 5 is a flowchart illustrating a pick manipulation;

Fig. 6 is a diagram illustrating a pick manipulation;

Fig. 7 is a diagram illustrating a scroll manipulation;

Fig. 8 is a diagram illustrating a push manipulation;

Fig. 9 is a diagram illustrating a flip manipulation;

Fig. 10 is a diagram illustrating a roll manipulation; and

Fig. 11 is a diagram illustrating a distort-restore manipulation.

Throughout the above-mentioned drawings, identical reference numerals are used to designate the same or similar component parts.

Fig. 2 is a configuration diagram of a touch screen-equipped workstation for implementing the

EX1021 - 54

present invention.

In addition to the conventional system shown in Fig. 1, the system includes an input-output (abbreviated to I/O) port 8, a touch screen controller 15 and a touch screen unit 1 with a touch screen 11. The touch screen controller 15, connected to the input-output port 8 through an RS-232C interface, controls the touch screen unit 1. The touch screen unit 1, which is sensitive to a position or positions (X-Y co-ordinates) where it is touched, and preferably also to a pressure applied to it, acts as a user interface that allows a user to send signals to the CPU by touching an area thereon with a body, such as a finger or a pencil.

Fig. 3 is a schematic diagram illustrating the principle of the present invention.

For easy understanding of the principle, the input-output port 8, touch screen controller 15 and touch screen unit 1 shown in Fig. 2 are represented by the touch screen unit 1; and the frame memory 6 and display unit 3 are represented by the display unit 3. A the system controller 50, touch discriminator 51 display controller 52 and display information table 1T, which are stored in the main memory 50, control display operations featured by the present invention.

Fig. 4(a) shows a display information table. Fig. 4(b) shows touch screen information.

A display information table 1T, which is provided in the main memory 5, corresponding to objects, includes an object type, display position information, file information, normal-display file name and special-state file name. The object type defines the type including the shape, properties, circumstances, etc., of the object. The display position information defines the size of the object (width, height), and the position (top-left coordinates X,Y) and the angle at which the object is displayed on the display unit 1. The file information defines the size (width, height) the object data to be displayed occupies in the display data file, and also the position (top-left coordinates X,Y) where the object data to be displayed is stored in the display data file. The normal-display file name specifies a display data file where object data for displaying a normal state of the object is stored. The special-state file name specifies a display data file where object data for displaying a special state (e.g., turn-over indication of display color, used for displaying intermediate process of manipulating the object) of the object is stored.

Touch-screen information 2I, which is sent from the touch screen unit 1, includes a touch position (X-Y coordinates) where the touch screen 11 is touched and a pressure applied thereon.

Following embodiments of the present invention correspond, item for item, to the Claims recited later.

(1) The touch discriminator 51, based on the touch screen information 2I from the touch screen unit 1, discriminates the type of a touch an operator's finger has on the touch screen 11, that is, a touch type including, i.e., a "continuous touch start" and "continuous touch end" explained later. The touch discriminator 51 sends to the system controller 50, the result of the discrimination as a touch report 3R, which includes a touch type and touch coordinates.

Based on the touch report 3R from the touch discriminator 51 and the display information table 1T, the system controller 50 determines the type of a manipulation conducted by an operator and, according to the determination, updates the display information table 1T. Then, the system controller 50 sends to the display controller 52, a display update request 4Q along with "display update data" which includes contents of the display information table 1T updated (including display position information, file information arid file name).

On receipt of the display update request 4Q from the system controller 50, the display controller 52 reads a display data file (including object data) specified by the file name from the hard disk 7 and stores the data into the main memory 5. The display controller 52 then updates the object data in accordance with the display update data from the system controller 50 and loads the thus-updated object data into the frame memory 6 to display the object, as manipulated by the operator on the touch screen unit 1.

Thus, the present invention determines a manipulation to be conducted on the object displayed, based on the touch screen information 2I which results from an operator's touching the touch screen 11 and the display information table 1T which defines the object's shape, physical properties, display position, etc. It then displays the object according to the manipulation determined, as intended by the operator.

(2) Pick manipulation (see Figs. 5 and 6.)

A pick manipulation is conducted in such a way as an object is picked up at a position on the display surface of the display unit 3 and placed at another position.

Fig. 5 is a flowchart illustrating a pick manipulation. Fig. 6 is a diagram illustrating a pick manipulation.

A pick manipulation is carried out according to the following steps (S1-S8) in Fig. 5:

(S1) The system controller 50 receives a touch report 3R from the touch discriminator 51.

(S2) The system controller 50 checks the touch report 3R to see whether the object-

EX1021 - 55

finger relation is a pick manipulation as shown in Fig. 6(a), based on the touch report 3R and contents of the display information table 1T shown in Fig. 6(c). When the relation is not a pick manipulation, the system controller 50 checks the touch report 3R for other manipulation.

(S3) When the relation is a pick manipulation, the system controller 50 sends a display update request 4Q including "display update data", commanding that the special-state file (turn-over indication) be displayed at the position specified by the display information table 1T.

(S4) The system controller 50 receives a touch report 3R.

(S5) The system controller 50 determines whether the touch report 3R includes a "continuous touch end", which occurs when the finger-object relation is as in Fig. 6(b). When a "continuous touch end" is reported, the operation goes to step (S8).

(S6) Otherwise, the system controller 50 updates the display position information "coordinates (X, Y)" of the display information table 1T so that the object is positioned between the two fingers.

(S7) The system controller 50 sends display update request 4Q to the display controller 52, commanding that the special-state file be displayed according to the display information table 1T updated, and returns to step (S4).

(S8) When "continuous touch end" is reported by a touch report 3R, the system controller 50 sends a display update request 4Q to the display controller 52, commanding that the normal-display file be displayed at the position specified in the display information table 1T.

Following manipulations are carried out in the same way as described in the above flowchart of the pick manipulation.

(3) Scroll manipulation (see Fig. 7.)

A scroll manipulation is conducted in such a way as an object extending outside of the display surface of the display unit 3 is moved into and out of the display surface.

Fig. 7 is a diagram illustrating a scroll manipulation.

On determining that the finger moves while touching the touch screen 11 based on the touch screen information 2I from the touch screen unit 1, the discriminator 51 sends to the system controller 50, a touch report 3R including "continuous touch start" for the touch type and also "coordinates (800, 800)" for the touch position. As another touch screen information 2I comes in, the discriminator 51 sends a touch report 3R including "continuous touch in progress" and coordinates (780, 800). When the touch screen information 2I is not sent for more than 100 milliseconds, for example, the discriminator 51 sends a touch report 3R including "continuous touch end" and coordinates (700, 800) to the system controller 50.

when a "continuous touch start" is reported and the "object type" is defined as "out-screen" in the display information table 1T, the system controller 50 recognizes the object as a large one extending beyond the display screen. Then, the system controller 50 determines the speed at which the finger has moved from right to left, for example, based on a change in the X-coordinate in the touch report 3R.

Depending on whether the finger has moved at a speed of more (high-speed) or less (normal-speed) than for example 20 dots (pixels) e.g. since the last check, the display screen is scrolled first at an interval of 100 or 500 milliseconds, respectively. Then, the interval, at which the display update request 4Q is sent to the display controller 52, is increased by a factor 1.5 at each touch report 3R and, when the interval reaches 2 seconds, the scrolling is stopped.

Practically, the screen is so controlled that it starts scrolling at an above-mentioned speed after a finger has moved a distance of 4 dots or more. That is, on recognizing that the finger has moved for that distance, the system controller 50 updates the file information "display position X" of the display information table 1T so that the object is displayed to the left by 10 dots, for example. Then, it sends to the display controller 52, a display update request including display position information, file information and normal display file name from the display information table 1T updated.

The display controller 52 reads from the hard disk a display file specified by the normal display file name and loads it in the main memory 5. The display controller 52 then transfers only the part of the display file specified by the file information "display position X" of the display information table 1T, from the main memory 5 to the appropriate location of the frame memory 6.

In the same way, the system controller 50 sends a display update request 4Q to the display controller 52 every time it receives a touch report 3R .

When another "continuous touch" is reported before the scroll currently in progress comes to a stop, a new scroll can start from this point and at the first speed described above.

(4) Scroll-stop manipulation (see Fig. 7.)

Fig. 7 is a diagram illustrating a scroll manipulation.

When a touch position given by a touch report 3R is the same as or approximately 5 dots apart from the position of the scrolling currently in progress, the system controller 50 doubles the frequency with which display update requests 4Q are sent to the display controller 52, in order to put an end to the scrolling.

(5) Push manipulation (see Fig. 8.)

A push manipulation is conducted in such a way as an object is pushed on the display surface of the display unit 3.

Fig. 8 is a diagram illustrating a push manipulation.

The system controller 50 determines the type of a manipulation, based on the touch report 3R and contents of the display information table 1T shown in Fig. 8(c). When the manipulation is a push manipulation as shown in Fig. 8(a), the system controller 50 sends to the display controller 52, a display update request 4Q including display position information, file information and normal display file name so that the object is displayed close to the finger position reported by the touch report 3R. The above display operation is repeated until a "continuous touch end" is reported by a touch report 3R.

(6) Push-while-rotate manipulation (see Fig. 8.)

A push-while-rotate manipulation is conducted in such a way as an object is pushed at a position off its center (or the center of gravity) and it moves rotating on the display surface of the display unit 3.

Fig. 8 is a diagram illustrating a push manipulation.

The system controller 50 determines the type of a manipulation, based on the touch report 3R and contents of the display information table 1T shown in Fig. 8(c). When the manipulation is a push-while-rotate manipulation as shown in Fig. 8(b), the system controller 50 sends to the display controller 52, display update requests 4Q with the angle of rotation increasing by 2 degrees, i.e., while increasing the angle in the display information table 1T shown in Fig. 8(c).

The display controller 52 reads the display file from the hard disk and loads the data in the main memory 5, rotates the object by the angle and with the left-top coordinates (X, Y) as a rotational center, as specified by the display update request 4Q, and transfers the data with the object rotated, from the main memory 5 to the frame memory 6.

(7) Flip manipulation (see Fig. 9.)

A flip manipulation is conducted in such a way as a finger flips an object or touches the object from a remote position at a high speed on the display surface of the display unit 3.

Fig. 9 is a diagram illustrating a flip manipulation.

When a touch report 3R is input from the touch discriminator 51, the system controller 50 descriminates the type of a manipulation based on the touch report 3R and contents of the display information table 1T shown in Fig. 9 (c). When the manipulation is a flip manipulation as shown in Fig. 9 (a), the system controller 50 obtains a finger speed based on the touch report 3R and also an object speed (i.e., the interval at which display update requests 4Q are sent to the display controller 52), in the same way as described in item (3). The system controller 50 sends display update requests 4Q to the display controller 52, while updating the display position information left-top coordinates (X, Y) of the display information table 1T so that the object moves in the direction the finger moves. The system controller 50 stops moving the object when the above-mentioned interval reaches 2 seconds.

(8) Flip-under-gravity manipulation (see Fig. 9.)

A flip-under-gravity manipulation is conducted in such a way as an object which is subjected to a gravity is flipped by a finger on the display surface of the display unit 3.

Fig. 9 is a diagram illustrating a flip manipulation.

When the finger manipulation is a flip as in the above item (8) and the display information table 1T defines the object type as "gravity" meaning that the object is subjected to gravity, for example, the object moves under the combined influences of inertia and simulated gravity, i.e. "falls" as shown in Fig. 9(b). Therefore, the system controller 50 sends display update requests 4Q to the display controller 52, while updating the display position information left-top coordinates (X, Y) by adding a value to the Y-coordinate of of the display information table 1T. The value is represented by 2 to the Nth power (N: the number of display-update requests 4Q sent). In this case, too, the system controller 50 stops moving the object when the above-mentioned interval reaches 2 seconds. The resulting trajectory may be a parabola.

(9) Roll manipulation (see Fig. 10.)

A roll manipulation is conducted in such a way as a rollable object is rolled by a finger on the display surface of the display unit 3.

Fig. 10 is a diagram illustrating a roll manipulation.

When a touch report 3R is input from the touch discriminator 51 and the display informa-

EX1021 - 57

tion table 1T defines the object type as "rollable" meaning that the object is constructed such that it rolls when flipped like a globe or a cylinder, as shown in Fig. 10(a), the system controller 50 sends display update requests 4Q to the display controller 52, while updating the display position information left-top coordinates (X, Y) of the display information table 1T so that the object moves a distance 10 per cent behind the distance and in the direction the finger moves.

(10) Distort-restore manipulation (see Fig. 11.)

A distort-restore manipulation is conducted in such a way as an"elastic"object is pressed by a finger on the display surface of the display unit 3, thereby deforming the displayed object.

Fig. 11 is a diagram illustrating a distort-restore manipulation.

When a touch report 3R is input from the touch discriminator 51 and the display information table 1T defines the object type as "elastic" meaning that the object can be distorted and restored according to a pressure applied thereon by a finger, as shown in Fig. 11(a), the system controller 50 calculates an amount of distortion of the object based on the pressure reported by the touch report 3R. It stores in the display information table 1T, a special-state file name specifying one of special-state files (for displaying a distorted state of the object in turnover indication) corresponding to the amount of distortion calculated. Then, the system controller 50 sends a display update request 4Q to the display controller 52, commanding that the special-state file be displayed at the current display position. When the above operation is repeated as necessary and a "continuous touch end" is reported by a touch report 3R, the system controller 50 sends a display update request 4Q (with a normal display file name specified) to the display controller 52, commanding that a normal display file (normal indication) be displayed at the current display position. A plurality of special-state files are provided in the hard disk 7, corresponding to the amount of distortion of the object, which results from a pressure applied on the touch screen 11.

As is apparent by the above description, the present invention regards a display screen as a virtual space. It defines conditions and physical properties of an object (e.g., weight, hardness, frictional resistance, center of gravity) in the display information table 1T. It also receives touch screen information 2I indicating a finger-touched position and pressure is input from a touch screen unit 1. Based on the touch screen information 2I and the display information table 1T, the present invention determines a manipulation to be conducted on the object displayed, e.g. scrolling, picking (up), pushing, rolling, distorting the object on the display surface of the display unit 3. Thus, the present invention allows a user to manipulate an object displayed on a display device quite easily, even when the user has little knowledge of computers.

The above description refers to a touch screen on the face of a display device, and this is the most preferable arrangement from the viewpoint of ease of use. However, the present invention is not limited to a touch screen, since it can also be applied using a touch panel quite separate from the display device, e.g. a graphics tablet. In this case, a finger or other body touching the panel may be represented by a symbol on the display device, so as to allow manipulation of objects on the display simply by observing the display.

Claims

1. An apparatus for manipulating an object displayed on a display device, comprising:-

   a touch panel, representing an area of a display surface of the display device and sensitive at least to a position on the panel at which a body touches, for outputting touch panel information representing motion of the body;

   means for storing a plurality of data files which store object data for displaying the object in different states;

   display information storage means for storing object information including at least:-

   an object type which specifies the shape and physical properties of the object,

   display position information which specifies a position where the object is displayed on the display device,

   file information which specifies the size and location of a part of the object data stored in one of said plurality of data files, and

   a file name which specifies one of said plurality of data files; and

   display control means, responsive to the touch panel information and to the object information included in said display information storage means, for recognizing a manipulation to be conducted on the object and for displaying the object on the display device in accordance with the recognition.

2. An apparatus according to claim 1, wherein the touch panel is a touch screen which is provided on the display surface of the display device.

3. An apparatus according to claim 2, wherein in response to touch panel information indicating

EX1021 - 58

that two bodies touch both sides of the object, move and stop with a distance in between, said display control means is operable to recognize a pick manipulation and to display the object on the display device so that the object moves on the display surface of the display device from where the two bodies touch both sides of the object to where the two bodies stop with a distance in between.

4. An apparatus according to claim 2 or 3, wherein in response to the touch panel information indicating that a body touches the object and moves on said touch panel while keeping in contact with the object, and in response to object information specifying the object type as "out-of-screen" in said display information storage means, which means that the object is a large one extending beyond the display screen, said display control means recognizes a scroll manipulation and displays the object on the display device so that the object scrolls on the display surface of the display device.

5. An apparatus according to claim 4, wherein in response to touch panel information from said touch panel indicating that the moving body stops, said display control means recognizes a scroll-stop manipulation and displays the object on the display device so that the scrolling object stops on the display surface of the display device.

6. An apparatus according to any of claims 2 to 5, wherein in response to touch panel information indicating that a body touches the object at its center or center of gravity, moves and stops on said touch panel while keeping in contact with the object, said display control means recognizes a push manipulation and displays the object on the display device so that the object moves on the display surface from where the body touches the object to where the body stops.

7. An apparatus according to any of claims 2 to 6, wherein in response to touch panel information indicating that a body touches the object at a position off the center or the center of gravity thereof, moves and stops on said touch panel while keeping in contact with the object, said display control means recognizes a push-while-rotate manipulation and displays the object on the display device so that the object moves while rotating on the display surface from where the body touches the object to where the body stops.

8. An apparatus according to any of claims 2 to 7, wherein in response to touch panel information from said touch panel indicating that a body touches the object from a position apart therefrom at a speed higher than a predetermined speed, said display control means recognizes a flip manipulation and displays the object on the display device so that the object moves a distance proportional to the speed with which the body touches the object and in the direction toward which the body touches the object.

9. An apparatus according to any of claims 2 to 8, wherein in response to touch panel information from said touch panel indicating that a body touches the object from a position apart therefrom at a speed higher than a predetermined speed, and in response to object information specifying the object type as "gravity" in said display information storage means, which means that the object is subject to gravity, said display control means recognizes a flip-under-gravity manipulation band displays the object on the display device so that the object moves a distance proportional to the speed with which the body touches the object and along a trajectory like that which the object would describe if it were a physical object moving under the force of gravity.

10. An apparatus according to any of claims 2 to 9, wherein in response to touch panel information indicating that a body touches the object, moves and stops on said touch panel while keeping in contact with the object, and in response to object information specifying the object type as "rollable" in said display information storage means, said display control means recognizes a roll manipulation and displays the object on the display device so that the object moves with positional relations between the object and the body varying from those at the beginning as the body moves.

11. An apparatus according to any of claims 2 to 10, wherein said touch panel is sensitive to an amount of pressure applied thereon, and wherein in response to touch panel information indicating that a body touches the object with an amount of pressure, and in response to object information specifying the object type as "elastic" in said display information storage means, said display control means recognizes a distort-restore manipulation and displays the object on the display device so that the object varies in a degree of distortion and/or restoration according to the amount of pressure ap-

plied.

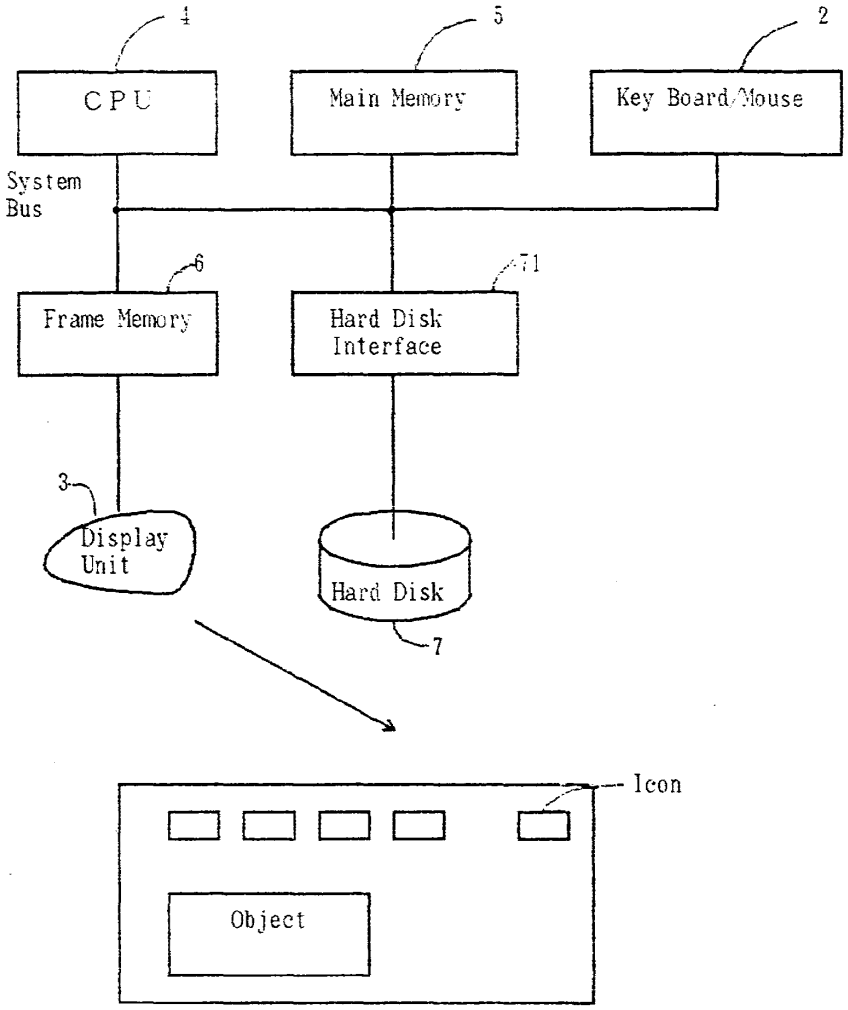

4
5
2
CPU
Main Memory
Key Board/Mouse
System
Bus
6
71
Frame Memory
Hard Disk
Interface
3
Display
Unit
Hard Disk
7
Icon
Object

FIG. 1

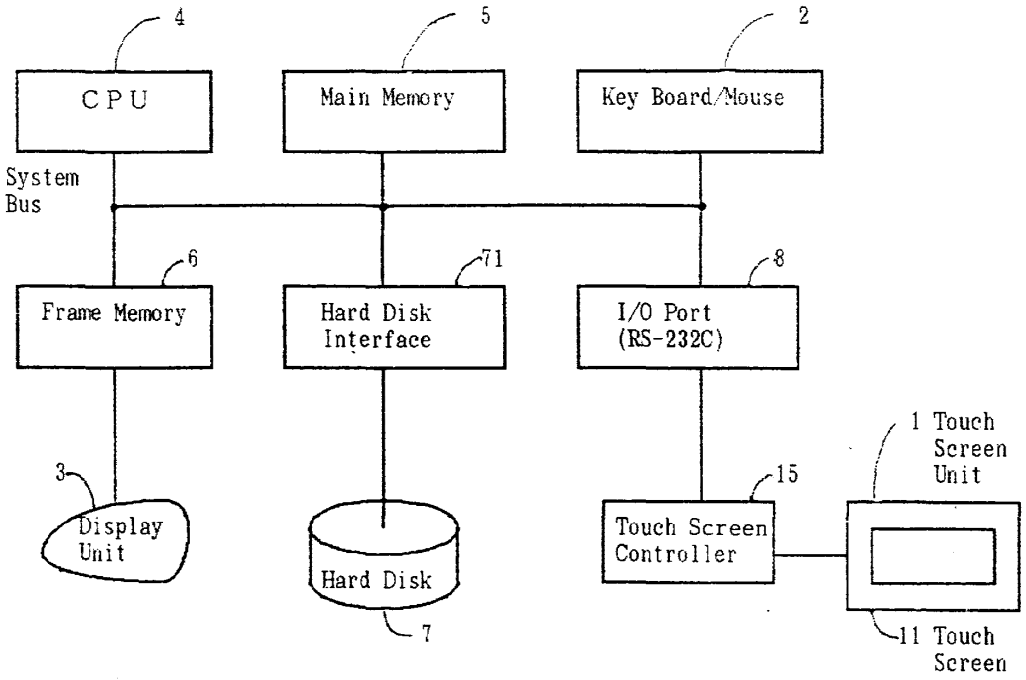

4
5
2
CPU
Main Memory
Key Board/Mouse
System
Bus
6
71
8
Frame Memory
Hard Disk
Interface
I/O Port
(RS-232C)
1 Touch
Screen
Unit
3
15
Display
Unit
Hard Disk
Touch Screen
Controller
7
11 Touch
Screen

FIG. 2

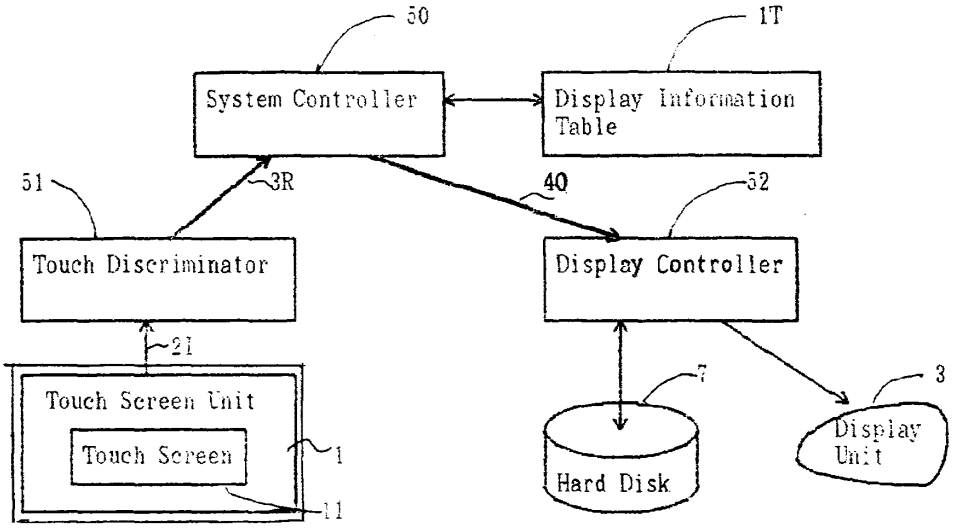

50
1T
System Controller
Display Information Table
51
3R
40
52
Touch Discriminator
Display Controller
21
Touch Screen Unit
Touch Screen
1
11
7
3
Hard Disk
Display Unit

FIG. 3

1T

Object type	Display position information					File information				Normal display file name	Special state file name
	Top-left coord		Size		Angle	Total size		Display position			
	X	Y	W	H		W	Y	X	Y		

FIG. 4 (a)

2T

		X-coord (4 bytes)	X-coord (4 bytes)	Pressure (4 bytes)

FIG. 4 (b)

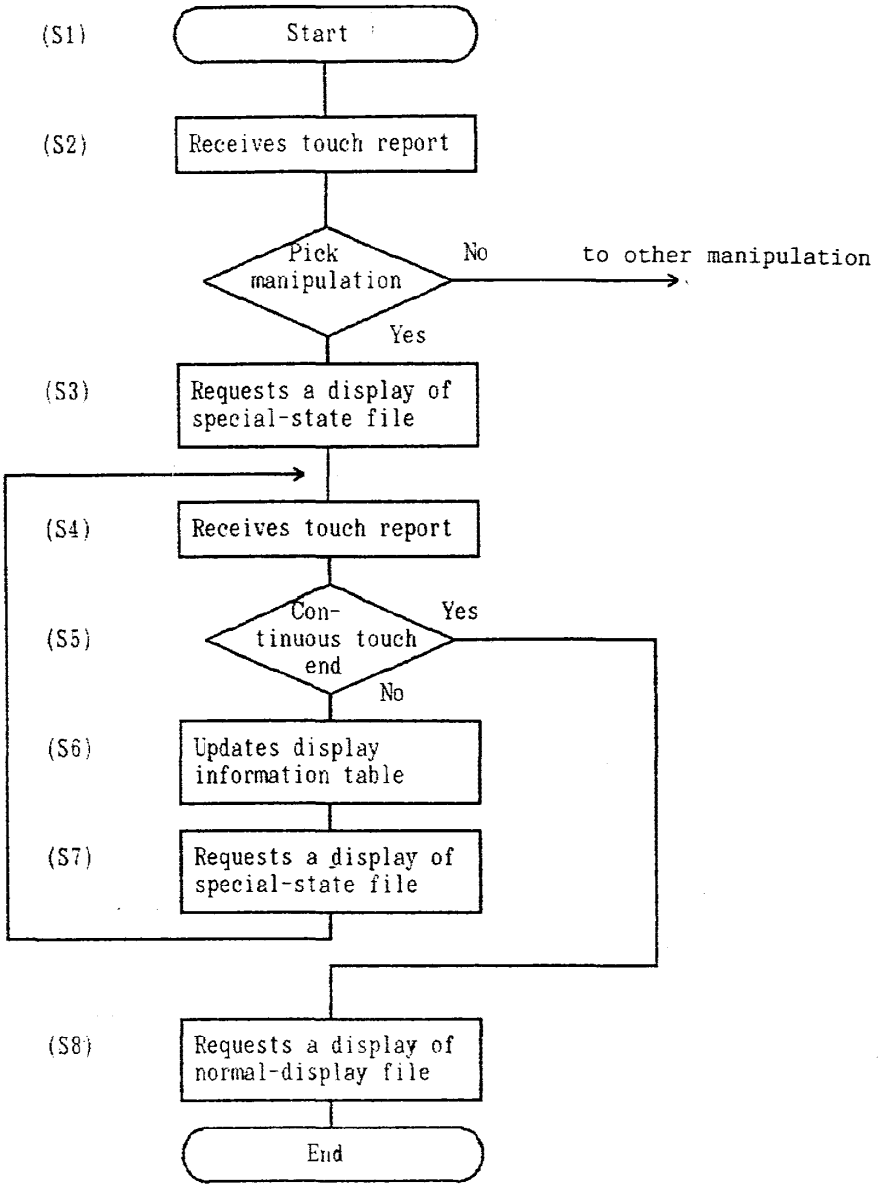

(S1)
Start
(S2)
Receives touch report
Pick manipulation
No
to other manipulation
Yes
(S3)
Requests a display of special-state file
(S4)
Receives touch report
(S5)
Con-tinuous touch end
Yes
No
(S6)
Updates display information table
(S7)
Requests a display of special-state file
(S8)
Requests a display of normal-display file
End

FIG. 5

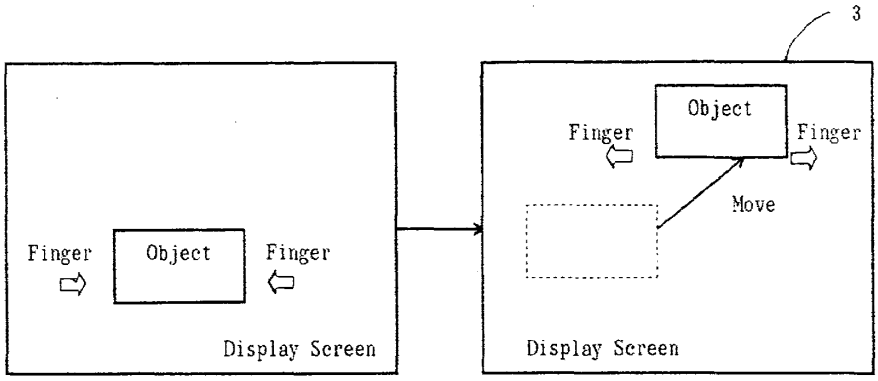


FIG. 6 (a) FIG. 6 (b)

1T

Object type	Display position information					File information				Normal display file name	Special state file name
	Top-left coord		Size		Ang	Total size		Display position			
	X	Y	W	H		W	Y	X	Y		
Normal	200	500	400	300	0	—	—	——	——	OBJ1	OBJ10

FIG. 6 (c)

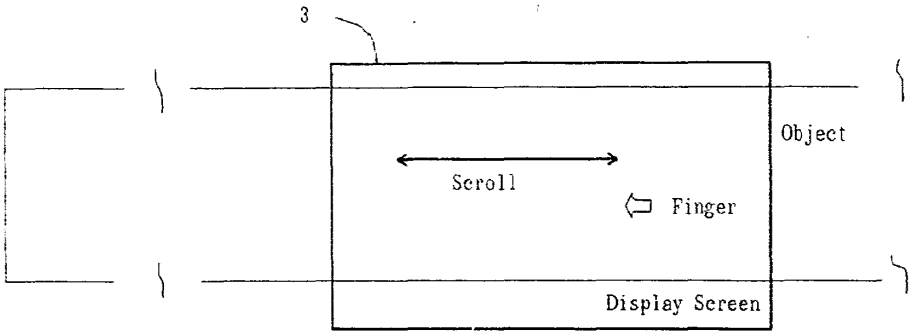


FIG. 7 (a)

1T

Object type	Display position information					File information				Normal display file name	Special state file name
	Top-left coord		Size		Ang	Total size		Display position			
	X	Y	W	H		W	Y	X	Y		
Out-Screen	0	100	1152	700	0	3000	700	1000	0	BIG	——

FIG. 7 (b)

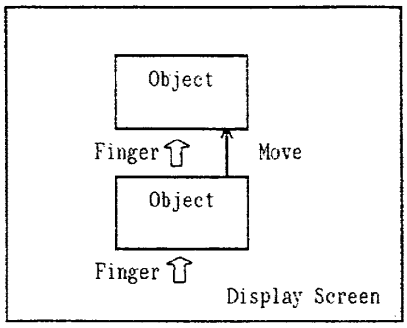


FIG. 8 (a)

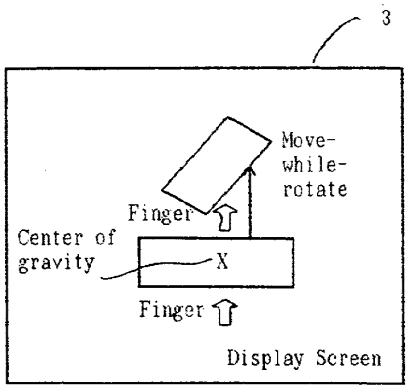


FIG. 8 (b)

1T

Object type	Display position information					File information				Normal display file name	Special state file name
	Top-left coord		Size		Ang	Total size		Display position			
	X	Y	W	H		W	Y	X	Y		
Normal	200	500	400	100	0	—	—	——	——	OBJ2	

FIG. 8 (c)

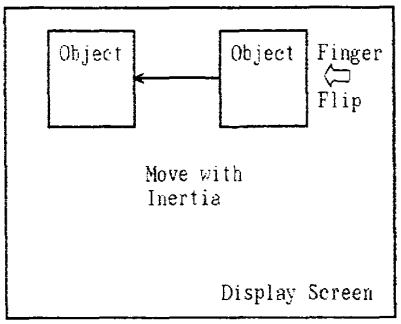


FIG. 9 (a)

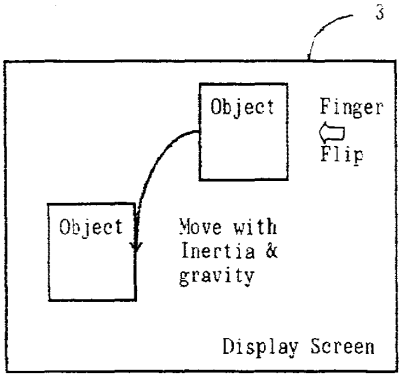


FIG. 9 (b)

1T

Object type	Display position information					File information				Normal display file name	Special state file name
	Top-left coord		Size		Ang	Total size		Display position			
	X	Y	W	H		W	Y	X	Y		
Normal	500	100	200	400	0	—	—	——	——	OBJ3	——

FIG. 9 (c)

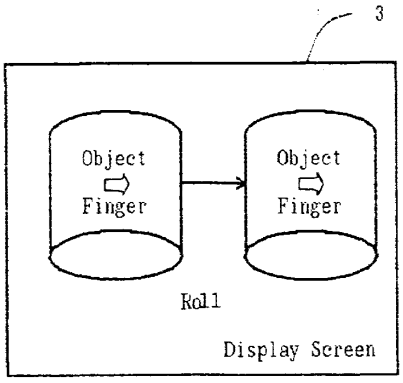


FIG. 10 (a)

1T

Object type	Display position information					File information				Normal display file name	Special state file name
	Top-left coord		Size		Ang	Total size		Display position			
	X	Y	W	H		W	Y	X	Y		
Roll-able	50	100	400	500	0	—	—	——	——	OBJ4	——

FIG. 10 (b)

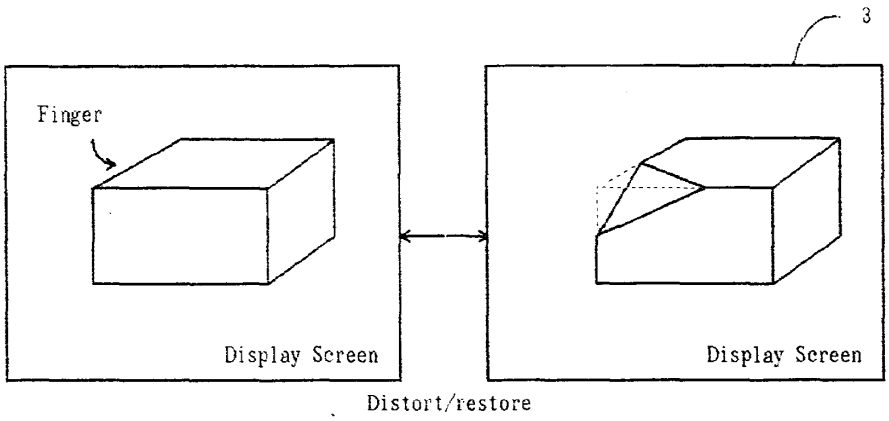


FIG. 11 (a)

1T

Object type	Display position information					File information				Normal display file name	Special state file name
	Top-left coord		Size		Ang	Total size		Display position			
	X	Y	W	H		W	Y	X	Y		
Elastic	200	200	400	400	0	—	—	—	—	OBJ5	OBJ50

FIG. 11 (b)

Electronic Patent Application Fee Transmittal

Application Number:	10723778
Filing Date:	26-Nov-2003
Title of Invention:	Systems and methods for adaptive interpretation of input from a touch-sensitive input device
First Named Inventor/Applicant Name:	Henry DaCosta
Filer:	Carl E. Sanders/Amber Johnson
Attorney Docket Number:	IMM174

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:	9534914
Application Number:	10723778
International Application Number:	
Confirmation Number:	4196
Title of Invention:	Systems and methods for adaptive interpretation of input from a touch-sensitive input device
First Named Inventor/Applicant Name:	Henry DaCosta
Customer Number:	34300
Filer:	Carl E. Sanders/Amber Johnson
Filer Authorized By:	Carl E. Sanders
Attorney Docket Number:	IMM174
Receipt Date:	25-FEB-2011
Filing Date:	26-NOV-2003
Time Stamp:	14:34:31
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$180
RAM confirmation Number	929
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Miscellaneous Incoming Letter	Transmittal.pdf	38640 fbd8e2ab2749948c354af07e5e52669a7458f3a6	no	1
Warnings:					
Information:					
2	Transmittal Letter	Cetification.pdf	201043 92b18d1ba7cd0ee99d520fd698405f7a33870415	no	5
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Filed (SB/08)	08a.pdf	87668 6b7fd04540568c567a1e71f4d9097e3c19c6b685	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
4	Foreign Reference	EP0536715A2.pdf	795016 491d6196cf2804ce75fbc2afae28ccd16c4cf87f	no	20
Warnings:					
Information:					
5	NPL Documents	Communication110810.pdf	309635 311bb139e6ee7d91e5bfd7d25017b45a112d978c	no	8
Warnings:					
Information:					
6	NPL Documents	Communication110910.pdf	286749 7f8e29aab34f5d4d8acc1ac6eb1f9acb9a19f31f	no	6
Warnings:					
Information:					
7	Fee Worksheet (PTO-875)	fee-info.pdf	29853 90ea7f28c667476fc51620fe20e75c302e39e68d	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	1748604	

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

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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

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

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of	:	Henry DaCosta et al.
Application No.	:	10/723,778
Filed	:	November 26, 2003
For	:	**SYSTEMS AND METHODS FOR ADAPTIVE INTERPRETATION OF INPUT FROM A TOUCH-SENSITIVE INPUT DEVICE**
Examiner	:	Regina Liang
Art Unit	:	2629
Conf. No.	:	4196

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

TRANSMITTAL

Sir:

Transmitted herewith is a copy of the following document(s) for filing in the above-identified application:

Information Disclosure Statement;
PTO/SB/08a listing 3 Documents;
One (1) Foreign Patent Document;
Two (2) Non-Patent Literature Documents.; and
EFS-Web Payment in the amount of $180 (IDS Fee).

The Commissioner is hereby authorized to charge any deficiency to Deposit Account Number 16-1435.

Respectfully submitted,

Date: February 25, 2011

By: _____
Carl E. Sanders (Reg. No. 57,203)

KILPATRICK TOWNSEND &
STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101
(336) 607-7300

Certificate of Electronic Filing

I hereby certify that this correspondence is being electronically filed with The United States Patent Office via EFS-Web, on Feb 25 2011.

_____
Amber C. Johnson

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Henry DeCosta et al.	)	
	)	Conf No.: 4196
Serial No. 10/723,778	)	
	)	Art Unit: 2629
Filed: November 26, 2003	)	
	)	Examiner: Regina Liang
For: **Systems and Methods for Adaptive Interpretation of Input from a Touch-Sensitive Input Device**	)	
Attorney Ref. IMM174		

INFORMATION DISCLOSURE STATEMENT

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

Sir:

Pursuant to 37 C.F.R. §§ 1.97 and 1.98, applicant(s) hereby submit(s) an Information Disclosure Statement for consideration by the Examiner.

I.. LIST OF PATENTS, PUBLICATIONS OR OTHER INFORMATION

The patents, publications, or other information submitted for consideration by the Office are listed on the PTO/SB/08 forms attached hereto.

II. COPIES (check at least one box)

,

a. ☐ This application was filed before June 30, 2003. Accordingly, submitted herewith is a legible copy of (i) each U.S. and foreign patent; (ii) each publication or that portion which caused it to be listed; and (iii) all other information or that portion which caused it to be listed.

b. ☒ This application was filed on or after June 30, 2003. Accordingly, copies of cited U.S. patents and patent application publications therefore are not included. Copies of foreign patent documents and non-patent literature are included.

c. ☐ Some or all of the documents listed on the PTO/SB/08 forms are not enclosed because they were cited in the International Search Report and copies should already be in the PTO file. If copies are needed, please contact the undersigned.

III. CONCISE EXPLANATION OF THE RELEVANCE
(check at least one box)

a. ☒ **DOCUMENTS IN THE ENGLISH LANGUAGE**
The patents, publications, or other information listed on the attached PTO/SB/08 forms are in the English language and therefore, do not require a statement of relevancy.

b. ☐ **DOCUMENTS NOT IN THE ENGLISH LANGUAGE**

A concise explanation of the relevance of all patents, publications, or other information listed that is not in the English language is as follows:

c. ☐ **ENGLISH LANGUAGE SEARCH REPORT**
An English language version of the search report or action that indicates the degree of relevance found by the foreign office is attached, thereby satisfying the requirement for a concise explanation. See MPEP 609(III)(A)(3).

d. ☐ **OTHER**
The following additional information is provided for the Examiner's consideration.

FEES

IV. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(b):
(check one box)

a. ☐ within three months of the filing date of a national application (37 C.F.R. § 1.97(b)(1)). No fee or statement is required. *(This section is not to be used with RCE's.)*

b. ☐ within three months of the date of entry of the national stage as set forth in § 1.491 in an international application (37 C.F.R. § 1.97(b)(2)). No fee or statement is required.

c. ☐ before the mailing of a first Office action after the filing of or concurrently with a Request for Continued Examination under § 1.114 (37 C.F.R. § 1.97(b)(4)). No fee or statement is required.

d. ☐ before the mailing date of a first Action on the merits (37 C.F.R. § 1.97(b)(3)). No fee or statement is required.

In the event that a first Office Action on the merits has been issued, please consider this IDS under 37 C.F.R. § 1.97(c) and see the statement under 37 C.F.R. § 1.97(e) below, or, if no statement has been made, charge our deposit account in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

V. ☒ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(c):
(check one box)

before the mailing date of a Final Office Action under 37 C.F.R. § 1.113 (See 37 C.F.R. § 1.97(c)(1)) or before the mailing date of a Notice of Allowance under 37 C.F.R. § 1.311 (See 37 C.F.R. § 1.97(c)(2)).

a. ☒ No statement; therefore, a fee in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

b. ☐ See the statement below. No fee is required.

VI. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(d)
after the period specified in 37 C.F.R. 1.97(c) but before payment of the issue fee; see statement and payment of fees below.

VII. STATEMENT UNDER 37 C.F.R. § 1.97(e) (check only one box)
The undersigned hereby states that

a. ☐ each item of information contained in the IDS was first cited in any communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS;

b. ☐ no item of information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of IDS was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of the IDS.

c. ☐ Some of the items of information were cited in a communication from a foreign Patent Office. As to this information, the undersigned states that each item of information contained in the IDS was first cited in a communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS. As to the remaining information, the undersigned hereby states that no item of this remaining information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application and, to the best of my knowledge after making reasonable inquiry, was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this statement.

VIII. ☐ PATENT TERM ADJUSTMENT

Each item of information contained in this Information Disclosure Statement was first cited in a communication from a foreign patent office in a counterpart application and this communication was not received by any individual designated in § 1.56(c) more than thirty days prior to the filing of this Information Disclosure Statement. 37 C.F.R. § 1.704(d).

IX. PAYMENT OF FEES (check one box)

☐ Payment by credit card Form PTO-2038 in the amount of $180 required by 37 C.F.R. § 1.17(p) is enclosed for the above-identified fee.

☐ Please charge Deposit Account No. 11-0855 in the amount required by 37 C.F.R. § 1.17(p) for the above-indicated fee. A triplicate copy of this paper is attached.

☐ No fee is required.

If the Examiner has any questions concerning this IDS, he/she is requested to contact the undersigned. If it is determined that this IDS has been filed under the wrong rule, the PTO is requested to consider this IDS under the proper rule and charge the appropriate fee to Deposit Account No. 11-0855.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 11-0855 for any additional fees required under 37 C.F.R. § 1.16 or under § 1.17.

Respectfully submitted,

Date: February 25, 2011

By: _____
Carl Sanders (Reg. No. 57203)

Attachment(s):

- ☒ PTO/SB/08
- ☒ Documents
- ☒ Fee
- ☐ Other

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/723,778	11/26/2003	Henry DaCosta	IMM174	4196

34300 7590 10/01/2009

PATENT DEPARTMENT (51851)
KILPATRICK STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

EXAMINER	
LIANG, REGINA	
ART UNIT	**PAPER NUMBER**
2629	

MAIL DATE	DELIVERY MODE
10/01/2009	PAPER

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.

United States Patent and Trademark Office

Under Secretary of Commerce for Intellectual Property and
Director of the United States Patent and Trademark Office
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

PATENT DEPARTMENT (51851)
KILPATRICK STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

Appeal No: 2009-015440
Application: 10/723,778
Appellant: Henry DaCosta et al.

Board of Patent Appeals and Interferences
Docketing Notice

Application 10/723,778 was received from the Technology Center at the Board on September 22, 2009 and has been assigned Appeal No: 2009-015440.

A review of the file indicates that the following documents have been filed by appellant:

Appeal Brief filed on:	April 23, 2009
Reply Brief filed on:	August 24, 2009
Request for Hearing filed on:	NONE

In all future communications regarding this appeal, please include both the application number and the appeal number.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/723,778	11/26/2003	Henry DaCosta	IMM174	4196

34300 7590 09/18/2009

PATENT DEPARTMENT (51851)
KILPATRICK STOCKTON LLP
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EXAMINER	
LIANG, REGINA	
ART UNIT	**PAPER NUMBER**
2629	

MAIL DATE	DELIVERY MODE
09/18/2009	PAPER

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APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR / PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
10723778	11/26/03	DACOSTA ET AL.	IMM174

PATENT DEPARTMENT (51851)
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EXAMINER
Regina Liang

ART UNIT	PAPER
2629	20090915

DATE MAILED:

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Commissioner for Patents

1. The reply brief filed 8/24/09 has been entered and considered. The application has been forwarded to the Board of Patent Appeals and Interferences for decision on the appeal.

/Regina Liang/
Primary Examiner, Art Unit 2629

PTO-90C (Rev.04-03)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Henry DaCosta
Application No.	:	10/723,778
For	:	**Systems and Methods for Adaptive Interpretation of Input from a Touch-Sensitive Input Device**
Filed	:	November 26, 2003
Examiner	:	Regina Liang
Art Unit	:	2629

Mail Stop Appeal Brief – Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REPLY BRIEF

Sir:

This is a Reply Brief filed under 37 C.F.R. § 41.41 in response to the Examiner's Answer mailed August 16, 2007. The Reply Brief is in connection with the final rejection of claims 1-5, 7-13, 16-19, 21-23, and 26-32 in the Final Office Action mailed September 24, 2008.

In the present Reply Brief, Appellant addresses a portion of the issues raised in the Examiner's Answer. Appellant's failure to address an issue in this Reply Brief should not be taken as an indication that Appellant agrees with the Examiner. The Board should instead consider Appellant's arguments in the record as a whole.

Status of the Claims

Claims 1-5, 7-13, 16-19, 21-23, and 26-32 are pending and are the substance of this appeal. Claims 6, 20, 24, and 25 were cancelled during prosecution. Applicant inadvertently included claim 20 in the listing of claims on appeal in the Appeal Brief.

Argument

Issue 1: Whether the Examiner erred in rejecting claims 1-5, 7-13, 16-19, 21-23, and 26-32 under 35 U.S.C. § 112, ¶ 1.

Claims 1-5, 7-13, 16-19, 21-23, and 26-32 satisfy 35 U.S.C. § 112, ¶ 1 because the specification discloses a "change in pressure threshold" as recited in claims 1 and 19.

Section 112, ¶ 1 requires, in relevant part, that the specification "contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same."

In the Examiner's Answer, the Examiner has stated that the claim term "change in pressure threshold" refers to a threshold that is changing.[1] While the specification describes adaptive thresholds and thus contemplates that threshold values may change, the claim term in question relates to a threshold for a change in pressure, i.e. a ΔZ threshold, not a changing threshold value for pressure as asserted by the Examiner. As noted in Applicant's appeal brief, a threshold against which a change in pressure is compared, i.e. a ΔZ threshold, is disclosed in the Figures and the specification. For example, the claimed "change in pressure is greater than a change in pressure threshold" is shown in Figure 2 where "$\Delta Z >$ threshold" is shown in step 222. Such a step is also shown in Figure 3, which includes step 322, which also shows "$\Delta Z >$ threshold." While the term "change in pressure threshold" is not used in the Figure, it is plain that "ΔZ" (i.e. a change in pressure) is being compared against a threshold value for a change in pressure. Further, the corresponding description for Figure 3 states that "[i]f the change in pseudo pressure is greater than the threshold, the processor (106) determines whether the first interval has elapsed 324. If so, the processor (106) concludes that the user is pressing 326 and the processor (106) returns to step 302 in the process." Thus, the specification plainly discloses that a press signal may be generated when, among other conditions, $\Delta Z > \Delta Z$ threshold, i.e. a change in pressure is greater than a change in pressure threshold. Therefore, each of claims 1-5, 7-13, 16-19, 21-23, and 26-32 are supported by sufficient written description and satisfy 35 U.S.C. § 112, ¶ 1.

[1] See Examiner's Answer, p. 8.

Applicant respectfully requests that the Board reverse the Examiner's rejection of claims 1-5, 7-13, 16-19, 21-23, and 26-32.

Issue 2: Whether the Examiner erred in rejecting claims 1-3, 5, 7-13, 16, 17, 19, 21-23, 26, 27, and 29-32 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Gillespie in view of Astala.

Claims 1-3, 5, 7-13, 16, 17, 19, 21-23, 26, 27, and 29-32 are patentable over Gillespie in view of Astala because Gillespie in view of Astala does not disclose "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed."

To reject a claim under 35 U.S.C. § 103(a) the scope and content of the references must be ascertained, the differences between the references and the claimed invention, and the level of ordinary skill in the pertinent art must be resolved. See Graham v. John Deere Co., 383 U.S. 1, 17 (1966); *See also* KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398 (2007).

Each of claims 1 and 19 recite "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed." The focus of the rejection under § 103(a) is the portion of claims 1 and 19 that recite "the change in pressure is greater than a change in pressure threshold."

In her Answer, the Examiner maintains her assertion that Gillespie discloses "the change in pressure is greater than a change in pressure threshold" because Gillespie recites "the finger pressure **increases** past threshold ZpushDown, causing the virtual button to be pressed." (emphasis in Examiner's Answer).[2] However, contrary to the Examiner's assertion, this portion of Gillespie simply describes comparing a pressure value against a pressure threshold in an iterative fashion over time: i.e. while the exerted pressure is below the ZpushDown threshold, a press is not detected; however, once the pressure is high enough (i.e. the pressure is greater than the pressure threshold, ZpushDown), a press is detected. This does not disclose a change in pressure value (i.e. a ΔZ value), nor does it disclose comparing a ΔZ against a ΔZ threshold (i.e. a change in pressure against a change in pressure threshold). Therefore, Gillespie does not disclose "the change in pressure is greater than a change in pressure threshold" as recited in

[2] See Examiner's Answer, p. 9.

claims 1 and 19. Further, the Examiner apparently does not dispute that Astala does not disclose such a feature. Therefore, claims 1 and 19 are patentable over Gillespie in view of Astala.

Applicant respectfully requests the Board reverse the Examiner's the rejection of claims 1 and 19. Because claims 2-3, 5, 7-13, 16, 17, 21-23, 26, 27, and 29-32 each depend from and further limit either claim 1 or claim 19, claims 2-3, 5, 7-13, 16, 17, 21-23, 26, 27, and 29-32 are each patentable over Gillespie in view of Astala for at least the same reasons. Applicant respectfully requests the Board reverse the Examiner's rejection of claims 2-3, 5, 7-13, 16, 17, 21-23, 26, 27, and 29-32.

Respectfully submitted,

Date: August 24, 2009

Carl Sanders
Reg. No. 57,203

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Electronic Acknowledgement Receipt

EFS ID:	5936946
Application Number:	10723778
International Application Number:	
Confirmation Number:	4196
Title of Invention:	Systems and methods for adaptive interpretation of input from a touch-sensitive input device
First Named Inventor/Applicant Name:	Henry DaCosta
Customer Number:	34300
Filer:	Carl E. Sanders/Laura Smith
Filer Authorized By:	Carl E. Sanders
Attorney Docket Number:	IMM174
Receipt Date:	24-AUG-2009
Filing Date:	26-NOV-2003
Time Stamp:	10:08:38
Application Type:	Utility under 35 USC 111(a)

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	Transmittal279589.pdf	35121 7de39bf8796e5dc3c3903f600d4ade08a12d6aa1	no	1

Warnings:	
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2	Reply Brief Filed	ReplyBrief279589.pdf	190403 105eae359c959360447b410ae3fda36c36acabd9	no	4

Warnings:	
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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
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of	:	Henry DaCosta et al.
Application No.	:	10/723,778
Filed	:	November 26, 2003
For	:	**SYSTEMS AND METHODS FOR ADAPTIVE INTERPRETATION OF INPUT FROM A TOUCH-SENSITIVE INPUT DEVICE**
Examiner	:	Regina Liang
Art Unit	:	2629
Conf. No.	:	4196

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TRANSMITTAL

Sir:

Transmitted herewith is a copy of the following document(s) for filing in the above-identified application:

Transmittal; and
Reply Brief

The Commissioner is hereby authorized to charge any deficiency to Deposit Account Number 16-1435.

Respectfully submitted,

Date: August 24, 2009

By: _____
Carl E. Sanders (Reg. No. 57,203)

KILPATRICK STOCKTON LLP
1001 West Fourth Street
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I hereby certify that this correspondence is being electronically filed with The United States Patent Office via EFS-Web, on August 24, 2009.

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US2000 11472757.1

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/723,778	11/26/2003	Henry DaCosta	IMM174	4196

34300 7590 07/31/2009

PATENT DEPARTMENT (51851)
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EXAMINER	
LIANG, REGINA	
ART UNIT	**PAPER NUMBER**
2629	

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APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR / PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
10723778	11/26/03	DACOSTA ET AL.	IMM174

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EXAMINER	
Regina Liang	
ART UNIT	**PAPER**
2629	20090730

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Commissioner for Patents

The status of claims as provided in the appeal brief is incorrect, claims 6 and 20 are canceled. A correct statement of claim status is as follows.

The statement of the status of claims contained in the brief is incorrect. A correct statement of the status of the claims is as follows: This appeal involves claims 1-5, 7-13, 16-19, 21-23, and 26-32.

/Regina Liang/
Primary Examiner, Art Unit 2629

PTO-90C (Rev.04-03)

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/723,778	11/26/2003	Henry DaCosta	IMM174	4196

34300 7590 06/24/2009

PATENT DEPARTMENT (51851)
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EXAMINER	
LIANG, REGINA	
ART UNIT	**PAPER NUMBER**
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06/24/2009	PAPER

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/723,778
Filing Date: November 26, 2003
Appellants: DACOSTA ET AL.

Carl Sanders
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 4/23/09 appealing from the Office action mailed 9/24/08.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is incorrect. A correct statement of the status of the claims is as follows:

This appeal involves claims 1-5, 7-13, 16-19, 21-23, and 26-32.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is substantially correct. The changes are as follows:

There are four grounds of rejection to be reviewed on appeal.

1. Claims 1-5, 7-13, 16-19, 21-23, and 26-32 stand rejected under 35 U.S.C. § 112,¶ 1 for allegedly failing to comply with the written description requirement.

2. Claims 1-3, 5, 7-13, 16, 17, 19, 21-23, 26, 27, and 29-32 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. 5,880,411 to Gillespie et al ("Gillespie") in view of U.S. Patent No. 6,590,568 to Astala et al ("Astala").

3. Claim 4 stands rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Gillespie in view of Astala and further in view of U.S. Patent Publication No. 2003/0063073 to Geaghan et al ("Geaghan").

4. Claims 18 and 28 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Gillespie in view of Astala and further in view of U.S. Patent No. 6,118,435 to Fujita et al ("Fujita").

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

5,880,411	Gillespie et al	03-1999
6,590,568	Astala et al	07-2003
6118435	Fujita et al	09-2000
20030063073	Geaghan et al	04-2003

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it

pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1-5, 7-13, 16-19, 21-23, 26-32 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The step 322 in Fig. 3 and the specification [0046] disclose "If the speed is less than the speed threshold, the change in pseudo pressure is compared to a threshold value 322. … If the change in pseudo pressure is greater than the threshold, the processor (106) determines whether the first interval has elapsed 324. If so, the processor (106) concludes that the user is pressing 326". The original specification discloses the change in pressure is greater than **a threshold value** where the threshold value is constant. Thus, the original specification does not provide support for "a change in pressure threshold" as claimed and as alleged by applicant in the remarks regarding claims 1 and 19.

In view of the above 112 1st problems, the claims are interpreted in light of the specification for examination purposes.

Claim Rejections - 35 USC § 103

3. Claims 1-3, 5, 7-13, 16, 17, 19, 21-23, 26, 27, 29-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gillespie et al (US 5,880,411 hereinafter Gillespie) in view of Astala et al (US 6,590,568 hereinafter Astala).

As to claims 1, 19, Gillespie discloses a method comprising: receiving a pressure signal (e.g. Z-value, Fig. 1) indicating a pressure from an input device (e.g. finger); determining a change in pressure based at least in part on the pressure signal (col. 23, lines 25-32, col. 24, lines 44-60 for example); determining a velocity associated with the pressure signal; and outputting a press signal if the velocity is less than the velocity threshold (col. 36, lines 26-47, which states" There are several ways to distinguish between a true drag and a press. **A true drag can be identified if the finger's speed of motion prior to lift-off is above a small threshold**. A press can be identified if the finger was stationary through the entire gesture, possibly ignoring small, inconsequential movements"; in other words, a press can be identified if the finger's speed of motion prior to lift-off is below a small threshold), and the change in pressure is greater than a change in pressure threshold (col. 35, lines 28-30, and col. 49, lines 8-12 for example).

Gillespie does not disclose outputting a press signal if a first interval has elapsed. However, Astala is cited to teach outputting a press signal if the value of pressure of touch input is greater than a pressure threshold and a first interval has elapsed (col. 9, lines 24-35). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gillespie to output the press signal if a first interval has elapsed as taught by Astala so as to "provide a touch screen technique for an electronic device in which the location and the time duration of an object, such as a finger or stylus or other pointed object, contacting or pressing a detection point on the touch screen, are detected" (col. 2, lines 21-23 of Astala) and to eliminate unintentional contact.

As to claims 31, 32, Gillespie discloses comparing the pressure signal to an adaptive

pressure threshold value, and outputting the press signal if the pressure signal is greater than the adaptive pressure threshold value (302, 320 in Fig. 17A).

As to claim 2, Gillespie also discloses an adaptive pressure threshold value (col. 23, lines 29-32), wherein the adaptive pressure threshold value (Z_{TH}) is associated with an absolute pressure threshold.

As to claim 3, Gillespie discloses adaptive pressure threshold value is associated with a position received from the input device (e.g. the Z-values is derived from the position signals X and Y).

As to claim 5, Gillespie discloses the adaptive pressure threshold value is associated with a user identifier (col. 23, lines 31-32).

As to claims 16 and 26, Gillespie discloses a first pressure signal and a second pressure signal, calculating a different signal indicative of a difference between the first and second pressure signal, comparing the difference signal to a difference threshold value and outputting the press signal if the difference signal is greater than the difference threshold value (col. 24, lines 20-60).

As to claim 7, Gillespie discloses the pressure signal comprises a pseudo pressure signal (e.g. the pressure value is varied in accordance with the capacitance value).

As to claim 8, Gillespie discloses supplying a pressure filter (48-1...48-n, Fig. 3) to the pressure signal to create a filtered pressure signal.

As to claims 9-11, 17, 21-22, 27, Gillespie discloses the pressure filter comprises a first pressure filter comprising a first attribute (e.g. high frequency, col. 13, lines 34-44), and further comprising applying a second pressure filter to the pressure signal, the second pressure filter

comprising a second attribute (e.g. low frequency, col. 15, line 55) that is different than the first attribute.

As to claims 12, 23, Gillespie discloses applying the pressure filter comprises applying the pressure filter utilizing a sliding window (col. 28, lines 47-58).

As to claim 13, Gillespie discloses the input device comprises a touch pad (10, Fig. 1).

As to claims 29, 30, Gillespie discloses determining a rate of change of pseudo-pressure associated with the pressure signal (determining the Z value applied by the user), comparing the rate of change of pseudo-pressure with a threshold (302, 320 in Fig. 17A) and outputting a pressing signal if the rate of change of pseudo-pressure is greater than the pseudo-threshold (Fig. 17A).

4. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gillespie and Astala as applied to claim 31, and further in view Geaghan et al (US 2003/0063073 hereinafter Geaghan).

As to claim 4, Gillespie as modified by Astala does not disclose the adaptive pressure threshold value can vary over time. However, Geaghan teaches the thresholds can be adjusted over time (lines 16-20 in [0040]). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gillespie as modified by Astala to adjust the adaptive pressure threshold value over time as taught by Geaghan to distinguish valid touch inputs on a continuously updated basis.

5. Claims 18 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gillespie and Astala as applied to claims 1 and 19, and further in view of Fujita et al. (US Patent No. 6,118,435).

As to claims 18 and 28, it is noted that Gillespie as modified by Astala does not specifically disclose outputting a signal associated with a haptic effect, the haptic effect based at least in part on the pressure signal. Fujita is cited to teach a touch panel device similar to Gillespie. Fujita further discloses a signal associated with a haptic effect, the haptic effect based at least in part on the pressure signal (see abstract and Fig. 2). It would have been obvious to one of ordinary skill in the art to have modified Gillespie as modified by Astala with the tactile force feedback as taught by Fujita so as to provide an interaction between the user and the computer.

(10) Response to Argument

Appellants' remarks regarding 112 1st rejection on pages 5-6 are not persuasive. As stated in the rejection above, the step 322 in Fig. 3 and the specification [0046] disclose "If the speed is less than the speed threshold, the change in pseudo pressure is compared to a threshold value 322. … If the change in pseudo pressure is greater than the threshold, the processor (106) determines whether the first interval has elapsed 324. If so, the processor (106) concludes that the user is pressing 326". The original specification discloses the change in pressure (ΔZ) is greater than **a threshold value** where the threshold value is constant. The specification does not disclose the "THRESHOLD" value in step 322 is changeable or variable. Thus, the original specification does not provide support for "a change in pressure threshold" as claimed and as alleged by appellant in the remarks regarding claims 1 and 19.

In response to appellants' argument on pages 6-7 that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., "a change in pressure is being calculated or that the calculated change in pressure is being compared against a threshold") are not recited in the rejected claims. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Fig. 19 and col. 49, lines 8-12 of Gillespie teaches "Fig. 19 is a timing diagram illustrating a "push" gesture. To perform this gesture, the finger is first brought near enough to cause cursor motion without causing a virtual button press. Next, **the finger pressure increase past threshold ZpushDown, causing the virtual button to be pressed**" (emphasis added). As stated in the 112 1st rejection above, step 322 in Fig. 3 and [0046] of the specification discloses "the change in pseudo pressure is compared to a threshold value 322". Gillespie clearly teaches comparing a change in pressure (i.e., increase) with a threshold and outputting a press signal if the change in pressure is greater than the threshold as claimed.

Appellants' remarks regarding Astala on pages 6-8 are not persuasive. Gillespie teaches comparing a change in pressure (i.e., increase) with a threshold and outputting a press signal if the change in pressure is greater than the threshold. Astala is used to teach **outputting a press signal if** the value of pressure of touch input is greater than a pressure threshold and **a first time interval has elapsed**. Therefore, Gillespie as modified by Astala discloses "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed" as claimed in claims 1 and 19.

Appellants' remarks regarding claim 4 on pages 8-9 are not persuasive. Note the discussion of claims 1 and 19 above. Gillespie as modified by Astala discloses "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed" as claimed. Geaghan is used to teach the thresholds can be adjusted over time.

Appellants' remarks regarding claims 18 and 28 on pages 9-10 are not persuasive. Again, note the discussion of claims 1 and 19 above. Gillespie as modified by Astala discloses "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed" as claimed. Fujita is used to teach a signal associated with a haptic effect, the haptic effect being based on the pressure signal.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Regina Liang/

Primary Examiner, Art Unit 2629

Conferees:

/Richard Hjerpe/

Supervisory Patent Examiner, Art Unit 2629

/Amare Mengistu/

Supervisory Patent Examiner, Art Unit 2629

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	10723778	DACOSTA ET AL.
	Examiner	Art Unit
	Regina Liang	2629

✓	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	11/19/2006	02/26/2008	09/08/2008	06/15/2009					
	1	✓	✓	✓	A					
	1	✓	✓	✓	A					
	2	✓	✓	✓	A					
	3	✓	✓	✓	A					
	4	✓	✓	✓	A					
	5	✓	✓	✓	A					
	6	✓	✓	✓	-					
	7	✓	✓	✓	A					
	8	✓	✓	✓	A					
	9	✓	✓	✓	A					
	10	✓	✓	✓	A					
	11	✓	✓	✓	A					
	12	✓	✓	✓	A					
	13	✓	✓	✓	A					
	14	✓	-	-	-					
	15	✓	-	-	-					
	16	✓	✓	✓	A					
	17	✓	✓	✓	A					
	18	✓	✓	✓	A					
	19	✓	✓	✓	A					
	20	✓	✓	✓	-					
	21	✓	✓	✓	A					
	22	✓	✓	✓	A					
	23	✓	✓	✓	A					
	24	✓	-	-	-					
	25	✓	-	-	-					
	26	✓	✓	✓	A					
	27	✓	✓	✓	A					
	28	✓	✓	✓	A					
	29		✓	✓	A					
	30		✓	✓	A					
	31		✓	✓	A					
	32		✓	✓	A					

OK TO ENTER: /RL/

Attorney Docket IMM174

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Henry DaCosta et al
Application No.	:	10/723,778
For	:	**Systems and Methods for Adaptive Interpretation of Input from a Touch-Sensitive Input Device**
Filed	:	November 26, 2003
Examiner	:	Regina Liang
Art Unit	:	2629

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

AMENDMENT AFTER NOTICE OF APPEAL

Sir:

The following Amendment and Remarks are submitted following the submission of a Notice of Appeal, but prior to the filing of an Appeal Brief.

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 7 of this paper.

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/723,778	11/26/2003	Henry DaCosta	IMM174	4196

34300 7590 06/16/2009

PATENT DEPARTMENT (51851)
KILPATRICK STOCKTON LLP
1001 WEST FOURTH STREET
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EXAMINER	
LIANG, REGINA	
ART UNIT	**PAPER NUMBER**
2629	

MAIL DATE	DELIVERY MODE
06/16/2009	PAPER

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.

Advisory Action Before the Filing of an Appeal Brief	**Application No.** 10/723,778	**Applicant(s)** DACOSTA ET AL.	
	Examiner Regina Liang	**Art Unit** 2629	

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

THE REPLY FILED 21 April 2009 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

1. ☒ The reply was filed after a final rejection, but prior to or on the same day as filing a Notice of Appeal. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114. The reply must be filed within one of the following time periods:
   a) ☒ The period for reply expires *4* months from the mailing date of the final rejection.
   b) ☐ The period for reply expires on: (1) the mailing date of this Advisory Action, or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.

   Examiner Note: If box 1 is checked, check either box (a) or (b). ONLY CHECK BOX (b) WHEN THE FIRST REPLY WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

NOTICE OF APPEAL

2. ☒ The Notice of Appeal was filed on *26 January 2009*. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37 CFR 41.37(a).

AMENDMENTS

3. ☐ The proposed amendment(s) filed after a final rejection, but prior to the date of filing a brief, will not be entered because
   (a) ☐ They raise new issues that would require further consideration and/or search (see NOTE below);
   (b) ☐ They raise the issue of new matter (see NOTE below);
   (c) ☐ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
   (d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.

   NOTE: _____. (See 37 CFR 1.116 and 41.33(a)).
4. ☐ The amendments are not in compliance with 37 CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).
5. ☐ Applicant's reply has overcome the following rejection(s): _____.
6. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
7. ☒ For purposes of appeal, the proposed amendment(s): a) ☐ will not be entered, or b) ☒ will be entered and an explanation of how the new or amended claims would be rejected is provided below or appended.
   The status of the claim(s) is (or will be) as follows:
   Claim(s) allowed: _____.
   Claim(s) objected to: _____.
   Claim(s) rejected: *1-5, 7-13, 16-19, 21-23, 26-32*.
   Claim(s) withdrawn from consideration: _____.

AFFIDAVIT OR OTHER EVIDENCE

8. ☐ The affidavit or other evidence filed after a final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
9. ☐ The affidavit or other evidence filed after the date of filing a Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing a good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
10. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

11. ☐ The request for reconsideration has been considered but does NOT place the application in condition for allowance because: _____.
12. ☐ Note the attached Information *Disclosure Statement*(s). (PTO/SB/08) Paper No(s). _____
13. ☐ Other: _____.

/Regina Liang/
Primary Examiner, Art Unit 2629

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Henry DaCosta et al
Application No.	:	10/723,778
For	:	**Systems and Methods for Adaptive Interpretation of Input from a Touch-Sensitive Input Device**
Filed	:	November 26, 2003
Examiner	:	Regina Liang
Art Unit	:	2629

Mail Stop Appeal Brief – Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

Sir:

This is an Appeal Brief filed under 37 C.F.R. § 41.37 in connection with the final rejection of claims 1-13, 16-23, and 26-32 in the Final Office Action mailed September 24, 2008. Each of the topics required by 37 C.F.R. § 41.37 is presented herewith and labeled appropriately.

Real Party in Interest

The real party in interest in the present application is the assignee, Immersion Corporation, 801 Fox Lane, San Jose, California 95131 (hereinafter "Appellant").

Related Appeals and Interferences

Appellant and the Appellant's legal representative know of no appeals or interferences that will directly affect, will be directly affected by, or have a bearing on the Board's decision in this appeal.

Status of Claims

Claims 1-5, 7-13, 16-20, 21-23, and 26-32 (listed in Appendix A) stand finally rejected and are the substance of this appeal. The final rejection of claims 1-5, 7-13, 16-20, 21-23, and 26-32 is appealed.

Status of Amendments

Applicant cancelled claims 6 and 20 in the response to Final Office Action filed November 21, 2008. Applicant submitted an amendment after filing the Notice of Appeal, but before the filing of this Appeal Brief to make a minor amendment to claim 19 to insert the obviously omitted phrase "program code for."

Summary of the Claimed Subject Matter

The present application has two pending independent claims – claims 1 and 19 – that are generally directed to methods and apparatuses for determining a user's intent when using a touch-sensitive interface. For example, it may be desirable to determine when a user is attempting to indicate a press of a virtual button displayed on the screen or to move a cursor across the screen. See Specification, e.g., paragraphs 5 and 6.

Claim 1 is a method claim comprising four elements. The first element recites "receiving a pressure signal indicating a pressure from an input device." For example, the specification discloses that a touchpad may detect a pressure of a contact on the touchpad, such as from a user's finger. See Specification, e.g., paragraph 10. In such an embodiment, the touchpad may transmit the pressure signal to a processor, where the pressure signal indicates a pressure on the touchpad. See Specification, e.g. paragraph 17. The indicated pressure may be a pressure or a pseudo-pressure. See Specification, e.g., paragraph 14.

In the second element, claim 1 recites "determining a change in pressure based at least in part on the pressure signal." For example, in one embodiment, a change in pseudo pressure may be computed by subtracting the filtered (average) pseudo pressure from the current pseudo pressure. In another embodiment, the previous filtered pseudo pressure is subtracted from the current filtered pseudo pressure. See Specification, e.g., paragraph 50.

In the third element, claim 1 recites "determining a velocity associated with the pressure signal." For example, in one embodiment, the specification discloses that the velocity can be determined based on a change in X and Y position on the touchpad. In such an embodiment, the speed (or velocity) is equal to the square root of the change in X position squared plus the change in Y position squared. See Specification, e.g., paragraph 41.

In the last element, claim 1 recites "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed." The specification discloses that in one embodiment the velocity is compared against a velocity threshold. See Specification, e.g., paragraph 46, Figure 3. If the velocity is less than the velocity threshold, then the change in pressure is compared against a change in pressure threshold. See Specification, e.g., paragraph 46, Figure 3. And if the change in pressure is greater than the change in pressure threshold, the processor determines whether a first interval has elapsed. See Specification, e.g., paragraph 46, Figure 3. If the first interval has elapsed, then the processor determines that a press is occurring and a press signal is output. See Specification, e.g., paragraph 46, Figure 3.

Independent claim 19 recites an apparatus: a computer-readable medium comprising programming code. In the first claim element, claim 19 recites "program code for receiving a pressure signal indicating a pressure from an input device." For example, the specification discloses that a touchpad may detect a pressure of a contact on the touchpad, such as from a user's finger. See Specification, e.g., paragraph 10. In such an embodiment, the touchpad may transmit the pressure signal to a processor, where the pressure signal indicates a pressure on the touchpad. See Specification, e.g. paragraph 17. The indicated pressure may be a pressure or a pseudo-pressure. See Specification, e.g., paragraph 14.

In the second element, claim 19 recites "program code for determining a change in pressure based at least in part on the pressure signal." For example, in one embodiment, a change in pseudo pressure may be computed by subtracting the filtered (average) pseudo pressure from the current pseudo pressure. In another embodiment, the previous filtered pseudo pressure is subtracted from the current filtered pseudo pressure. See Specification, e.g., paragraph 50.

In the third element, claim 19 recites "program code for determining a velocity associated with the pressure signal." For example, in one embodiment, the specification discloses that the

velocity can be determined based on a change in X and Y position on the touchpad. In such an embodiment, the speed (or velocity) is equal to the square root of the change in X position squared plus the change in Y position squared. See Specification, e.g., paragraph 41.

In the last element, claim 19 recites "program code for outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed." The specification discloses that in one embodiment the velocity is compared against a velocity threshold. See Specification, e.g., paragraph 46, Figure 3. If the velocity is less than the velocity threshold, then the change in pressure is compared against a change in pressure threshold. See Specification, e.g., paragraph 46, Figure 3. And if the change in pressure is greater than the change in pressure threshold, the processor determines whether a first interval has elapsed. If the first interval has elapsed, then the processor determines that a press is occurring and a press signal is output. See Specification, e.g., paragraph 46, Figure 3.

Grounds of Rejection to be Reviewed on Appeal

There are five grounds of rejection to be reviewed on appeal.

1. Claims 1-13, 16-23, and 26-32 stand rejected under 35 U.S.C. § 112, ¶ 1 for allegedly failing to comply with the written description requirement.

2. Claims 1-3, 5-13, 16, 17, 19-23, 26, 27, and 29-32 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. 5,880,411 to Gillespie et al ("Gillespie") in view of U.S. Patent No. 6,590,568 to Astala et al ("Astala").

3. Claim 4 stands rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Gillespie in view of Astala and further in view of U.S. Patent Publication No. 2003/0063073 to Geaghan et al ("Geaghan").

4. Claims 18 and 28 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Gillespie in view of Astala and further in view of U.S. Patent No. 6,118,435 to Fujita et al ("Fujita").

5. Claims 19-23, 26-28, 30, and 32 stand rejected under 35 U.S.C. § 101 as allegedly being directed towards unpatentable subject matter.

Argument

Issue 1: Whether the Examiner erred in rejecting claims 1-13, 16-23, and 26-32 under 35 U.S.C. § 112, ¶ 1.

Claims 1-13, 16-23, and 26-32 satisfy 35 U.S.C. § 110, ¶ 1 because the specification discloses a "change in pressure threshold" as recited in claims 1 and 19.

Section 112, ¶ 1 requires, in relevant part, that the specification "contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same."

Applicant has cancelled claims 6 and 20 rendering the rejection of those claims moot.

Because the specification of this application would enable one of ordinary skill in the art to make and use the invention, claims 1 and 19 satisfy § 112, ¶ 1. More specifically and contrary to the Examiner's assertions, the specification provides enabling support for a "change in pressure threshold." For example, the specification recites that "If the change in pseudo pressure is greater than the threshold, the processor (106) determines whether the first interval has elapsed 324." See Specification, paragraph 46. Further, it is disclosed that if several conditions are true, including that a change in pressure is greater than a threshold, a press signal is output. See Specification, paragraph 46. In addition, Figure 3 shows a flow chart including a decision step 222 for determining whether a change in pressure is greater than a change in pressure threshold. See Figure 3.

Based on the Examiner's rejection, there appears to be confusion over the use of the phrase in question. It should be noted that the threshold quoted above is a "change in pressure" threshold (i.e. a threshold for ΔP), which may be a constant value, rather than a pressure threshold that is changing, which appears to be the Examiner's interpretation.

For the foregoing reasons, Applicant respectfully asserts that claims 1 and 19, and consequently their dependent claims, satisfy the requirements of 35 U.S.C. § 112, ¶ 1. Consequently, claims 2-5, 7-13, 16-18, 21-23, and 26-32 satisfy 35 U.S.C. § 112, ¶ 1 because

they were rejected based on the rejection of either claim 1 or 19. Applicant requests that the Board reverse the Examiner's rejection of claims 1-13, 16-23, and 26-32 under 35 U.S.C. § 112, ¶ 1.

Issue 2: Whether the Examiner erred in rejecting claims 1-3, 5-13, 16, 17, 19-23, 26, 27, and 29-32 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Gillespie in view of Astala.

Claims 1-3, 5-13, 16, 17, 19-23, 26, 27, and 29-32 are patentable over Gillespie in view of Astala because Gillespie in view of Astala does not disclose "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed."

To reject a claim under 35 U.S.C. § 103(a) the scope and content of the references must be ascertained, the differences between the references and the claimed invention, and the level of ordinary skill in the pertinent art must be resolved. See Graham v. John Deere Co., 383 U.S. 1, 17 (1966); *See also* KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398 (2007).

Applicant has cancelled claims 6 and 20 rendering their rejection moot.

In response to Applicant's arguments presented in the previous response, the Examiner argues that Gillespie discloses "the change in pressure is greater than a change in pressure threshold" because Gillespie recites "the finger pressure increases past threshold ZpushDown, causing the virtual button to be pressed." See Office Action, p. 9. However, this does not disclose that a change in pressure is being calculated or that the calculated change in pressure is being compared against a threshold. Rather, the quoted section discloses that a pressure, not a change in pressure, is compared against the threshold in an iterative fashion until the pressure is greater than the threshold, at which time a button press occurs. Thus, Gillespie does not disclose comparing a change in pressure to a threshold, but only discloses comparing a pressure to a threshold.

Further, with respect to Astala, the Examiner responds that Astala discloses "the change in pressure is greater than a change in pressure threshold" because:

> Astala teaches "at step 710, a determination is made that the value of the pressure z of touch input 732 is greater than a predetermined value Za over the period of time t.sub.1 that the object touches the touch screen 70, that is greater than a

> predetermined time tA. That is, the pressure of the object touching the touch screen 70 is determined to be greater than a predetermined pressure value for a period of time, which is greater than a predetermined period of time," which clearly teaches outputting a press signal if the value of a **pressure of a touch input is greater than a pressure threshold** and a first time interval has elapsed.

Final Office Action mailed September 24, 2008, p. 9 (emphasis added). As can be seen in the emphasized portion of the language from the Office Action, the Examiner alleges that Astala discloses comparing a pressure to a pressure threshold. See Office Action, p. 9-10. But this is not the same as comparing a change in pressure to a threshold as recited in claim 1. Thus, Astala also fails to teach "the change in pressure is greater than a change in pressure threshold."

With respect to the Examiner's rejection, because Gillespie in view of Astala does not teach or suggest "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed" as recited in claim 1, claim 1 is patentable over the combined references. The Examiner has cited column 35 lines 28-30 and column 49, lines 8-12 to support the assertion that Gillespie teaches comparing a change in pressure to a threshold. However, these two portions of Gillespie relate to a pressure value, not a change in pressure value:

> Finally, the Z signal exceeds threshold Ztap for at least some part of the stroke. Thus the stroke qualifies as a tap.

Gillespie, Col. 35, lines 28-30.

> FIG. 19 is a timing diagram illustrating a "push" gesture. To perform this gesture, the finger is first brought near enough to cause cursor motion without causing a virtual button press. Next, the finger pressure increases past threshold ZpushDown, causing the virtual button to be pressed.

Gillespie, Col. 49, lines 8-12.

Each of these passages describes comparing a "pressure" with a threshold, not a "change in pressure" with a "change in pressure" threshold. As such, Gillespie does not teach or suggest "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed." Astala does not cure this deficiency. Astala teaches a method for dragging a virtual object across a touch screen by dragging a finger across the touch screen. The portion cited by the Examiner does not relate

to detecting a press event. Instead it relates to the detection of the drag gesture. The detection of a press is dealt with summarily:

> The process begins at step 700. At step 702, a touch screen input is detected. That is, the touch of an object, such as a finger or pointed stylus, on the touch screen 70 is detected. This is illustrated in FIG. 6b by touch input 732 being disposed over the object file 1 of window 728.

Astala, Col. 9, lines 15-19.

Thus, neither Astala, nor Gillespie in view of Astala, teach or suggest "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed" as recited in claim 1. As such, claim 1 is patentable over Gillespie in view of Astala. Applicant respectfully requests the Board reverse the Examiner's the rejection of claim 1.

Similar to claim 1, claim 19 recites "program code for outputting a press signal if the velocity is less than the velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed." Claim 19 is patentable over Gillespie in view of Astala for at least the same reasons as claim 1. Applicant respectfully requests the Board reverse the Examiner's the rejection of claim 19.

Because claims 2-3, 5, 7-13, 16, 17, 21-23, 26, 27, and 29-32 each depend from and further limit either claim 1 or claim 19, claims 2-3, 5, 7-13, 16, 17, 21-23, 26, 27, and 29-32 are each patentable over Gillespie in view of Astala for at least the same reasons. Applicant respectfully requests the Board reverse the Examiner's rejection of claims 2-3, 5, 7-13, 16, 17, 21-23, 26, 27, and 29-32.

Issue 3: Whether the Examiner erred in rejecting claim 4 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Gillespie in view of Astala and Geaghan.

Claim 4 is patentable over Gillespie in view of Astala and further in view of Geaghan because Gillespie in view of Astala and Geaghan does not disclose "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed."

To reject a claim under 35 U.S.C. § 103(a) the scope and content of the references must be ascertained, the differences between the references and the claimed invention, and the level of

ordinary skill in the pertinent art must be resolved. See Graham v. John Deere Co., 383 U.S. 1, 17 (1966); *See also* KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398 (2007).

As discussed above, Gillespie in view of Astala does not teach or suggest "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed." Geaghan does not cure this deficiency. Geaghan teaches that a change in pressure should be **less than** a threshold to detect a valid press event, not that a change in pressure should be greater than a threshold as recited in claim 1. See Geaghan, Figure 1. Further, Geaghan states that if the rate of change of pressure is greater than a threshold, it "can indicate a double touch or an unstable touch. If the touch is stable and the rate of change is less than a threshold, a position can be reported." Geaghan, Paragraph 50. As such, Geaghan teaches that a change in pressure greater than a threshold is undesirable when detecting a touch, contrary to elements recited in claim 4. Thus, claim 4 is patentable over the combined references. Applicant respectfully requests the Board reverse the Examiner's rejection of claim 4.

Issue 4: Whether the Examiner erred in rejecting claims 18 and 28 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Gillespie in view of Astala and Fujita

Claims 18 and 28 are patentable over Gillespie in view of Astala and further in view of Fujita because Gillespie in view of Astala and Fujita does not disclose "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed."

To reject a claim under 35 U.S.C. § 103(a) the scope and content of the references must be ascertained, the differences between the references and the claimed invention, and the level of ordinary skill in the pertinent art must be resolved. See Graham v. John Deere Co., 383 U.S. 1, 17 (1966); *See also* KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398 (2007).

As discussed above, Gillespie in view of Astala does not teach or suggest "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed." Fujita does not cure this deficiency.

Fujita generally teaches a touch panel with tactile feedback. However, Fujita teaches that detection of a press is made as follows:

> Within the case 1, a press detection switch 6 is provided between the touch panel 3 and the touch-panel support plate 4 therebelow for detection of a press on the touch panel 3 at a pressure greater than a predetermined level Pt and for output of a press detection signal SS (see FIG. 2). The press detection switch 6 constitutes the press detecting means. The predetermined pressure Pt in this case means a pressure such as to cause the press detection switch 6 to output the press detection signal SS.

Fujita, Col. 4, lines 19-27.

As such, Fujita teaches that a press is detected simply by detecting a pressure above a threshold. This is not the same as "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed." Thus, the combined references do not teach or suggest each and every element of claim 18. Therefore, claim 18 is patentable over the combined references.

Claim 28 depends from claim 19, which recites "program code for outputting a press signal if the velocity is less than the velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed." Claim 28 is patentable over the combined references for at least the same reasons as claim 18. Applicant respectfully requests the Board reverse the Examiner's rejection of claims 18 and 28.

Issue 5: Whether the Examiner erred in maintaining the rejecting claims 19-23, 26-28, 30, and 32 under 35 U.S.C. § 101 after the Applicant removed the reference to "transmission device" from the specification per the Examiner's request.

In the Final Office Action, the Examiner rejected claims 19-23, 26-28, 30, and 32 under 35 U.S.C. § 101 as allegedly being directed to non-patentable subject matter because the scope of the term "computer-readable media" may encompass a pure signal embodiment. Office Action mailed September 24, 2008, p. 4. Thus, Applicant has deleted reference to 'transmission device' from paragraph 20 to clarify that claims 19-23, 26-28, 30, and 32 do not claim pure signal embodiments. This deletion is only intended to ensure the scope of the term 'computer-readable media' does not cover pure signal embodiments, but does not otherwise indicate any intent to disclaim any other non-pure signal embodiments that 'computer-readable media' may encompass.

In view of the foregoing, Applicant respectfully asserts that claims 19-23, 26-28, 30, and 32 do not include pure signal embodiments within their scope and therefore claim only patentable subject matter. Applicant respectfully requests the Board reverse the Examiner's rejection of claims 19-23, 26-28, 30, and 32 under 35 U.S.C. § 101.

In view of the foregoing, Applicant requests the Board reverse each of the Examiner's rejections of the claims.

Respectfully submitted,

Date: 4/23/2009

Carl Sanders
Reg. No. 57,203

KILPATRICK STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101
(336) 607-7474 (voice)
(336) 734-2629 (fax)

Appendix A – Claims

1. A method comprising:

receiving a pressure signal indicating a pressure from an input device;

determining a change in pressure based at least in part on the pressure signal;

determining a velocity associated with the pressure signal; and

outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed.

2. The method of claim 31, wherein the adaptive pressure threshold value is associated with an absolute pressure threshold.

3. The method of claim 31, wherein the adaptive pressure threshold value is associated with a position received from the input device.

4. The method of claim 31, wherein the adaptive pressure threshold value can vary over time.

5. The method of claim 31, wherein the adaptive pressure threshold value is associated with a user identifier.

7. The method of claim 1, wherein the pressure signal comprises a pseudo pressure signal.

8. The method of claim 1, further comprising applying a pressure filter to the pressure signal to create a filtered pressure signal.

9. The method of claim 8, wherein the pressure filter comprises a first pressure filter comprising a first attribute, and further comprising applying a second pressure filter to the pressure signal, the second pressure filter comprising a second attribute that is different than the first attribute.

10. The method of claim 9, wherein the first attribute comprises a first frequency value and the second attribute comprises a second frequency value.

11. The method of claim 10, wherein the second frequency value is lower than the first frequency value.

12. The method of claim 8, wherein applying the pressure filter comprises applying the pressure filter utilizing a sliding window.

13. The method of claim 1, wherein the input device comprises one of a touchpad, a touch panel, and a touch screen.

16. The method of claim 1, wherein the pressure signal comprises a first pressure signal and further comprising:

receiving a second pressure signal indicating a second pressure from the input device;

calculating a difference signal indicative of a difference between the first pressure signal and the second pressure signal;

comparing the difference signal to a difference threshold value; and

outputting the press signal if the difference signal is greater than the difference threshold value.

17. The method of claim 16, further comprising filtering the difference signal to create a filtered difference signal.

18. The method of claim 1, further comprising outputting a signal associated with a haptic effect, the haptic effect based at least in part on the pressure signal.

19. A computer-readable medium on which is encoded programming code, comprising:

program code for receiving a pressure signal indicating a pressure from an input device;

program code for determining a change in pressure based at least in part on the pressure signal;

program code for determining a velocity associated with the pressure signal;

and

program code for outputting a press signal if the velocity is less than the velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed.

21. The computer-readable medium of claim 19, further comprising program code for applying a pressure filter to the pressure signal to create a filtered pressure signal.

22. The computer-readable medium of claim 21, wherein the pressure filter comprises a first pressure filter comprising a first attribute, and further comprising program code for applying a second pressure filter to the pressure signal, wherein the second pressure filter comprises a second attribute that is different than the first attribute.

23. The computer-readable medium of claim 21, wherein program code for applying the pressure filter comprises program code for applying the pressure filter utilizing a sliding window.

26. The computer-readable medium of claim 19, wherein the pressure signal comprises a first pressure signal and further comprising:

program code for receiving a second pressure signal indicating a second pressure from the input device;

program code for calculating a difference signal indicative of a difference between the first pressure signal and the second pressure signal;

program code for comparing the difference signal to a difference threshold value; and

program code for outputting the press signal if the difference signal is greater than the difference threshold value.

27. The computer-readable medium of claim 26, further comprising program code for filtering the difference signal to create a filtered difference signal.

28. The computer-readable medium of claim 19, further comprising program code for outputting a signal associated with a haptic effect, the haptic effect based at least in part on the pressure signal.

29. The method of claim 1, further comprising:

determining a rate of change of pseudo-pressure associated with the pressure signal;

comparing the rate of change of pseudo-pressure with a pseudo-pressure threshold; and

outputting a press signal if the rate of change of pseudo-pressure is greater than the pseudo-pressure threshold

30. The computer-readable medium of claim 19, further comprising:

program code for determining a rate of change of pseudo-pressure associated with the pressure signal;

program code for comparing the rate of change of pseudo-pressure with a pseudo-pressure threshold; and

program code for outputting a press signal if the rate of change of pseudo-pressure is greater than the pseudo-pressure threshold.

31. The method of claim 1, further comprising comparing the pressure signal to an adaptive pressure threshold value, and outputting the press signal if the pressure signal is greater than the adaptive pressure threshold value

32. The computer-readable medium of claim 19, further comprising program code for comparing the pressure signal to an adaptive pressure threshold value, and program code for outputting the press signal if the pressure signal is greater than the adaptive pressure threshold value.

Appendix B – Evidence

None.

Appendix C – Related Proceedings

None.

Electronic Patent Application Fee Transmittal

Application Number:	10723778
Filing Date:	26-Nov-2003
Title of Invention:	Systems and methods for adaptive interpretation of input from a touch-sensitive input device
First Named Inventor/Applicant Name:	Henry DaCosta
Filer:	Carl E. Sanders/Laura Smith
Attorney Docket Number:	IMM174

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:				
Filing a brief in support of an appeal	1402	1	540	540
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
			Total in USD ($)	**540**

Electronic Acknowledgement Receipt

EFS ID:	5208200
Application Number:	10723778
International Application Number:	
Confirmation Number:	4196
Title of Invention:	Systems and methods for adaptive interpretation of input from a touch-sensitive input device
First Named Inventor/Applicant Name:	Henry DaCosta
Customer Number:	34300
Filer:	Carl E. Sanders/Laura Smith
Filer Authorized By:	Carl E. Sanders
Attorney Docket Number:	IMM174
Receipt Date:	23-APR-2009
Filing Date:	26-NOV-2003
Time Stamp:	16:20:13
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$540
RAM confirmation Number	2884
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Miscellaneous Incoming Letter	Transmittal279589.pdf	35347 c012b2a0eacf547d2b7936b6bc6c4dee348830c0	no	1
Warnings:					
Information:					
2	Appeal Brief Filed	AppealBrief279589.pdf	774752 7c04eb30d87311de87494193700c5a4e1b946028	no	17
Warnings:					
Information:					
3	Fee Worksheet (PTO-875)	fee-info.pdf	29751 ddf8f95992cbb2aacd8d4b7fa24bc44fd7602b5d	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	839850		

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<u>New Applications Under 35 U.S.C. 111</u>
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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

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

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of	:	Henry DaCosta
Application No.	:	10/723,778
Filed	:	November 26, 2003
For	:	**SYSTEMS AND METHODS FOR ADAPTIVE INTERPRETATION OF INPUT FROM A TOUCH-SENSITIVE INPUT DEVICE**
Examiner	:	Regina Liang
Art Unit	:	2629

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

TRANSMITTAL

Sir:

Transmitted herewith is a copy of the following document(s) for filing in the above-identified application:

Transmittal;
Appeal Brief; and
EFS Web Payment in the amount of $540.00

The Commissioner is hereby authorized to charge any deficiency to Deposit Account Number 16-1435.

Respectfully submitted,

Date: 4/23/2009

By: _____
Carl E. Sanders (Reg. No. 57,203)

KILPATRICK STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101
(336) 607-7300

Certificate of Electronic Filing

I hereby certify that this correspondence is being electronically filed with The United States Patent Office via EFS-Web, on April 23, 2009.

_____
Laura J. Smith

US2000 11334578.1

Document code: WFEE

United States Patent and Trademark Office
Sales Receipt for Accounting Date: 05/21/2009

TCOLE1 SALE #00000001 Mailroom Dt: 04/23/2009 161435 10723778
01 FC : 1251 130.00 DA

Attorney Docket IMM174

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Henry DaCosta et al
Application No.	:	10/723,778
For	:	**Systems and Methods for Adaptive Interpretation of Input from a Touch-Sensitive Input Device**
Filed	:	November 26, 2003
Examiner	:	Regina Liang
Art Unit	:	2629

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

AMENDMENT AFTER NOTICE OF APPEAL

Sir:

The following Amendment and Remarks are submitted following the submission of a Notice of Appeal, but prior to the filing of an Appeal Brief.

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 7 of this paper.

AMENDMENTS TO THE CLAIMS

1. (Previously Presented) A method comprising:

receiving a pressure signal indicating a pressure from an input device;

determining a change in pressure based at least in part on the pressure signal;

determining a velocity associated with the pressure signal; and

outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed.

2. (Previously Presented) The method of claim 31, wherein the adaptive pressure threshold value is associated with an absolute pressure threshold.

3. (Previously Presented) The method of claim 31, wherein the adaptive pressure threshold value is associated with a position received from the input device.

4. (Previously Presented) The method of claim 31, wherein the adaptive pressure threshold value can vary over time.

5. (Previously Presented) The method of claim 31, wherein the adaptive pressure threshold value is associated with a user identifier.

6. (Cancelled)

7. (Original) The method of claim 1, wherein the pressure signal comprises a pseudo pressure signal.

8. (Original) The method of claim 1, further comprising applying a pressure filter to the pressure signal to create a filtered pressure signal.

9. (Original) The method of claim 8, wherein the pressure filter comprises a first pressure filter comprising a first attribute, and further comprising applying a second pressure filter to the pressure signal, the second pressure filter comprising a second attribute that is different than the first attribute.

10. (Original) The method of claim 9, wherein the first attribute comprises a first frequency value and the second attribute comprises a second frequency value.

11. (Original) The method of claim 10, wherein the second frequency value is lower than the first frequency value.

12. (Original) The method of claim 8, wherein applying the pressure filter comprises applying the pressure filter utilizing a sliding window.

13. (Original) The method of claim 1, wherein the input device comprises one of a touchpad, a touch panel, and a touch screen.

14. (Cancelled)

15. (Cancelled)

16. (Previously Presented) The method of claim 1, wherein the pressure signal comprises a first pressure signal and further comprising:

receiving a second pressure signal indicating a second pressure from the input device;

calculating a difference signal indicative of a difference between the first pressure signal and the second pressure signal;

comparing the difference signal to a difference threshold value; and

outputting the press signal if the difference signal is greater than the difference threshold value.

17. (Original) The method of claim 16, further comprising filtering the difference signal to create a filtered difference signal.

18. (Original) The method of claim 1, further comprising outputting a signal associated with a haptic effect, the haptic effect based at least in part on the pressure signal.

19. (Currently Amended) A computer-readable medium on which is encoded programming code, comprising:

program code for receiving a pressure signal indicating a pressure from an input device;

program code for determining a change in pressure based at least in part on the pressure signal;

program code for determining a velocity associated with the pressure signal; and

program code for outputting a press signal if the velocity is less than the velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed.

20. (Cancelled)

21. (Original) The computer-readable medium of claim 19, further comprising program code for applying a pressure filter to the pressure signal to create a filtered pressure signal.

22. (Original) The computer-readable medium of claim 21, wherein the pressure filter comprises a first pressure filter comprising a first attribute, and further comprising program code for applying a second pressure filter to the pressure signal, wherein the second pressure filter comprises a second attribute that is different than the first attribute.

23. (Original) The computer-readable medium of claim 21, wherein program code for applying the pressure filter comprises program code for applying the pressure filter utilizing a sliding window.

24. (Cancelled)

25. (Cancelled)

26. (Previously Presented) The computer-readable medium of claim 19, wherein the pressure signal comprises a first pressure signal and further comprising:

program code for receiving a second pressure signal indicating a second pressure from the input device;

program code for calculating a difference signal indicative of a difference between the first pressure signal and the second pressure signal;

program code for comparing the difference signal to a difference threshold value; and

program code for outputting the press signal if the difference signal is greater than the difference threshold value.

27. (Original) The computer-readable medium of claim 26, further comprising program code for filtering the difference signal to create a filtered difference signal.

28. (Original) The computer-readable medium of claim 19, further comprising program code for outputting a signal associated with a haptic effect, the haptic effect based at least in part on the pressure signal.

29. (Previously Presented) The method of claim 1, further comprising:

determining a rate of change of pseudo-pressure associated with the pressure signal;

comparing the rate of change of pseudo-pressure with a pseudo-pressure threshold; and

outputting a press signal if the rate of change of pseudo-pressure is greater than the pseudo-pressure threshold

30. (Previously Presented) The computer-readable medium of claim 19, further comprising:

program code for determining a rate of change of pseudo-pressure associated with the pressure signal;

program code for comparing the rate of change of pseudo-pressure with a pseudo-pressure threshold; and

program code for outputting a press signal if the rate of change of pseudo-pressure is greater than the pseudo-pressure threshold.

31. (Previously Presented) The method of claim 1, further comprising comparing the pressure signal to an adaptive pressure threshold value, and outputting the press signal if the pressure signal is greater than the adaptive pressure threshold value

32. (Previously Presented) The computer-readable medium of claim 19, further comprising program code for comparing the pressure signal to an adaptive pressure threshold value, and program code for outputting the press signal if the pressure signal is greater than the adaptive pressure threshold value

REMARKS

Applicant submits this amendment after the filing of a Notice of Appeal, but before the filing of an Appeal Brief. Applicant has amended claim 19 to insert obviously omitted words: the second claim element did not previously include the phrase "program code for." Applicant respectfully requests that this amendment be entered for purposes of appeal.

Should the Examiner have any comments, questions, or suggestions of a nature necessary to expedite the prosecution of the application, or to place the case in condition for allowance, the Examiner is courteously requested to telephone the undersigned at the number listed below.

Respectfully submitted,

Date: 4/21/2009

Carl Sanders
Reg. No. 57,203

KILPATRICK STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101
(336) 607-7474 (voice)
(336) 734-2629 (fax)

Electronic Acknowledgement Receipt

EFS ID:	5193373
Application Number:	10723778
International Application Number:	
Confirmation Number:	4196
Title of Invention:	Systems and methods for adaptive interpretation of input from a touch-sensitive input device
First Named Inventor/Applicant Name:	Henry DaCosta
Customer Number:	34300
Filer:	Carl E. Sanders/Dee Jones
Filer Authorized By:	Carl E. Sanders
Attorney Docket Number:	IMM174
Receipt Date:	21-APR-2009
Filing Date:	26-NOV-2003
Time Stamp:	18:15:13
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	Miscellaneous Incoming Letter	IMM174Transmittal.pdf	34376 d73dcc2b02816a05d0ba965cae8c1e0a8920ae9f	no	1

Warnings:	
Information:	

2	Amendment/Argument after Notice of Appeal	IMM174Amendment.pdf	233266 f41e95d935b4ff39721858c24580ff92f67d405b	no	7
Warnings:					
Information:					
			Total Files Size (in bytes):	267642	

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<u>New Applications Under 35 U.S.C. 111</u>
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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

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

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of	:	Henry DaCosta
Application No.	:	10/723,778
Filed	:	November 26, 2003
For	:	**SYSTEMS AND METHODS FOR ADAPTIVE INTERPRETATION OF INPUT FROM A TOUCH-SENSITIVE INPUT DEVICE**
Examiner	:	Regina Liang
Art Unit	:	2629

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

TRANSMITTAL

Sir:

Transmitted herewith is a copy of the following document(s) for filing in the above-identified application:

Transmittal; and
Amendment After Notice of Appeal.

The Commissioner is hereby authorized to charge any deficiency to Deposit Account Number 16-1435.

Respectfully submitted,

Date: 4/21/2009

By: _____
Carl E. Sanders (Reg. No. 57,203)

KILPATRICK STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101
(336) 607-7300

Certificate of Electronic Filing

I hereby certify that this correspondence is being electronically filed with The United States Patent Office via EFS-Web, on April 21, 2009.

_____
Dee Jones

US2000 11337722.1

PTO/SB/06 (07-06)
Approved for use through 1/31/2007. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
10/723,778	11/26/2003	

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	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT 04/21/2009	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	SMALL ENTITY ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 26	Minus	** 28	= 0	X $ =		OR	X $52=	0
Independent (37 CFR 1.16(h))	* 2	Minus	***3	= 0	X $ =		OR	X $220=	0
☐ 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	0

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

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/brown s. charrissa/

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

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

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of	:	Henry DaCosta
Application No.	:	10/723,778
Filed	:	November 26, 2003
For	:	**SYSTEMS AND METHODS FOR ADAPTIVE INTERPRETATION OF INPUT FROM A TOUCH-SENSITIVE INPUT DEVICE**
Examiner	:	Regina Liang
Art Unit	:	2629

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

TRANSMITTAL

Sir:

Transmitted herewith is a copy of the following document(s) for filing in the above-identified application:

Notice of Appeal;
One-Month Extension of Time; and
Payment of Fees ($670).

The Commissioner is hereby authorized to charge any deficiency to Deposit Account Number 16-1435.

Respectfully submitted,

By: _____
Carl Sanders (Reg. No. 57,203)

Date: January 26, 2009
KILPATRICK STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101
(336) 607-7300

Certificate of Electronic Filing

I hereby certify that this correspondence is being electronically filed with The United States Patent Office via EFS-Web, on January 26, 2009.

_____
Dee Jones

US2000 11225719.1 51851-279589

PTO/SB/31 (12-08)
Approved for use through 01/31/2009. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

NOTICE OF APPEAL FROM THE EXAMINER TO THE BOARD OF PATENT APPEALS AND INTERFERENCES	Docket Number (Optional) IMM174

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to "Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450" [37 CFR 1.8(a)] on _____ Signature _____ Typed or printed name _____	In re Application of: Systems and Methods For Adaptive Interpretation...
	Application Number: 10/723,778 — Filed: November 26, 2003
	For: Henry DaCosta
	Art Unit: 2629 — Examiner: Regina Liang

Applicant hereby **appeals** to the Board of Patent Appeals and Interferences from the last decision of the examiner.

The fee for this Notice of Appeal is (37 CFR 41.20(b)(1)) $ 540

☐ Applicant claims small entity status. See 37 CFR 1.27. Therefore, the fee shown above is reduced by half, and the resulting fee is: $ _____

☐ A check in the amount of the fee is enclosed.

☑ Payment by credit card. Form PTO-2038 is attached.

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☐ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. _____ .

☑ A petition for an extension of time under 37 CFR 1.136(a) (PTO/SB/22) is enclosed.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

☐ applicant/inventor.

☐ assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96)

☑ attorney or agent of record. Registration number 57,203.

☐ attorney or agent acting under 37 CFR 1.34. Registration number if acting under 37 CFR 1.34. _____

Signature

Carl E. Sanders
Typed or printed name

336-607-7300
Telephone number

January 26, 2009
Date

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

☐ *Total of _____ forms are submitted.

This collection of information is required by 37 CFR 41.31. 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, 1.14 and 41.6. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

PTO/SB/22 (12-08)
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U.S. Patent and Trademark Office; U.S. DEPARMENT OF COMMERCE
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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a) **FY 2009** *(Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).)*	Docket Number (Optional) IMM174
Application Number 10/723,778	Filed November 26, 2003
For Systems and Methods For Adaptive Interpretation Of Input From A Touch-Sensitive Input Device	
Art Unit 2629	Examiner Regina Liang

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

		Fee	Small Entity Fee	
☑	One month (37 CFR 1.17(a)(1))	$130	$65	$ 130
☐	Two months (37 CFR 1.17(a)(2))	$490	$245	$
☐	Three months (37 CFR 1.17(a)(3))	$1110	$555	$
☐	Four months (37 CFR 1.17(a)(4))	$1730	$865	$
☐	Five months (37 CFR 1.17(a)(5))	$2350	$1175	$

☐ Applicant claims small entity status. See 37 CFR 1.27.

☐ A check in the amount of the fee is enclosed.

☑ Payment by credit card. Form PTO-2038 is attached.

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☐ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number _____.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

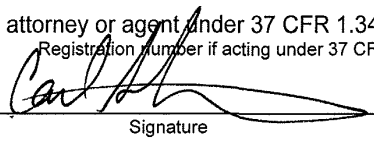
I am the

☐ applicant/inventor.

☐ assignee of record of the entire interest. See 37 CFR 3.71.
Statement under 37 CFR 3.73(b) is enclosed (Form PTO/SB/96).

☑ attorney or agent of record. Registration Number 57,203

☐ attorney or agent under 37 CFR 1.34.
Registration number if acting under 37 CFR 1.34 _____



Signature — January 26, 2009 — Date

Carl E. Sanders — Typed or printed name

336-607-7335 — Telephone Number

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

☐ Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.136(a). 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 6 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.

Electronic Patent Application Fee Transmittal

Application Number:	10723778
Filing Date:	26-Nov-2003
Title of Invention:	Systems and methods for adaptive interpretation of input from a touch-sensitive input device
First Named Inventor/Applicant Name:	Henry DaCosta
Filer:	Carl E. Sanders/Dee Jones
Attorney Docket Number:	IMM174

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:				
Notice of appeal	1401	1	540	540
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 1 month with $0 paid	1251	1	130	130
Miscellaneous:				
		Total in USD ($)		**670**

Electronic Acknowledgement Receipt

EFS ID:	4676423
Application Number:	10723778
International Application Number:	
Confirmation Number:	4196
Title of Invention:	Systems and methods for adaptive interpretation of input from a touch-sensitive input device
First Named Inventor/Applicant Name:	Henry DaCosta
Customer Number:	34300
Filer:	Carl E. Sanders/Dee Jones
Filer Authorized By:	Carl E. Sanders
Attorney Docket Number:	IMM174
Receipt Date:	26-JAN-2009
Filing Date:	26-NOV-2003
Time Stamp:	16:42:53
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$670
RAM confirmation Number	2451
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Miscellaneous Incoming Letter	IMM174Transmittal.pdf	34957 b8f6fb6cf43b6cc5db7ae37066da1062c8471cb3	no	1
Warnings:					
Information:					
2	Notice of Appeal Filed	IMM174Notice.pdf	69865 ffef19fcd9f9aab058026d9ada6cffdac283effb	no	1
Warnings:					
Information:					
3	Extension of Time	IMM174Extension.pdf	70324 45f9ecdc9faf443055c64c94661e378d5c742a6d	no	1
Warnings:					
Information:					
4	Fee Worksheet (PTO-06)	fee-info.pdf	31735 b033b0f4a0dbf04cfd5cc6e62ba4ae497da35674	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	206881		

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

<u>New Applications Under 35 U.S.C. 111</u>
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/723,778	11/26/2003	Henry DaCosta	IMM174	4196

34300 7590 12/03/2008

PATENT DEPARTMENT (51851)
KILPATRICK STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

EXAMINER	
LIANG, REGINA	
ART UNIT	**PAPER NUMBER**
2629	

MAIL DATE	DELIVERY MODE
12/03/2008	PAPER

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.

Advisory Action Before the Filing of an Appeal Brief	Application No.	Applicant(s)	
	10/723,778	DACOSTA ET AL.	
	Examiner	Art Unit	
	Regina Liang	2629	

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

THE REPLY FILED 21 November 2008 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

1. ☒ The reply was filed after a final rejection, but prior to or on the same day as filing a Notice of Appeal. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114. The reply must be filed within one of the following time periods:
   a) ☐ The period for reply expires _____months from the mailing date of the final rejection.
   b) ☒ The period for reply expires on: (1) the mailing date of this Advisory Action, or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.

   Examiner Note: If box 1 is checked, check either box (a) or (b). ONLY CHECK BOX (b) WHEN THE FIRST REPLY WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

NOTICE OF APPEAL

2. ☐ The Notice of Appeal was filed on _____. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37 CFR 41.37(a).

AMENDMENTS

3. ☐ The proposed amendment(s) filed after a final rejection, but prior to the date of filing a brief, will not be entered because
   (a) ☐ They raise new issues that would require further consideration and/or search (see NOTE below);
   (b) ☐ They raise the issue of new matter (see NOTE below);
   (c) ☐ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
   (d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.

   NOTE: _____. (See 37 CFR 1.116 and 41.33(a)).
4. ☐ The amendments are not in compliance with 37 CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).
5. ☒ Applicant's reply has overcome the following rejection(s): 101 rejection, 112 1st rejection regarding claims 6 an 20.
6. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
7. ☒ For purposes of appeal, the proposed amendment(s): a) ☐ will not be entered, or b) ☒ will be entered and an explanation of how the new or amended claims would be rejected is provided below or appended.
   The status of the claim(s) is (or will be) as follows:
   Claim(s) allowed: _____.
   Claim(s) objected to: _____.
   Claim(s) rejected: *1-5, 7-13, 16-19, 21-23, 26-32*.
   Claim(s) withdrawn from consideration: _____.

AFFIDAVIT OR OTHER EVIDENCE

8. ☐ The affidavit or other evidence filed after a final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
9. ☐ The affidavit or other evidence filed after the date of filing a Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing a good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
10. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

11. ☒ The request for reconsideration has been considered but does NOT place the application in condition for allowance because: See Continuation Sheet.
12. ☐ Note the attached Information *Disclosure Statement*(s). (PTO/SB/08) Paper No(s). _____
13. ☐ Other: _____.

/Regina Liang/
Primary Examiner, Art Unit 2629

Continuation of 11. does NOT place the application in condition for allowance because: Applicant's remarks regarding 112 1st rejection in re claims 1 and 19 are not persuasive. Step 222 in Fig. 2 of the specification may show a change in pressure, but Fig. 2 of the specification does not disclose "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure thresold, and a first interval has elapsed" as claimed in claims 1 and 19. Applicant's remarks regarding the art rejections are not persuasive since the combination of the references read on the claims.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Henry DaCosta et al
Application No.	:	10/723,778
For	:	**Systems and Methods for Adaptive Interpretation of Input from a Touch-Sensitive Input Device**
Filed	:	November 26, 2003
Examiner	:	Regina Liang
Art Unit	:	2629

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

AMENDMENT AND RESPONSE TO FINAL OFFICE ACTION

Sir:

The following Amendment and Remarks are submitted in response to the Office Action mailed September 24, 2008.

Amendments to the Specification begin on page 2 of this paper.

Amendments to the Claims begin on page 3 of this paper.

Remarks begin on page 8 of this paper.

AMENDMENTS TO THE SPECIFICATION

Please replace paragraph 20 of the specification with the following paragraph.

[0020] Embodiments of computer-readable media include, but are not limited to, an electronic, optical, magnetic, or other storage ~~or transmission~~ device capable of providing a processor, such as the processor 106 in communication with a touch-sensitive input device, with computer-readable instructions. Other examples of suitable media include, but are not limited to, a floppy disk, CD-ROM, magnetic disk, memory chip, ROM, RAM, an ASIC, a configured processor, all optical media, all magnetic tape or other magnetic media, or any other medium from which a computer processor can read instructions. The instructions may comprise code from any computer-programming language, including, for example, C, C#, Visual Basic, Java, and JavaScript.

AMENDMENTS TO THE CLAIMS

1. (Previously Presented) A method comprising:

receiving a pressure signal indicating a pressure from an input device;

determining a change in pressure based at least in part on the pressure signal;

determining a velocity associated with the pressure signal; and

outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed.

2. (Previously Presented) The method of claim 31, wherein the adaptive pressure threshold value is associated with an absolute pressure threshold.

3. (Previously Presented) The method of claim 31, wherein the adaptive pressure threshold value is associated with a position received from the input device.

4. (Previously Presented) The method of claim 31, wherein the adaptive pressure threshold value can vary over time.

5. (Previously Presented) The method of claim 31, wherein the adaptive pressure threshold value is associated with a user identifier.

6. (Cancelled)

7. (Original) The method of claim 1, wherein the pressure signal comprises a pseudo pressure signal.

8. (Original) The method of claim 1, further comprising applying a pressure filter to the pressure signal to create a filtered pressure signal.

9. (Original) The method of claim 8, wherein the pressure filter comprises a first pressure filter comprising a first attribute, and further comprising applying a second pressure filter to the pressure signal, the second pressure filter comprising a second attribute that is different than the first attribute.

10. (Original) The method of claim 9, wherein the first attribute comprises a first frequency value and the second attribute comprises a second frequency value.

11. (Original) The method of claim 10, wherein the second frequency value is lower than the first frequency value.

12. (Original) The method of claim 8, wherein applying the pressure filter comprises applying the pressure filter utilizing a sliding window.

13. (Original) The method of claim 1, wherein the input device comprises one of a touchpad, a touch panel, and a touch screen.

14. (Cancelled)

15. (Cancelled)

16. (Previously Presented) The method of claim 1, wherein the pressure signal comprises a first pressure signal and further comprising:

receiving a second pressure signal indicating a second pressure from the input device;

calculating a difference signal indicative of a difference between the first pressure signal and the second pressure signal;

comparing the difference signal to a difference threshold value; and

outputting the press signal if the difference signal is greater than the difference threshold value.

17. (Original) The method of claim 16, further comprising filtering the difference signal to create a filtered difference signal.

18. (Original) The method of claim 1, further comprising outputting a signal associated with a haptic effect, the haptic effect based at least in part on the pressure signal.

19. (Previously Presented) A computer-readable medium on which is encoded programming code, comprising:

program code for receiving a pressure signal indicating a pressure from an input device;

determining a change in pressure based at least in part on the pressure signal;

program code for determining a velocity associated with the pressure signal; and

program code for outputting a press signal if the velocity is less than the velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed.

20. (Cancelled)

21. (Original) The computer-readable medium of claim 19, further comprising program code for applying a pressure filter to the pressure signal to create a filtered pressure signal.

22. (Original) The computer-readable medium of claim 21, wherein the pressure filter comprises a first pressure filter comprising a first attribute, and further comprising program code for applying a second pressure filter to the pressure signal, wherein the second pressure filter comprises a second attribute that is different than the first attribute.

23. (Original) The computer-readable medium of claim 21, wherein program code for applying the pressure filter comprises program code for applying the pressure filter utilizing a sliding window.

24. (Cancelled)

25. (Cancelled)

26. (Previously Presented) The computer-readable medium of claim 19, wherein the pressure signal comprises a first pressure signal and further comprising:

program code for receiving a second pressure signal indicating a second pressure from the input device;

program code for calculating a difference signal indicative of a difference between the first pressure signal and the second pressure signal;

program code for comparing the difference signal to a difference threshold value; and

program code for outputting the press signal if the difference signal is greater than the difference threshold value.

27. (Original) The computer-readable medium of claim 26, further comprising program code for filtering the difference signal to create a filtered difference signal.

28. (Original) The computer-readable medium of claim 19, further comprising program code for outputting a signal associated with a haptic effect, the haptic effect based at least in part on the pressure signal.

29. (Previously Presented) The method of claim 1, further comprising:

determining a rate of change of pseudo-pressure associated with the pressure signal;

comparing the rate of change of pseudo-pressure with a pseudo-pressure threshold; and

outputting a press signal if the rate of change of pseudo-pressure is greater than the pseudo-pressure threshold

30. (Previously Presented) The computer-readable medium of claim 19, further comprising:

program code for determining a rate of change of pseudo-pressure associated with the pressure signal;

program code for comparing the rate of change of pseudo-pressure with a pseudo-pressure threshold; and

program code for outputting a press signal if the rate of change of pseudo-pressure is greater than the pseudo-pressure threshold.

31. (Previously Presented) The method of claim 1, further comprising comparing the pressure signal to an adaptive pressure threshold value, and outputting the press signal if the pressure signal is greater than the adaptive pressure threshold value

32. (Previously Presented) The computer-readable medium of claim 19, further comprising program code for comparing the pressure signal to an adaptive pressure threshold value, and program code for outputting the press signal if the pressure signal is greater than the adaptive pressure threshold value

REMARKS

This paper is filed in response to the Office Action mailed September 24, 2008.

Following the amendments above, claims 1-5, 7- 13, 16-19, 21-23, and 26-32 are pending in this application. Claims 1-13, 16-23, and 26-32 stand rejected under 35 U.S.C. § 112, ¶ 1 for allegedly failing to comply with the written description requirement. Claims 19-23, 26-28, 30, and 32 stand rejected under 35 U.S.C. § 101 as allegedly being directed towards unpatentable subject matter. Claims 1-3, 5-13, 16, 17, 19-23, 26, 27, and 29-32 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. 5,880,411 to Gillespie et al ("Gillespie") in view of U.S. Patent No. 6,590,568 to Astala et al ("Astala"). Claim 4 stands rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Gillespie in view of Astala and further in view of U.S. Patent Publication No. 2003/0063073 to Geaghan et al ("Geaghan"). Claims 18 and 28 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Gillespie in view of Astala and further in view of U.S. Patent No. 6,118,435 to Fujita et al ("Fujita").

Applicant has cancelled claims 6 and 20. Applicant traverses each of the Examiner's rejections of the claims and respectfully requests reconsideration and allowance of all claims in view of the remarks below.

I. § 112, ¶ 1 – Claims 1-13, 16-23, and 26-32

Applicant respectfully traverses the rejection of claims 1-13, 16-23, and 26-32 under 35 U.S.C. § 112, ¶ 1.

Applicant has cancelled claims 6 and 20 rendering the rejection of those claims moot.

The Examiner has rejected claims 1 and 19 for reciting a "change in pressure threshold." See Office Action, p. 3. Based on the Examiner's rejection, there appears to be confusion over the use of the phrase in question. The Examiner states that the specification recites comparing a change in pressure to a threshold value. See Office Action, p. 3. Further, the specification recites comparing a change in pressure to a threshold value. See e.g. Specification, ¶ 3. Additionally, Figure 2 shows step 222 in which a change in pressure (ΔP) is compared to a threshold. Further, it is disclosed that if

several conditions are true, including that a change in pressure is greater than a threshold, a press signal is output. Thus, the element that recites "the change in pressure is greater than a change in pressure threshold" is supported by the specification.

It should be noted that the threshold quoted above is a "change in pressure" threshold (i.e. a threshold for ΔP), which may be a constant value, rather than a pressure threshold that is changing, which appears to be the Examiner's interpretation.

For the foregoing reasons, Applicant respectfully asserts that claims 1 and 19, and consequently their dependent claims, satisfy the requirements of 35 U.S.C. § 112, ¶ 1.

II. § 101 – Claims 19-23, 26-28, 30, and 32

Applicant respectfully traverses the rejection of claims 19-23, 26-28, 30, and 32 under 35 U.S.C. § 101 as allegedly being directed to non-patentable subject matter.

In response to the Examiner's assertion that the description of 'computer-readable media' in the specification may encompass a pure signal embodiment, Applicant has deleted reference to 'transmission device' from paragraph 20 to clarify that claims 19-23, 26-28, 30, and 32 do not claim pure signal embodiments. This deletion is only intended to ensure the scope of the term 'computer-readable media' does not cover pure signal embodiments, but does not otherwise indicate any intent to disclaim any other non-pure signal embodiments that 'computer-readable media' may encompass.

In view of the foregoing, Applicant respectfully asserts that claims 19-23, 26-28, 30, and 32 do not include pure signal embodiments within their scope and therefore claim only patentable subject matter. Applicant respectfully requests the Examiner withdraw the rejection of claims 19-23, 26-28, 30, and 32.

III. § 103(a) – Gillespie in view of Astala – Claims 1-3, 5-13, 16, 17, 19-23, 26, 27, and 29-32

Applicant respectfully traverses the rejection of claims 1-3, 5-13, 16, 17, 19-23, 26, 27, and 29-32 under 35 U.S.C. § 103(a) as being unpatentable over Gillespie in view of Astala.

To sustain a rejection under 35 U.S.C. § 103(a), the combined references must teach or suggest each and every element of the claimed invention. See M.P.E.P. § 2143.03.

Applicant has cancelled claims 6-20 rendering their rejection moot.

In response to Applicant's arguments presented in the previous response, the Examiner argues that Gillespie discloses "the change in pressure is greater than a change in pressure threshold" because Gillespie recites "the finger pressure increases past threshold ZpushDown, causing the virtual button to be pressed." See Office Action, p. 9. However, this does not disclose that a change in pressures is being calculated or compared against a threshold. Rather, the quoted section discloses that a pressure, not a change in pressure, is compared against the threshold in an iterative fashion until the pressure is greater than the threshold, at which time a button press occurs. Thus, Gillespie does not disclose comparing a change in pressure to a threshold, but only discloses comparing a pressure to a threshold.

Further, with respect to Astala, the Examiner responds that Astala discloses "the change in pressure is greater than a change in pressure threshold" because:

> Astala teaches "at step 710, a determination is made that the value of the pressure z of touch input 732 is greater than a predetermined value Za over the period of time t.sub.1 that the object touches the touch screen 70, that is greater than a predetermined time tA. That is, the pressure of the object touching the touch screen 70 is determined to be greater than a predetermined pressure value for a period of time, which is greater than a predetermined period of time," which clearly teaches outputting a press signal if the value of a **pressure of a touch input is greater than a pressure threshold** and a first time interval has elapsed. (emphasis added)

As can be seen in the emphasized portion of the language from the Office Action, the Examiner alleges that Astala discloses comparing a pressure to a pressure threshold. See Office Action, p. 9-10. But this is not the same as comparing a change in pressure to a threshold as recited in claim 1. Thus, Astala also fails to teach "the change in pressure is greater than a change in pressure threshold."

With respect to the Examiner's rejection, because Gillespie in view of Astala does not teach or suggest "outputting a press signal if the velocity is less than a velocity

threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed" as recited in claim 1, claim 1 is patentable over the combined references. The Examiner has cited to column 35 lines 28-30 and column 49, lines 8-12 to support the assertion that Gillespie teaches comparing a change in pressure to a threshold. However, these two portions of Gillespie relate to a pressure value, not a change in pressure value:

> Finally, the Z signal exceeds threshold Ztap for at least some part of thes stroke. Thus the stroke qualifies as a tap. Gillespie, Col. 35, lines 28-30.

> FIG. 19 is a timing diagram illustrating a "push" gesture. To perform this gesture, the finger is first brought near enough to cause cursor motion without causing a virtual button press. Next, the finger pressure increases past threshold ZpushDown, causing the virtual button to be pressed. Gillespie, Col. 49, lines 8-12.

Each of these passages describes comparing a "pressure" with a threshold, not a "change in pressure" with a "change in pressure" threshold. As such, Gillespie does not teach or suggest "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed." Astala does not cure this deficiency. Astala teaches a method for dragging a virtual object across a touch screen by dragging a finger across the touch screen. The portion cited by the Examiner does not relate to detecting a press event. Instead it relates to the detection of the drag gesture. The detection of a press is dealt with summarily:

> The process begins at step 700. At step 702, a touch screen input is detected. That is, the touch of an object, such as a finger or pointed stylus, on the touch screen 70 is detected. This is illustrated in FIG. 6b by touch input 732 being disposed over the object file 1 of window 728. Astala, Col. 9, lines 15-19.

Thus, neither Astala, nor Gillespie in view of Astala, teach or suggest "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed" as recited in claim 1. As such, claim 1 is patentable over Gillespie in view of Astala. Applicant respectfully requests the Examiner withdraw the rejection of claim 1.

Similar to claim 1, claim 19 recites "program code for outputting a press signal if the velocity is less than the velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed." Claim 19 is patentable over Gillespie in view of Astala for at least the same reasons as claim 1. Applicant respectfully requests the Examiner withdraw the rejection of claim 1.

Because claims 2-3, 5, 7-13, 16, 17, 21-23, 26, 27, and 29-32 each depend from and further limit either claim 1 or claim 19, claims 2-3, 5, 7-13, 16, 17, 21-23, 26, 27, and 29-32 are each patentable over Gillespie in view of Astala for at least the same reasons. Applicant respectfully requests the Examiner withdraw the rejection of claims 2-3, 5, 7-13, 16, 17, 21-23, 26, 27, and 29-32.

IV. § 103(a) – Gillespie in view of Astala and Geaghan – Claim 4

Applicant respectfully traverses the rejection of claim 4 under 35 U.S.C. § 103(a) as being unpatentable over Gillespie in view of Astala and further in view of Geaghan.

To sustain a rejection under 35 U.S.C. § 103(a), the combined references must teach or suggest each and every element of the claimed invention. See M.P.E.P. § 2143.03.

Because Gillespie in view of Astala and further in view of Geaghan does not teach or suggest "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed" as recited in claim 1, from which claim 4 depends, claim 4 is patentable over the combined references. As discussed above, Gillespie in view of Astala does not teach or suggest "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed." Geaghan does not cure this deficiency. Geaghan teaches that a change in pressure should be **less than** a threshold to detect a valid press event, not that a change in pressure should be greater than a threshold as recited in claim 1. See Geaghan, Figure 1. Further, Geaghan states that if the rate of change of pressure is greater than a threshold, it "can indicate a double touch or an unstable touch. If the touch is stable and the rate of change is less than a threshold, a position can be reported." Geaghan, Paragraph 50. As such, Geaghan teaches that a change in pressure greater than a threshold is undesirable

when detecting a touch, contrary to elements recited in claim 4. Thus, claim 4 is patentable over the combined references. Applicant respectfully requests the Examiner withdraw the rejection of claim 4.

V. § 103(a) – Gillespie in view of Astala and Fujita – Claims 18 and 28

Applicant respectfully traverses the rejection of claims 18 and 28 under 35 U.S.C. § 103(a) as being unpatentable over Gillespie in view of Astala and further in view of Fujita.

To sustain a rejection under 35 U.S.C. § 103(a), the combined references must teach or suggest each and every element of the claimed invention. See M.P.E.P. § 2143.03.

Because Gillespie in view of Astala and further in view of Fujita does not teach or suggest "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed" as recited in claim 1, from which claim 18 depends, claim 18 is patentable over the combined references. As discussed above, Gillespie in view of Astala does not teach or suggest "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed." Fujita does not cure this deficiency.

Fujita generally teaches a touch panel with tactile feedback. However, Fujita teaches that detection of a press is made as follows:

> Within the case 1, a press detection switch 6 is provided between the touch panel 3 and the touch-panel support plate 4 therebelow for detection of a press on the touch panel 3 at a pressure greater than a predetermined level Pt and for output of a press detection signal SS (see FIG. 2). The press detection switch 6 constitutes the press detecting means. The predetermined pressure Pt in this case means a pressure such as to cause the press detection switch 6 to output the press detection signal SS. Fujita, Col. 4, lines 19-27.

As such, Fujita teaches that a press is detected simply by detecting a pressure above a threshold. This is not the same as "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure

threshold, and a first interval has elapsed." Thus, the combined references do not teach or suggest each and every element of claim 18. Therefore, claim 18 is patentable over the combined references. Applicant respectfully requests the Examiner withdraw the rejection of claim 18.

Claim 28 depends from claim 19, which recites "program code for outputting a press signal if the velocity is less than the velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed." Claim 28 is patentable over the combined references for at least the same reasons as claim 18. Applicant respectfully requests the Examiner withdraw the rejection of claim 28.

CONCLUSION

Applicant respectfully asserts that in view of the amendments and remarks above, all pending claims are allowable and Applicant respectfully requests the allowance of all claims.

Should the Examiner have any comments, questions, or suggestions of a nature necessary to expedite the prosecution of the application, or to place the case in condition for allowance, the Examiner is courteously requested to telephone the undersigned at the number listed below.

Respectfully submitted,

Date: 11/21/2008

Carl Sanders
Reg. No. 57,203

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(336) 734-2629 (fax)

Electronic Acknowledgement Receipt

EFS ID:	4335300
Application Number:	10723778
International Application Number:	
Confirmation Number:	4196
Title of Invention:	Systems and methods for adaptive interpretation of input from a touch-sensitive input device
First Named Inventor/Applicant Name:	Henry DaCosta
Customer Number:	34300
Filer:	Carl E. Sanders/Dee Jones
Filer Authorized By:	Carl E. Sanders
Attorney Docket Number:	IMM174
Receipt Date:	21-NOV-2008
Filing Date:	26-NOV-2003
Time Stamp:	17:32:39
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	Miscellaneous Incoming Letter	IMM174Transmittal.pdf	42364 201ec5fca398046116998ec975bbb7c85cb cdc1b	no	1

Warnings:	
Information:	

2	Amendment After Final	IMM174Response.pdf	627058 4a6c52984a35ae915ab9a9fbdc12956ec32499e8	no	14
Warnings:					
Information:					
			Total Files Size (in bytes):	669422	

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

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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

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

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of	:	Henry DaCosta
Application No.	:	10/723,778
Filed	:	November 26, 2003
For	:	**SYSTEMS AND METHODS FOR ADAPTIVE INTERPRETATION OF INPUT FROM A TOUCH-SENSITIVE INPUT DEVICE**
Examiner	:	Regina Liang
Art Unit	:	2629

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

TRANSMITTAL

Sir:

Transmitted herewith is a copy of the following document(s) for filing in the above-identified application:

Transmittal; and
Amendment and Response to Final Office Action;

Shown below are the fees for the presentation of the amended claims:

	Claims Remaining	Highest # Previously Paid For	Extra	Rate	Fee
TOTAL	26	28	0	$52	$ 0
Ind. Cls.	2	3	0	$220	$ 0
Multiple Dependent Claim Added.....					NO
				TOTAL	$0

The Commissioner is hereby authorized to charge any deficiency to Deposit Account Number 16-1435.

Respectfully submitted,

By: _____
Carl Sanders (Reg. No. 57,203)

Date: November 21, 2008
KILPATRICK STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101
(336) 607-7300

Certificate of Electronic Filing

I hereby certify that this correspondence is being electronically filed with The United States Patent Office via EFS-Web, on November 21, 2008.

_____
Dee Jones

US2000 11139432.1 51851-279589

PTO/SB/06 (07-06)
Approved for use through 1/31/2007. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
10/723,778	11/26/2003	

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)	SMALL ENTITY ☐		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	11/21/2008	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 26	Minus	** 28	= 0	X $ =		OR	X $52=	0
	Independent (37 CFR 1.16(h))	* 2	Minus	***3	= 0	X $ =		OR	X $220=	0
	☐ 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	0

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

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/MARQUETTA MCGEE/

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

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

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/723,778	11/26/2003	Henry DaCosta	IMM174	4196

34300 7590 09/24/2008

PATENT DEPARTMENT (51851)
KILPATRICK STOCKTON LLP
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WINSTON-SALEM, NC 27101

EXAMINER	
LIANG, REGINA	
ART UNIT	**PAPER NUMBER**
2629	

MAIL DATE	DELIVERY MODE
09/24/2008	PAPER

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.

Office Action Summary	Application No.	Applicant(s)	
	10/723,778	DACOSTA ET AL.	
	Examiner	Art Unit	
	Regina Liang	2629	

-- 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 *07 July 2008*.

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

3)☐ 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

4)☒ Claim(s) *1-13,16-23 and 26-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13, 16-23, 26-32* is/are rejected.

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

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

Application Papers

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

10)☐ 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).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

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).

a)☐ All b)☐ Some * c)☐ None of:

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) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-13, 16-23, 26-32 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Fig. 3 and section [0050] of the specification discloses "If the speed is less than the speed threshold, the change in pseudo pressure is compared to a threshold value 322. If the change in pseudo pressure is less than or equal to the threshold, the processor (106) returns to step 302 in the process. If the change in pseudo pressure is greater than the threshold, the processor (106) determines whether the first interval has elapsed 324, if so, the processor (106) concludes that the user is pressing 326 and the processor (106) returns to step 302 in the process". In step 322, the specification discloses the change in pseudo pressure is compared to **a threshold value**. The specification does not disclose in step 322 that the change in pseudo pressure is compared to a first pressure threshold value and a second pressure threshold value, and outputting the signal if

the pressure signal is greater than both first pressure threshold value and the second pressure threshold value as is now claimed in claims 6 and 20.

Although the specification discloses in steps 302 and 306 of Fig. 3, comparing the pressure signal to an upper threshold and to a lower threshold, respectively, in step 306, comparing the pressure signal to a lower threshold (corresponds to a second pressure threshold value) occurs only if the pressure signal is **less than** the upper threshold (corresponds to a first pressure threshold value) at step 302. The specification does not disclose outputting the signal if the pressure signal is greater than **both** the first pressure threshold value and the second pressure threshold value. Therefore, the specification does not provide support for "comparing to a second pressure threshold value, and outputting the signal if the pressure signal is greater than both first pressure threshold value and the second pressure threshold value" as claimed in claims 6 and 20

The step 322 and the specification [0050] disclose "If the speed is less than the speed threshold, the change in pseudo pressure is compared to a threshold value 322. … If the change in pseudo pressure is greater than the threshold, the processor (106) determines whether the first interval has elapsed 324. If so, the processor (106) concludes that the user is pressing 326". The original specification discloses the change in pressure is greater than **a threshold value** where the threshold value is constant. Thus, the original specification does not provide support for "a change in pressure threshold" as alleged by applicant in the remarks regarding claims 1 and 19.

In view of the above 112 1st problems, the claims are interpreted in light of the specification for examination purposes.

Claim Rejections - 35 USC § 101

4. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claims 19-23, 26-28, 30, 32 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claims 19-23, 26-28, 30, 32 are rejected under 35 U.S.C. 101 as being non-statutory because claims although claim a computer-readable medium on which is encoded programming code, however, page 8, [0024] of the specification discloses "Embodiments of computer-readable media include, but are not limited to, an electronic, optical, magnetic, or other storage or **transmission device** capable of providing a processor, …. " (emphasis added), in light of the definition in the specification, the medium (transmission device) as claimed is that of a signal. As set forth in the Interim Guidelines, page 55, "A claimed signal has no physical structure, does not itself perform any useful, concrete and tangible result and, thus, does not fit within the definition of a machine". Therefore, claims 19-23, 26-28, 30, 32 are nothing but a signal and signal is non-statutory.

Claim Rejections - 35 USC § 103

6. Claims 1-3, 5-13, 16, 17, 19-23, 26, 27, 29-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gillespie et al (US 5,880,411 hereinafter Gillespie) in view of Astala et al (US 6,590,568 hereinafter Astala).

As to claims 1, 19, Gillespie discloses a method comprising: receiving a pressure signal (e.g. Z-value, Fig. 1) indicating a pressure from an input device (e.g. finger); determining a change in pressure based at least in part on the pressure signal (col. 23, lines 25-32, col. 24, lines

44-60 for example); determining a velocity associated with the pressure signal; and outputting a press signal if the velocity is less than the velocity threshold (col. 36, lines 26-47, which states" There are several ways to distinguish between a true drag and a press. **A true drag can be identified if the finger's speed of motion prior to lift-off is above a small threshold**. A press can be identified if the finger was stationary through the entire gesture, possibly ignoring small, inconsequential movements"; in other words, a press can be identified if the finger's speed of motion prior to lift-off is below a small threshold), and the change in pressure is greater than a change in pressure threshold (col. 35, lines 28-30, and col. 49, lines 8-12 for example).

Gillespie does not disclose outputting a press signal if a first interval has elapsed. However, Astala is cited to teach outputting a press signal if the value of pressure of touch input is greater than a pressure threshold and a first interval has elapsed (col. 9, lines 24-35). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gillespie to output the press signal if a first interval has elapsed as taught by Astala so as to "provide a touch screen technique for an electronic device in which the location and the time duration of an object, such as a finger or stylus or other pointed object, contacting or pressing a detection point on the touch screen, are detected" (col. 2, lines 21-23 of Astala) and to eliminate unintentional contact.

As to claims 31, 32, Gillespie discloses comparing the pressure signal to an adaptive pressure threshold value, and outputting the press signal if the pressure signal is greater than the adaptive pressure threshold value (302, 320 in Fig. 17A).

As to claim 2, Gillespie also discloses an adaptive pressure threshold value (col. 23, lines 29-32), wherein the adaptive pressure threshold value (Z_{TH}) is associated with an absolute

pressure threshold.

As to claim 3, Gillespie discloses adaptive pressure threshold value is associated with a position received from the input device (e.g. the Z-values is derived from the position signals X and Y).

As to claim 5, Gillespie discloses the adaptive pressure threshold value is associated with a user identifier (col. 23, lines 31-32).

As to claims 6, 20, Fig. 9 of Gillespie discloses the adaptive pressure threshold value comprises a first pressure threshold value, and further comprising: comparing the pressure signal to a second pressure threshold value; and outputting the signal if the pressure signal is greater than both the first pressure threshold value and the second pressure threshold value.

As to claims 16 and 20, Gillespie discloses a first pressure signal and a second pressure signal, calculating a different signal indicative of a difference between the first and second pressure signal, comparing the difference signal to a difference threshold value and outputting the press signal if the difference signal is greater than the difference threshold value (col. 24, lines 20-60).

As to claim 7, Gillespie discloses the pressure signal comprises a pseudo pressure signal (e.g. the pressure value is varied in accordance with the capacitance value).

As to claim 8, Gillespie discloses supplying a pressure filter (48-1...48-n, Fig. 3) to the pressure signal to create a filtered pressure signal.

As to claims 9-11, 17, 21-22, 27, Gillespie discloses the pressure filter comprises a first pressure filter comprising a first attribute (e.g. high frequency, col. 13, lines 34-44), and further comprising applying a second pressure filter to the pressure signal, the second pressure filter

comprising a second attribute (e.g. low frequency, col. 15, line 55) that is different than the first attribute.

As to claims 12, 23, Gillespie discloses applying the pressure filter comprises applying the pressure filter utilizing a sliding window (col. 28, lines 47-58).

As to claim 13, Gillespie discloses the input device comprises a touch pad (10, Fig. 1).

As to claims 29, 30, Gillespie discloses determining a rate of change of pseudo-pressure associated with the pressure signal (determining the Z value applied by the user), comparing the rate of change of pseudo-pressure with a threshold (302, 320 in Fig. 17A) and outputting a pressing signal if the rate of change of pseudo-pressure is greater than the pseudo-threshold (Fig. 17A).

7. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gillespie and Astala as applied to claim 31, and further in view Geaghan et al (US 2003/0063073 hereinafter Geaghan).

As to claim 4, Gillespie as modified by Astala does not disclose the adaptive pressure threshold value can vary over time. However, Geaghan teaches the thresholds can be adjusted over time (lines 16-20 in [0040]). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gillespie as modified by Astala to adjust the adaptive pressure threshold value over time as taught by Geaghan to distinguish valid touch inputs on a continuously updated basis.

8. Claims 18 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gillespie and Astala as applied to claims 1 and 19, and further in view of Fujita et al. (US Patent No. 6,118,435).

As to claims 18 and 28, it is noted that Gillespie as modified by Astala does not specifically disclose outputting a signal associated with a haptic effect, the haptic effect based at least in part on the pressure signal. Fujita is cited to teach a touch panel device similar to Gillespie. Fujita further discloses a signal associated with a haptic effect, the haptic effect based at least in part on the pressure signal (see abstract and Fig. 2). It would have been obvious to one of ordinary skill in the art to have modified Gillespie as modified by Astala with the tactile force feedback as taught by Fujita so as to provide an interaction between the user and the computer.

Response to Arguments

9. Applicant's arguments filed 7/7/08 have been fully considered but they are not persuasive.

Applicant's remarks regarding 112 1st rejections are not persuasive. In Fig. 3, steps 302 and 306 and paragraphs 41 and 46 of the specification may disclose an upper threshold and a lower threshold. However, the step 306 comparing the pressure signal to the lower threshold **only if** the pressure signal is **less than** the upper threshold. The specification does not disclose comparing the pressure signal against **both** upper and lower thresholds and outputting the press signal if the pressure signal is greater than **both** the upper and lower thresholds as claimed. The claims require "outputting the press signal if the pressure signal is greater than the adaptive pressure threshold value" (claims 31, 32) and the adaptive pressure threshold value comprising a

first and second pressure threshold values (claims 6, 20). The specification only discloses outputting the **press signal** at step 326 (Fig. 3) if the speed is less than a speed threshold, the change in pressure is grater than a threshold value and a first interval has elapsed. The steps 302 and 306 in Fig. 3 of the specification are comparing the pseudo pressure against both lower and upper thresholds to determine whether the finger is **touching** (at step 318), which is not a **press signal**.

Applicant's remarks regarding Gillespie on pages 5-6 are not persuasive. Fig. 19 and col. 49, lines 8-12 of Gillespie teaches "Fig. 19 is a timing diagram illustrating a "push" gesture. To perform this gesture, the finger is first brought near enough to cause cursor motion without causing a virtual button press. Next, **the finger pressure increase past threshold ZpushDown, causing the virtual button to be pressed**" (emphasis added). As stated in the 112 1st rejection above, step 322 in Fig. 3 and [0050] of the specification discloses "the change in pseudo pressure is compared to a threshold value 322". Gillespie clearly teaches comparing a change in pressure (i.e., increase) with a threshold and outputting a press signal if the change in pressure is greater than the threshold as claimed.

Applicant's remarks regarding Astala on page 6 are not persuasive. Col. 9, lines 24-35 of Astala teaches "at step 710, a determination is made that the value of the pressure z of touch input 732 is greater than a predetermined value Za over the period of time t1 that the object touches the touch screen 70, that is greater than a predetermined time tA. that is, the pressure of the object touching the touch screen 70 is determined to be greater than a predetermined pressure value for a period of time, which is greater than a predetermined period of time", which clearly teaches outputting a press signal if the value of pressure of touch input is greater than a pressure

threshold and a first time interval has elapsed. Therefore, Gillespie as modified by Astala discloses "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed" as claimed in claims 1 and 19.

Applicant's remarks regarding dependent claims 4, 18, 28 are not persuasive since the combination of references reads on the claims.

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Regina Liang whose telephone number is (571) 272-7693. The examiner can normally be reached on Monday-Friday from 8AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Hjerpe, can be reached on (571) 272-7691. 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).

/Regina Liang/
Primary Examiner, Art Unit 2629

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	10723778	DACOSTA ET AL.
	Examiner	Art Unit
	Regina Liang	2629

✓	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	11/19/2006	02/26/2008	09/08/2008						
	1	✓	✓	✓						
	1	✓	✓	✓						
	2	✓	✓	✓						
	3	✓	✓	✓						
	4	✓	✓	✓						
	5	✓	✓	✓						
	6	✓	✓	✓						
	7	✓	✓	✓						
	8	✓	✓	✓						
	9	✓	✓	✓						
	10	✓	✓	✓						
	11	✓	✓	✓						
	12	✓	✓	✓						
	13	✓	✓	✓						
	14	✓	-	-						
	15	✓	-	-						
	16	✓	✓	✓						
	17	✓	✓	✓						
	18	✓	✓	✓						
	19	✓	✓	✓						
	20	✓	✓	✓						
	21	✓	✓	✓						
	22	✓	✓	✓						
	23	✓	✓	✓						
	24	✓	-	-						
	25	✓	-	-						
	26	✓	✓	✓						
	27	✓	✓	✓						
	28	✓	✓	✓						
	29		✓	✓						
	30		✓	✓						
	31		✓	✓						
	32		✓	✓						

Attorney Docket IMM174

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Henry DaCosta et al
Application No.	:	10/723,778
For	:	**Systems and Methods for Adaptive Interpretation of Input from a Touch-Sensitive Input Device**
Filed	:	November 26, 2003
Examiner	:	Regina Liang
Art Unit	:	2629

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

AMENDMENT AND RESPONSE TO NON-FINAL OFFICE ACTION

Sir:

The following Amendment and Remarks are submitted in response to the Office Action mailed March 6, 2008.

Amendments to the Specification begin on page 2 of this paper.

Remarks begin on page 3 of this paper.

AMENDMENTS TO THE SPECIFICATION

Please replace paragraph 20 of the specification with the following paragraph.

[0020] Embodiments of computer-readable media include, but are not limited to, an electronic, optical, magnetic, or other storage or transmission device capable of providing a processor, such as the processor 106 in communication with a touch-sensitive input device, with computer-readable instructions. Other examples of suitable media include, but are not limited to, a floppy disk, CD-ROM, magnetic disk, memory chip, ROM, RAM, an ASIC, a configured processor, all optical media, all magnetic tape or other magnetic media, or any other medium from which a computer processor can read instructions. ~~Also, various other forms of computer-readable media may transmit or carry instructions to a computer, including a router, private or public network, or other transmission device or channel, both wired and wireless.~~ The instructions may comprise code from any computer-programming language, including, for example, C, C#, Visual Basic, Java, and JavaScript.

REMARKS

This paper is filed in response to the Office Action mailed March 6, 2008.

Claims 1-13, 16-23, and 26-32 are pending in this application. Claims 6 and 20 are rejected under 35 U.S.C. § 112, ¶ 1 for allegedly failing to comply with the written description requirement. Claims 19-23, 26-28, 30, and 32 are rejected under 35 U.S.C. § 101 for allegedly being directed to non-statutory subject matter. Claims 1-3, 5-13, 16, 17, 19-23, 26, 27, and 29-32 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. 5,880,411 to Gillespie et al ("Gillespie") in view of U.S. Patent No. 6,590,568 to Astala et al ("Astala"). Claim 4 is rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Gillespie in view of Astala and further in view of U.S. Patent Publication No. 2003/0063073 to Geaghan et al ("Geaghan"). Claims 18 and 28 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Gillespie in view of Astala and further in view of U.S. Patent No. 6,118,435 to Fujita et al ("Fujita").

Applicant has amended the specification. No new matter is added by this amendment, and support may be found in the specification and claims as originally filed.

Applicant traverses each of the Examiner's rejections and respectfully requests reconsideration and allowance of all claims in light of the remarks below.

As a preliminary matter, the Applicant notes that the Examiner appears to use the terms "pressure" and "change in pressure" interchangeably in the various rejections of the claims. This is incorrect because the two terms refer to different characteristics or values. As such, the use of one term should not be construed by the Examiner as a use of the other.

I. § 112, ¶ 1 – Claims 6 and 20

Claims 6 and 20 were rejected under 35 U.S.C. § 112, ¶ 1 as failing to comply with the written description requirement.

To satisfy the written description requirement of 35 U.S.C. § 112, ¶ 1, the applicant must describe the claimed invention with all of its limitations. See M.P.E.P. § 2163(I).

In the Office Action, the Examiner states that

> The specification does not disclose in step 322 that the change in pseudo pressure is compared to a first pressure threshold value and a second pressure threshold value, and outputting the signal if the pressure signal is greater than both first pressure threshold value and the second pressure threshold value. See Office Action, p. 3.

However, regardless of whether the Examiner's statement is true, the specification does provide written description for comparing a pressure value against two threshold values as recited in claims 6 and 20. For example, paragraph 41 recites that "[i]n the embodiment shown in FIG. 2, the processor (106) compares the pseudo pressure against both lower and upper thresholds to determine whether the finger is touching." Further, in paragraph 46, the specification recites "[i]n the embodiment shown in FIG. 3, a processor (106) executing program code first compares the pseudo pressure to an upper threshold value 302. If the pseudo pressure exceeds the upper threshold value, the process continues at step 314. If not, the processor (106) determines whether the user was previously touching, for example by checking the value of a stored flag 304. If so, the processor (106) compares the pseudo pressure to a lower threshold value 306." As such, with regards to both of figures 2 and 3, the specification describes comparing a pressure value to a first and second threshold value.

Further, Applicant would like to note that in the rejection, the Examiner stated that "the change in pseudo pressure is compared to a first pressure threshold value and a second pressure threshold value." This is not accurate based on the claim language. The claim language of claims 6 and 20 recites that a "pressure signal," not a "change in pressure," is compared against first and second thresholds.

In view of the foregoing, Applicant respectfully requests the Examiner withdraw the rejections of claims 6 and 20.

II. § 101 – Claims 19-23, 26-28, 30, and 32

Applicant respectfully traverses the Examiner's rejection of claims 19-23, 26-28, 30, and 32 under 35 U.S.C. § 101 as being directed towards non-patentable subject matter. The Examiner asserts that Applicant's definition of a computer-readable medium includes a signal *per se*, which were adjudged non-patentable subject matter in *In re*

Nuijten[1]. Applicant expressly states that, for the purposes of this application, the term computer-readable medium does not include a signal *per se*. However, to expedite prosecution, Applicant has cancelled the portion of the specification that the Examiner alleges recites a signal *per se*. Applicant respectfully requests the Examiner withdraw the rejection of claims 19-23, 26-28, 30, and 32.

III. § 103(a) – Gillespie in view of Astala – Claims 1-3, 5-13, 16, 17, 19-23, 26, 27, and 29-32

Applicant respectfully traverses the rejection of claims 1-3, 5-13, 16, 17, 19-23, 26, 27, and 29-32 under 35 U.S.C. § 103(a) as being unpatentable over Gillespie in view of Astala.

To sustain a rejection under 35 U.S.C. § 103(a), the combined references must teach or suggest each and every element of the claimed invention. See M.P.E.P. § 2143.03.

Because Gillespie in view of Astala does not teach or suggest "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed" as recited in claim 1, claim 1 is patentable over the combined references. The Examiner has cited to column 35 lines 28-30 and column 49, lines 8-12 to support the assertion that Gillespie teaches comparing a change in pressure to a threshold. However, these two portions of Gillespie relate a a pressure value, not a change in pressure value:

> Finally, the Z signal exceeds threshold Ztap for at least some part of thes stroke. Thus the stroke qualifies as a tap. Gillespie, Col. 35, lines 28-30.

> FIG. 19 is a timing diagram illustrating a "push" gesture. To perform this gesture, the finger is first brought near enough to cause cursor motion without causing a virtual button press. Next, the finger pressure increases past threshold ZpushDown, causing the virtual button to be pressed. Gillespie, Col. 49, lines 8-12.

Each of these passages describes comparing a "pressure" with a threshold, not a "change in pressure" with a "change in pressure" threshold. As such, Gillespie does not

[1] 500 F.3d 1346 (Fed. Cir. 2007).

teach or suggest "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed." Astala does not cure this deficiency. Astala teaches a method for dragging a virtual object across a touch screen by dragging a finger across the touch screen. The portion cited by the Examiner does not relate to detecting a press event. Instead it relates to the detection of the drag gesture. The detection of a press is dealt with summarily:

> The process begins at step 700. At step 702, a touch screen input is detected. That is, the touch of an object, such as a finger or pointed stylus, on the touch screen 70 is detected. This is illustrated in FIG. 6b by touch input 732 being disposed over the object file 1 of window 728. Astala, Col. 9, lines 15-19.

Thus, neither Astala, nor Gillespie in view of Astala, teach or suggest "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed" as recited in claim 1. As such, claim 1 is patentable over Gillespie in view of Astala. Applicant respectfully requests the Examiner withdraw the rejection of claim 1.

Similar to claim 1, claim 19 recites "program code for outputting a press signal if the velocity is less than the velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed." Claim 19 is patentable over Gillespie in view of Astala for at least the same reasons as claim 1. Applicant respectfully requests the Examiner withdraw the rejection of claim 1.

Because claims 2-3, 5-13, 16, 17, 20-23, 26, 27, and 29-32 each depend from and further limit either claim 1 or claim 19, claims 2-3, 5-13, 16, 17, 20-23, 26, 27, and 29-32 are each patentable over Gillespie in view of Astala for at least the same reasons. Applicant respectfully requests the Examiner withdraw the rejection of claims 2-3, 5-13, 16, 17, 20-23, 26, 27, and 29-32.

IV. § 103(a) – Gillespie in view of Astala and Geaghan – Claim 4

Applicant respectfully traverses the rejection of claim 4 under 35 U.S.C. § 103(a) as being unpatentable over Gillespie in view of Astala and further in view of Geaghan.

To sustain a rejection under 35 U.S.C. § 103(a), the combined references must teach or suggest each and every element of the claimed invention. See M.P.E.P. § 2143.03.

Because Gillespie in view of Astala and further in view of Geaghan does not teach or suggest "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed" as recited in claim 1, from which claim 4 depends, claim 4 is patentable over the combined references. As discussed above, Gillespie in view of Astala does not teach or suggest "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed." Geaghan does not cure this deficiency. Geaghan teaches that a change in pressure should be **less than** a threshold to detect a valid press event, not that a change in pressure should be greater than a threshold as recited in claim 1. Geaghan, Figure 1. Further, Geaghan states that if the rate of change of pressure is greater than a threshold, it "can indicate a double touch or an unstable touch. If the touch is stable and the rate of change is less than a threshold, a position can be reported." Geaghan, Paragraph 50. As such, Geaghan teaches that a change in pressure greater than a threshold is undesirable when detecting a touch, contrary to elements recited in claim 4. Thus, claim 4 is patentable over the combined references. Applicant respectfully requests the Examiner withdraw the rejection of claim 4.

V. § 103(a) – Gillespie in view of Astala and Fujita – Claims 18 and 28

Applicant respectfully traverses the rejection of claims 18 and 28 under 35 U.S.C. § 103(a) as being unpatentable over Gillespie in view of Astala and further in view of Fujita.

To sustain a rejection under 35 U.S.C. § 103(a), the combined references must teach or suggest each and every element of the claimed invention. See M.P.E.P. § 2143.03.

Because Gillespie in view of Astala and further in view of Fujita does not teach or suggest "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has

elapsed" as recited in claim 1, from which claim 18 depends, claim 18 is patentable over the combined references. As discussed above, Gillespie in view of Astala does not teach or suggest "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed." Fujita does not cure this deficiency.

Fujita generally teaches a touch panel with tactile feedback. However, Fujita teaches that detection of a press is made as follows:

> Within the case 1, a press detection switch 6 is provided between the touch panel 3 and the touch-panel support plate 4 therebelow for detection of a press on the touch panel 3 at a pressure greater than a predetermined level Pt and for output of a press detection signal SS (see FIG. 2). The press detection switch 6 constitutes the press detecting means. The predetermined pressure Pt in this case means a pressure such as to cause the press detection switch 6 to output the press detection signal SS. Fujita, Col. 4, lines 19-27.

As such, Fujita teaches that a press is detected simply by detecting a pressure above a threshold. This is not the same as "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed." Thus, the combined references do not teach or suggest each and every element of claim 18. Therefore, claim 18 is patentable over the combined references. Applicant respectfully requests the Examiner withdraw the rejection of claim 18.

Claim 28 depends from claim 19, which recites "program code for outputting a press signal if the velocity is less than the velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed." Claim 28 is patentable over the combined references for at least the same reasons as claim 18. Applicant respectfully requests the Examiner withdraw the rejection of claim 28.

CONCLUSION

Applicant respectfully asserts that in view of the amendments and remarks above, all pending claims are allowable and Applicant respectfully requests the allowance of all claims.

Should the Examiner have any comments, questions, or suggestions of a nature necessary to expedite the prosecution of the application, or to place the case in condition for allowance, the Examiner is courteously requested to telephone the undersigned at the number listed below.

Respectfully submitted,

Date: 7/7/2008

Carl Sanders
Reg. No. 57,203

KILPATRICK STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101
(336) 607-7474 (voice)
(336) 734-2629 (fax)

Electronic Patent Application Fee Transmittal

Application Number:	10723778
Filing Date:	26-Nov-2003
Title of Invention:	Systems and methods for adaptive interpretation of input from a touch-sensitive input device
First Named Inventor/Applicant Name:	Henry DaCosta
Filer:	Carl E. Sanders/Dee Jones
Attorney Docket Number:	IMM174

Filed as Large Entity

Utility 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:				
Extension - 1 month with $0 paid	1251	1	120	120

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
			Total in USD ($)	**120**

Electronic Acknowledgement Receipt

EFS ID:	3571736
Application Number:	10723778
International Application Number:	
Confirmation Number:	4196
Title of Invention:	Systems and methods for adaptive interpretation of input from a touch-sensitive input device
First Named Inventor/Applicant Name:	Henry DaCosta
Customer Number:	34300
Filer:	Carl E. Sanders/Dee Jones
Filer Authorized By:	Carl E. Sanders
Attorney Docket Number:	IMM174
Receipt Date:	07-JUL-2008
Filing Date:	26-NOV-2003
Time Stamp:	15:37:37
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$120
RAM confirmation Number	971
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes) /Message Digest	Multi Part /.zip	Pages (if appl.)

1	Miscellaneous Incoming Letter	IMM174Transmittal.pdf	34762 e1dc7203b8a9cd6c4355dacfdac37cb401601827	no	1
Warnings:					
Information:					
2	Extension of Time	IMM174Extension.pdf	75040 2e2f4132e3a7aee449a3348da750ca1eb86d9648	no	1
Warnings:					
Information:					
3	Amendment - After Non-Final Rejection	IMM174Response.pdf	422614 8c9395c7912e7b028c33da87d74f142e1ba6adbc	no	9
Warnings:					
Information:					
4	Fee Worksheet (PTO-06)	fee-info.pdf	8183 9bf8d33ebedce164a283730528762ac6ea2736dc	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	540599		

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

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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

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

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of	:	Henry DaCosta
Application No.	:	10/723,778
Filed	:	November 26, 2003
For	:	**SYSTEMS AND METHODS FOR ADAPTIVE INTERPRETATION OF INPUT FROM A TOUCH-SENSITIVE INPUT DEVICE**
Examiner	:	Regina Liang
Art Unit	:	2629

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

TRANSMITTAL

Sir:

Transmitted herewith is a copy of the following document(s) for filing in the above-identified application:

Amendment and Response to Non-Final Office Action;
One-Month Extension of Time; and
Payment of Fee ($120).

The Commissioner is hereby authorized to charge any deficiency to Deposit Account Number 16-1435.

Respectfully submitted,

By: _____
Carl Sanders (Reg. No. 57,203)

Date: July 7, 2008
KILPATRICK STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101
(336) 607-7300

Certificate of Electronic Filing

I hereby certify that this correspondence is being electronically filed with The United States Patent Office via EFS-Web, on July 7, 2008.

_____
Dee Jones

US2000 10931134.1 51851-279589

PTO/SB/22 (01-08)
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Under the paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless if displays a valid OMB control number.

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a) **FY 2008** *(Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).)*	Docket Number (Optional) IMM174
Application Number 10/723,778	Filed November 26, 2003
For Systems and Methods For Adaptive Interpretation of Input From A Touch-Sensitive Input Device	
Art Unit 2629	Examiner Regina Liang

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

		Fee	Small Entity Fee	
[X]	One month (37 CFR 1.17(a)(1))	$120	$60	$ 120
[ ]	Two months (37 CFR 1.17(a)(2))	$460	$230	$
[ ]	Three months (37 CFR 1.17(a)(3))	$1050	$525	$
[ ]	Four months (37 CFR 1.17(a)(4))	$1640	$820	$
[ ]	Five months (37 CFR 1.17(a)(5))	$2230	$1115	$

[ ] Applicant claims small entity status. See 37 CFR 1.27.

[ ] A check in the amount of the fee is enclosed.

[X] Payment by credit card. Form PTO-2038 is attached.

[ ] The Director has already been authorized to charge fees in this application to a Deposit Account.

[ ] The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number _____. I have enclosed a duplicate copy of this sheet.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

[ ] applicant/inventor.

[ ] assignee of record of the entire interest. See 37 CFR 3.71.
Statement under 37 CFR 3.73(b) is enclosed (Form PTO/SB/96).

[X] attorney or agent of record. Registration Number 57,203

[ ] attorney or agent under 37 CFR 1.34.
Registration number if acting under 37 CFR 1.34 _____

Signature — Date: 7/7/2008

Carl E. Sanders — Typed or printed name

336-607-7474 — Telephone Number

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

[ ] Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.136(a). 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 6 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.

PTO/SB/06 (07-06)
Approved for use through 1/31/2007. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD
Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
10/723,778	11/26/2003	

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	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	01/16/2008	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	SMALL ENTITY ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 28	Minus	** 28	= 0	X $ =		OR	X $50=	0
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0	X $ =		OR	X $210=	0
	☐ 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	0

7/7/08

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 28	Minus	** 28	= 1	X $ =		OR	X $ =	
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 1	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 number found in the appropriate box in column 1.

Legal Instrument Examiner:
marquita D. jones

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

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/723,778	11/26/2003	Henry DaCosta	IMM174	4196

34300 7590 03/06/2008

PATENT DEPARTMENT (51851)
KILPATRICK STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

EXAMINER	
LIANG, REGINA	
ART UNIT	**PAPER NUMBER**
2629	

MAIL DATE	DELIVERY MODE
03/06/2008	PAPER

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.

Office Action Summary	Application No.	Applicant(s)	
	10/723,778	DACOSTA ET AL.	
	Examiner	Art Unit	
	Regina Liang	2629	

-- 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 *16 January 2008*.

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

3)☐ 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

4)☒ Claim(s) *1-13,16-23 and 26-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13, 16-23, 26-32* is/are rejected.

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

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

Application Papers

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

10)☐ 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).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

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).

a)☐ All b)☐ Some * c)☐ None of:

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) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 1/16/08 has been entered. Claims 1-13, 16-23, 26-32 are pending in the application.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 6 and 20 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Fig. 3 and section [0050] of the specification discloses "If the speed is less than the speed threshold, the change in pseudo pressure is compared to a threshold value 322. If the change in pseudo pressure is less than or equal to the threshold, the processor (106) returns to step 302 in the process. If the change in pseudo pressure is greater than the threshold, the processor (106) determines whether the first interval has elapsed 324, if so, the processor (106) concludes that the user is pressing 326 and the processor (106) returns to step 302 in the process". In step 322, the specification discloses the change in pseudo pressure is compared to **a threshold value**. Although the specification discloses in steps 302 and 306 of Fig. 3, comparing the pressure signal to an upper threshold and to a lower threshold, respectively, the specification does not disclose in step 322 that the change in pseudo pressure is compared to a first pressure threshold value and a second pressure threshold value, and outputting the signal if the pressure signal is greater than both first pressure threshold value and the second pressure threshold value. Therefore, the specification does not provide support for "comparing to a second pressure threshold value, and outputting the signal if the pressure signal is greater than both first pressure threshold value and the second pressure threshold value" as claimed in claims 6 and 20

Claim Rejections - 35 USC § 101

5. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

6. Claims 19-23, 26-28, 30, 32 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claims 19-23, 26-28, 30, 32 are rejected under 35 U.S.C. 101 as being non-statutory because claims although claim a computer-readable

medium on which is encoded programming code, however, page 8, [0024] of the specification discloses "Embodiments of computer-readable media include, but are not limited to, an electronic, optical, magnetic, or other storage or transmission device capable of providing a processor, …. Also, various other forms of commuter-readable media may transmit or carry instructions to a computer, including a router, private or public network, or other transmission device or channel, both wired and wireless", in light of the definition in the specification, the medium as claimed is that of a signal. As set forth in the Interim Guidelines, page 55, "A claimed signal has no physical structure, does not itself perform any useful, concrete and tangible result and, thus, does not fit within the definition of a machine". Therefore, claims 19-23, 26-28, 30, 32 are nothing but a signal and signal is non-statutory.

Claim Rejections - 35 USC § 103

7. Claims 1-3, 5-13, 16, 17, 19-23, 26, 27, 29-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gillespie et al (US 5,880,411 hereinafter Gillespie) in view of Astala et al (US 6,590,568 hereinafter Astala).

As to claims 1, 19, Gillespie discloses a method comprising: receiving a pressure signal (e.g. Z-value, Fig. 1) indicating a pressure from an input device (e.g. finger); determining a change in pressure based at least in part on the pressure signal (col. 23, lines 25-32, col. 24, lines 44-60 for example); determining a velocity associated with the pressure signal; and outputting a press signal if the velocity is less than the velocity threshold (col. 36, lines 26-47, which states" There are several ways to distinguish between a true drag and a press. **A true drag can be identified if the finger's speed of motion prior to lift-off is above a small threshold**. A press

can be identified if the finger was stationary through the entire gesture, possibly ignoring small, inconsequential movements"; in other words, a press can be identified if the finger's speed of motion prior to lift-off is below a small threshold), and the change in pressure is greater than a change in pressure threshold (col. 35, lines 28-30, and col. 49, lines 8-112 for example).

Gillespie does not disclose outputting a press signal if a first interval has elapsed. However, Astala is cited to teach outputting a press signal if the value of pressure of touch input is greater than a pressure threshold and a first interval has elapsed (col. 9, lines 24-35). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gillespie to output the press signal if a first interval has elapsed as taught by Astala so as to "provide a touch screen technique for an electronic device in which the location and the time duration of an object, such as a finger or stylus or other pointed object, contacting or pressing a detection point on the touch screen, are detected" (col. 2, lines 21-23 of Astala) and to eliminate unintentional contact.

As to claims 31, 32, Gillespie discloses comparing the pressure signal to an adaptive pressure threshold value, and outputting the press signal if the pressure signal is greater than the adaptive pressure threshold value (302, 320 in Fig. 17A).

As to claim 2, Gillespie also discloses an adaptive pressure threshold value (col. 23, lines 29-32), wherein the adaptive pressure threshold value (Z_{TH}) is associated with an absolute pressure threshold.

As to claim 3, Gillespie discloses adaptive pressure threshold value is associated with a position received from the input device (e.g. the Z-values is derived from the position signals X and Y).

As to claim 5, Gillespie discloses the adaptive pressure threshold value is associated with a user identifier (col. 23, lines 31-32).

As to claims 6, 20, Fig. 9 of Gillespie discloses the adaptive pressure threshold value comprises a first pressure threshold value, and further comprising: comparing the pressure signal to a second pressure threshold value; and outputting the signal if the pressure signal is greater than both the first pressure threshold value and the second pressure threshold value.

As to claims 16 and 20, Gillespie discloses a first pressure signal and a second pressure signal, calculating a different signal indicative of a difference between the first and second pressure signal, comparing the difference signal to a difference threshold value and outputting the press signal if the difference signal is greater than the difference threshold value (col. 24, lines 20-60).

As to claim 7, Gillespie discloses the pressure signal comprises a pseudo pressure signal (e.g. the pressure value is varied in accordance with the capacitance value).

As to claim 8, Gillespie discloses supplying a pressure filter (48-1...48-n, Fig. 3) to the pressure signal to create a filtered pressure signal.

As to claims 9-11, 17, 21-22, 27, Gillespie discloses the pressure filter comprises a first pressure filter comprising a first attribute (e.g. high frequency, col. 13, lines 34-44), and further comprising applying a second pressure filter to the pressure signal, the second pressure filter comprising a second attribute (e.g. low frequency, col. 15, line 55) that is different than the first attribute.

As to claims 12, 23, Gillespie discloses applying the pressure filter comprises applying

the pressure filter utilizing a sliding window (col. 28, lines 47-58).

As to claim 13, Gillespie discloses the input device comprises a touch pad (10, Fig. 1).

As to claims 29, 30, Gillespie discloses determining a rate of change of pseudo-pressure associated with the pressure signal (determining the Z value applied by the user), comparing the rate of change of pseudo-pressure with a threshold (302, 320 in Fig. 17A) and outputting a pressing signal if the rate of change of pseudo-pressure is greater than the pseudo-threshold (Fig. 17A).

8. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gillespie and Astala as applied to claim 31, and further in view Geaghan et al (US 2003/0063073 hereinafter Geaghan).

As to claim 4, Gillespie as modified by Astala does not disclose the adaptive pressure threshold value can vary over time. However, Geaghan teaches the thresholds can be adjusted over time (lines 16-20 in [0040]). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gillespie as modified by Astala to adjust the adaptive pressure threshold value over time as taught by Geaghan to distinguish valid touch inputs on a continuously updated basis.

9. Claims 18 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gillespie and Astala as applied to claims 1 and 19, and further in view of Fujita et al. (US Patent No. 6,118,435).

As to claims 18 and 28, it is noted that Gillespie as modified by Astala does not specifically disclose outputting a signal associated with a haptic effect, the haptic effect based at least in part on the pressure signal. Fujita is cited to teach a touch panel device similar to Gillespie. Fujita further discloses a signal associated with a haptic effect, the haptic effect based at least in part on the pressure signal (see abstract and Fig. 2). It would have been obvious to one of ordinary skill in the art to have modified Gillespie as modified by Astala with the tactile force feedback as taught by Fujita so as to provide an interaction between the user and the computer.

Response to Arguments

10. Applicant's arguments with respect to claims 1-13, 16-23, 26-32 have been considered but are moot in view of the new ground(s) of rejection.

Applicant's remarks regarding the 101 rejection of claims 19-23, 28, 30, 32 are not persuasive. The "router, private or public network, or other transmission device or channel, both wired and wireless" are nothing more than propagation media that transmit or carry instructions, and it is the signal within these media that is actually carrying the signal. As such the claimed media is nothing but a signal which is not-statutory. As set forth in the Interim Guidelines, page 55, "A claimed signal has no physical structure, does not itself perform any useful, concrete and tangible result and, thus, does not fit within the definition of a machine". "A signal, a form of energy, does not fall within either of the two definitions of manufacture. Thus, a signal does not fall within one of the four statutory classes of § 101." Page 57 of the Interim Guidelines. Furthermore, it has been decided by the CAFC in In re Nuijten that signals are not statutory. Therefore claims 19-23, 28, 30, 32 are not statutory.

Applicant's remarks regarding Gillespie are not persuasive, see the rejections above.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Regina Liang whose telephone number is (571) 272-7693. The examiner can normally be reached on Monday-Friday from 8AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Hjerpe, can be reached on (571) 272-7691. 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).

/Regina Liang/
Primary Examiner, Art Unit 2629

Notice of References Cited	Application/Control No. 10/723,778	Applicant(s)/Patent Under Reexamination DACOSTA ET AL.	
	Examiner Regina Liang	Art Unit 2629	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,590,568	07-2003	Astala et al.	345/173
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	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.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	10723778	DACOSTA ET AL.
	Examiner	Art Unit
	Regina Liang	2629

SEARCHED			
Class	Subclass	Date	Examiner
update search		11/18/2006	x.w.
345	173-179	2/26/08	rl
178	18.01,18.03-18.09	2/16/08	rl

SEARCH NOTES		
Search Notes	Date	Examiner

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	10723778	DACOSTA ET AL.
	Examiner	**Art Unit**
	Regina Liang	2629

✓	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	11/19/2006	02/26/2008							
	1	✓	✓							
	1	✓	✓							
	2	✓	✓							
	3	✓	✓							
	4	✓	✓							
	5	✓	✓							
	6	✓	✓							
	7	✓	✓							
	8	✓	✓							
	9	✓	✓							
	10	✓	✓							
	11	✓	✓							
	12	✓	✓							
	13	✓	✓							
	14	✓	-							
	15	✓	-							
	16	✓	✓							
	17	✓	✓							
	18	✓	✓							
	19	✓	✓							
	20	✓	✓							
	21	✓	✓							
	22	✓	✓							
	23	✓	✓							
	24	✓	-							
	25	✓	-							
	26	✓	✓							
	27	✓	✓							
	28	✓	✓							
	29		✓							
	30		✓							
	31		✓							
	32		✓							

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	11301	press$3 adj2 signal same (interval or period or time)	US-PGPUB; USPAT	OR	ON	2008/02/26 08:57
L2	5714	press$3 adj2 signal with (interval or period or time)	US-PGPUB; USPAT	OR	ON	2008/02/26 08:57
L3	32	2 and 345/173.ccls.	US-PGPUB; USPAT	OR	ON	2008/02/26 08:58
L4	14	2 and 345/174-179.ccls.	US-PGPUB; USPAT	OR	ON	2008/02/26 09:01
L5	19	2 and "178"/$.ccls.	US-PGPUB; USPAT	OR	ON	2008/02/26 09:04
L6	481156	press$3 with (interval or period or time)	US-PGPUB; USPAT	OR	ON	2008/02/26 09:09
L7	475442	6 not 2	US-PGPUB; USPAT	OR	ON	2008/02/26 09:09
L8	658	7 and 345/173.ccls.	US-PGPUB; USPAT	OR	ON	2008/02/26 09:09
L9	421	8 and @ad<="20031126"	US-PGPUB; USPAT	OR	ON	2008/02/26 09:10
L10	122	9 and threshold	US-PGPUB; USPAT	OR	ON	2008/02/26 09:10
L11	26059	press$3 with predetermin$3 adj2 (interval or period or time)	US-PGPUB; USPAT	OR	ON	2008/02/26 09:15
L12	24781	11 not 2	US-PGPUB; USPAT	OR	ON	2008/02/26 09:16
L13	94	12 and 345/173.ccls.	US-PGPUB; USPAT	OR	ON	2008/02/26 09:16
L14	55	13 and @ad<="20031126"	US-PGPUB; USPAT	OR	ON	2008/02/26 09:16
L15	7064	press$3 with predetermin$3 adj2 (interval or period or time)	EPO; JPO; DERWENT	OR	ON	2008/02/26 09:40
L16	0	15 and (touchpanel or touch-panel)	EPO; JPO; DERWENT	OR	ON	2008/02/26 09:40
L17	4	15 and (touchpanel or touch-panel or touch adj screen)	EPO; JPO; DERWENT	OR	ON	2008/02/26 09:41
S19	3891	345/173.ccls.	US-PGPUB; USPAT	OR	OFF	2008/02/25 09:49
S20	14874	press$3 same threshold same (interval or period or time)	US-PGPUB; USPAT	OR	ON	2008/02/25 09:50
S21	103	S19 and S20	US-PGPUB; USPAT	OR	ON	2008/02/25 09:50

S22	45	S21 and @ad<="20031126"	US-PGPUB; USPAT	OR	ON	2008/02/25 09:51
S23	717	press$3 same threshold same (interval or period or time) with elaps$3	US-PGPUB; USPAT	OR	ON	2008/02/25 10:33
S24	0	S23 and 178/18.01.ccls.	US-PGPUB; USPAT	OR	ON	2008/02/25 10:33
S25	1	S23 and "178"/$.ccls.	US-PGPUB; USPAT	OR	ON	2008/02/25 10:34
S26	1417	press$3 same threshold same (interval or period or time) with (elaps$3 or pass $3)	US-PGPUB; USPAT	OR	ON	2008/02/25 10:34
S27	1	S26 and 178/18.01.ccls.	US-PGPUB; USPAT	OR	ON	2008/02/25 10:34
S28	12	S26 and 345/173-179.ccls.	US-PGPUB; USPAT	OR	ON	2008/02/25 10:35
S29	2	S26 and "178"/$.ccls.	US-PGPUB; USPAT	OR	ON	2008/02/25 10:41

2/26/08 9:43:56 AM
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Request For Continued Examination (RCE) Transmittal

Address to:
Mail Stop RCE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Application Number	10/723,778
Filing Date	November 26, 2003
First Named Inventor	Henry DaCosta
Art Unit	2629
Examiner Name	Regina Liang
Attorney Docket Number	IMM174

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. See Instruction Sheet for RCEs (not to be submitted to the USPTO) on page 2.

1. Submission required under 37 C.F.R. 1.114 Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

a. ☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

i. ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
ii. ☐ Other _____

b. . ☒ Enclosed

i. ☒ Amendment/Reply
ii ☐ Affidavit(s)/Declaration(s)
iii. ☐ Information Disclosure Statement (IDS)
iv. ☐ Other _____

2. Miscellaneous

a. ☐ Suspension of action on the above-identified application is requested under 37 C.F.R. 1.103(c) for a period of _____months. (Period of suspension shall not exceed 3 months; Fee under 37 C.F.R. 1.17(i) required)

b. ☐ Other _____

3. Fees The RCE fee under 37 C.F.R. 1.17(e) is required by 37 C.F.R. 1.114 when the RCE is filed.

a. ☐ The Director is hereby authorized to charge the following fees, or credit any overpayments, to Deposit Account No._____ . I have enclosed a duplicate copy of this sheet.

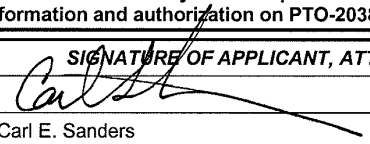
i. ☒ RCE fee required under 37 C.F.R. 1.17(e)
ii. ☐ Extension of time fee (37 C.F.R. 1.136 and 1.17)
iii. ☐ Other _____

b. ☐ Check in the amount of $ _____ enclosed

c. ☒ Payment by credit card (Form PTO-2038 enclosed)

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

Signature		Date	January 16, 2008
Name (Print /Type)	Carl E. Sanders	Registration No.	57203

CERTIFICATE OF MAILING OR TRANSMISSION

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop RCE, Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450 or facsimile transmitted to the U.S. Patent and Trademark Office on the date shown below.

Signature			
Name (Print /Type)		Date	

This collection of information is required by 37 CFR 1.114. 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 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Mail Stop RCE, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

Electronic Patent Application Fee Transmittal

Application Number:	10723778
Filing Date:	26-Nov-2003
Title of Invention:	Systems and methods for adaptive interpretation of input from a touch-sensitive input device
First Named Inventor/Applicant Name:	Henry DaCosta
Filer:	Carl E. Sanders/Dee Jones
Attorney Docket Number:	IMM174

Filed as Large Entity

Utility 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($)
Miscellaneous:				
Request for continued examination	1801	1	810	810
		Total in USD ($)		**810**

Electronic Acknowledgement Receipt

EFS ID:	2725975
Application Number:	10723778
International Application Number:	
Confirmation Number:	4196
Title of Invention:	Systems and methods for adaptive interpretation of input from a touch-sensitive input device
First Named Inventor/Applicant Name:	Henry DaCosta
Customer Number:	34300
Filer:	Carl E. Sanders/Dee Jones
Filer Authorized By:	Carl E. Sanders
Attorney Docket Number:	IMM174
Receipt Date:	16-JAN-2008
Filing Date:	26-NOV-2003
Time Stamp:	17:10:28
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$810
RAM confirmation Number	2297
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes) /Message Digest	Multi Part /.zip	Pages (if appl.)

1	Miscellaneous Incoming Letter	IMM174Transmittal.pdf	34852 9d9accc7d6052c02da27ef0bef9fbf63ee0b62af	no	1
Warnings:					
Information:					
2	Amendment After Final	IMM174Response.pdf	565786 f6581aaa209ee7382b0e54c94353e20b52fc531f	no	13
Warnings:					
Information:					
3	Request for Continued Examination (RCE)	IMM174RCE.pdf	90523 d481ad363ed80e83a52a452be2367ce88bf93e83	no	1
Warnings:					
This is not a USPTO supplied RCE SB30 form.					
Information:					
4	Fee Worksheet (PTO-06)	fee-info.pdf	8205 98b2e1c1e2dd13110b4f5fa00ee9561b5cac61dd	no	2
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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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of	:	Henry DaCosta
Application No.	:	10/723,778
Filed	:	November 26, 2003
For	:	**SYSTEMS AND METHODS FOR ADAPTIVE INTERPRETATION OF INPUT FROM A TOUCH-SENSATIVE INPUT DEVICE**
Examiner	:	Regina Liang
Art Unit	:	2629

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

TRANSMITTAL

Sir:

Transmitted herewith is a copy of the following document(s) for filing in the above-identified application:

Amendment and Response to Final Office Action; and
Request For Continued Examination.

The Commissioner is hereby authorized to charge any deficiency to Deposit Account Number 16-1435.

Respectfully submitted,

By: _____
Carl Sanders (Reg. No. 57,203)

Date: January 16, 2008
KILPATRICK STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101
(336) 607-7300

Certificate of Electronic Filing

I hereby certify that this correspondence is being electronically filed with The United States Patent Office via EFS-Web, on January 16, 2008.

_____
Dee Jones

US2000 10567264.1 51851-279589

Attorney Docket IMM174

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Henry DaCosta et al
Application No.	:	10/723,778
For	:	**Systems and Methods for Adaptive Interpretation of Input from a Touch-Sensitive Input Device**
Filed	:	November 26, 2003
Examiner	:	Regina Liang
Art Unit	:	2629

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

AMENDMENT AND RESPONSE TO FINAL OFFICE ACTION

Sir:

The following Amendment and Remarks are submitted in response to the Office Action mailed October 16, 2007.

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 7 of this paper.

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A method comprising:

receiving a pressure signal indicating a pressure from an input device;

determining a change in pressure based at least in part on the pressure signal;

determining a velocity associated with the pressure signal;

~~comparing the velocity with a velocity threshold;~~ and

outputting a press signal if the velocity is less than a ~~the~~ velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed.

2. (Previously Presented) The method of claim 31, wherein the adaptive pressure threshold value is associated with an absolute pressure threshold.

3. (Previously Presented) The method of claim 31, wherein the adaptive pressure threshold value is associated with a position received from the input device.

4. (Previously Presented) The method of claim 31, wherein the adaptive pressure threshold value can vary over time.

5. (Previously Presented) The method of claim 31, wherein the adaptive pressure threshold value is associated with a user identifier.

6. (Previously Presented) The method of claim 31, wherein the adaptive pressure threshold value comprises a first pressure threshold value, and further comprising:

comparing the pressure signal to a second pressure threshold value; and

outputting the signal if the pressure signal is greater than both the first pressure threshold value and the second pressure threshold value.

7. (Original) The method of claim 1, wherein the pressure signal comprises a pseudo pressure signal.

8. (Original) The method of claim 1, further comprising applying a pressure filter to the pressure signal to create a filtered pressure signal.

9. (Original) The method of claim 8, wherein the pressure filter comprises a first pressure filter comprising a first attribute, and further comprising applying a second pressure filter to the pressure signal, the second pressure filter comprising a second attribute that is different than the first attribute.

10. (Original) The method of claim 9, wherein the first attribute comprises a first frequency value and the second attribute comprises a second frequency value.

11. (Original) The method of claim 10, wherein the second frequency value is lower than the first frequency value.

12. (Original) The method of claim 8, wherein applying the pressure filter comprises applying the pressure filter utilizing a sliding window.

13. (Original) The method of claim 1, wherein the input device comprises one of a touchpad, a touch panel, and a touch screen.

14. (Cancelled)

15. (Cancelled)

16. (Previously Presented) The method of claim 1, wherein the pressure signal comprises a first pressure signal and further comprising:

receiving a second pressure signal indicating a second pressure from the input device;

calculating a difference signal indicative of a difference between the first pressure signal and the second pressure signal;

comparing the difference signal to a difference threshold value; and

outputting the press signal if the difference signal is greater than the difference threshold value.

17. (Original) The method of claim 16, further comprising filtering the difference signal to create a filtered difference signal.

18. (Original) The method of claim 1, further comprising outputting a signal associated with a haptic effect, the haptic effect based at least in part on the pressure signal.

19. (Currently Amended) A computer-readable medium on which is encoded programming code, comprising:

program code for receiving a pressure signal indicating a pressure from an input device;

determining a change in pressure based at least in part on the pressure signal;

program code for determining a velocity associated with the pressure signal;

~~program code for comparing the velocity with a velocity threshold;~~ and

program code for outputting a press signal if the velocity is less than the velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed.

20. (Previously Presented) The computer-readable medium of claim 32, wherein the adaptive pressure threshold value comprises a first pressure threshold value, and further comprising:

program code for comparing the pressure signal to a second pressure threshold value; and

program code for outputting the signal if the pressure signal is greater than both the first pressure threshold value and the second pressure threshold value.

21. (Original) The computer-readable medium of claim 19, further comprising program code for applying a pressure filter to the pressure signal to create a filtered pressure signal.

22. (Original) The computer-readable medium of claim 21, wherein the pressure filter comprises a first pressure filter comprising a first attribute, and further comprising program code for applying a second pressure filter to the pressure signal, wherein the second pressure filter comprises a second attribute that is different than the first attribute.

23. (Original) The computer-readable medium of claim 21, wherein program code for applying the pressure filter comprises program code for applying the pressure filter utilizing a sliding window.

24. (Cancelled)

25. (Cancelled)

26. (Previously Presented) The computer-readable medium of claim 19, wherein the pressure signal comprises a first pressure signal and further comprising:

program code for receiving a second pressure signal indicating a second pressure from the input device;

program code for calculating a difference signal indicative of a difference between the first pressure signal and the second pressure signal;

program code for comparing the difference signal to a difference threshold value; and

program code for outputting the press signal if the difference signal is greater than the difference threshold value.

27. (Original) The computer-readable medium of claim 26, further comprising program code for filtering the difference signal to create a filtered difference signal.

28. (Original) The computer-readable medium of claim 19, further comprising program code for outputting a signal associated with a haptic effect, the haptic effect based at least in part on the pressure signal.

29. (Previously Presented) The method of claim 1, further comprising:

determining a rate of change of pseudo-pressure associated with the pressure signal;

comparing the rate of change of pseudo-pressure with a pseudo-pressure threshold; and

outputting a press signal if the rate of change of pseudo-pressure is greater than the pseudo-pressure threshold

30. (Previously Presented) The computer-readable medium of claim 19, further comprising:

program code for determining a rate of change of pseudo-pressure associated with the pressure signal;

program code for comparing the rate of change of pseudo-pressure with a pseudo-pressure threshold; and

program code for outputting a press signal if the rate of change of pseudo-pressure is greater than the pseudo-pressure threshold.

31. (Currently Amended) The method of claim 1, further comprising comparing the pressure signal to an ~~the~~ adaptive pressure threshold value, and outputting the press signal if the pressure signal is greater than the adaptive pressure threshold value

32. (Currently Amended) The computer-readable medium of claim 19, further comprising program code for comparing the pressure signal to an ~~the~~ adaptive pressure threshold value, and program code for outputting the press signal if the pressure signal is greater than the adaptive pressure threshold value

REMARKS

This paper is filed in response to the Final Office Action mailed October 16, 2007.

Claims 1-13, 16-23, and 26-32 are pending in this application. Claims 1-13, 16-23, and 26-32 were rejected under 35 U.S.C. § 112, first paragraph, for lacking sufficient written description to show that the inventor had possession of the claimed invention. Claims 2-6 and 20 were rejected under 35 U.S.C. § 112, second paragraph, as lacking antecedent basis for "the adaptive pressure threshold value." Claims 19-23, 28, 30, and 32 were rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter. Claims 1-3, 5-13, 16, 17, 19-23, 26, 27, 29-32 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,880,411 to Gillespie et al ("Gillespie"). Claim 4 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Gillespie in view of U.S. Patent Publication 2003/0063073 to Geaghan et al ("Geaghan"). Claims 18 and 28 were rejected under 35 U.S.C. § 103(a) as being unpatentable to Gillespie in view of U.S. Patent No. 6,118,435 to Fujita et al ("Fujita"). A portion of the specification was objected to for being confusing and awkward.

Applicant has amended claims 1, 19, 31, and 32. No new matter is added by these amendments and support may be found in the specification and claims as originally filed.

Applicant respectfully traverses each of the rejections and objections within the Office Action, and requests reconsideration and allowance of all claims based on the amendments above and the remarks below.

I. Objection to the Specification

The following portion of the specification was objected to for being confusing and awkward as computer-readable media allegedly do not have any transmit capability:

> "various other forms of computer-readable media may transmit or carry instructions to a computer, including a router, private or public network, or other transmission device or channel, both wired and wireless" Office Action, p. 2.

Respectfully, some computer-readable media have the ability to transmit. For example, various solid-state memory devices, including ROM (including devices such as EPROMs and EEPROMs), RAM, and ASICs include the capability to transmit data stored within their memory portions. Each of these devices is a computer-readable media, and each has transmit capability. Further, the devices recited in the quoted portion of the specification are known to include computer-readable media, such as, without limitation, RAM, ROM, and/or ASIC devices. As such, the quoted portion of the specification is clear and accurate. Applicant respectfully requests the Examiner withdraw the objection to the specification.

II. § 112, first paragraph – Claims 1-13, 16-23, and 26-32

The Examiner rejected claims 1-13, 16-23, and 26-32 for omitting steps of the method disclosed within the specification. Applicant has amended claims 1 and 19 to include the omitted steps. Applicant respectfully requests the Examiner withdraw the rejection of claims 1 and 19. Further, because claims 2-13, 16-18, 20-23, and 26-32 each depend from either claim 1 or 19, each of these claims now includes the previously-omitted steps. Applicant respectfully requests the Examiner withdraw the rejection of claims 2-13, 16-18, 20-23, and 26-32.

III. § 112, second paragraph – Claims 2-6 and 20

The Examiner has rejected claims 2-6 and 20 for lacking antecedent bases for "the adaptive pressure threshold." Respectfully, Applicant had previously amended claims 2-6 to depend from claim 31, which provides antecedent basis for "the adaptive pressure threshold." Applicant had also previously amended claim 20 to depend from claim 32, which provides antecedent basis for "the adaptive pressure threshold." Applicant respectfully requests the Examiner withdraw the rejection of claims 2-6 and 20.

IV. § 101 – Claims 19-23, 28, 30, and 32

The Examiner rejected claims 19-23, 28, 30, and 32 for claiming a signal per se, which is unpatentable subject matter under current Federal Circuit case law. Respectfully, the definition of computer-readable medium within the specification does

not include a signal per se. The quoted portion of the specification from paragraph 20 recites in relevant part:

> "various other forms of computer-readable media may transmit or carry instructions to a computer, including a router, private or public network, or other transmission device or channel, both wired and wireless."

Each of the elements recited in the quoted portion are tangible devices. A router is a well-known networking device that includes computer-readable media, such as memory chips. Public and private networks are likewise tangible systems comprised of routers, switches, computers, and other devices that are communicatively connected together. Each of these tangible, non-signal component devices is capable of storing, transmitting, or carrying instructions to a computer. Other transmission devices or channels are likewise tangible devices that are capable of transmitting, storing, or carrying instructions to a computer. However, none of these tangible devices is a signal.

The Examiner cites to the Federal Circuit's decision in In re Nuijten[1] to support the rejection of claims 19-23, 28, 30, and 32.[2] However, the decision in Nuijten was direct to a claim to a signal per se:

> "*A signal* with embedded supplemental data, the signal being encoded in accordance with a given encoding process and selected samples of the signal representing the supplemental data, and at least one of the samples preceding the selected samples is different from the sample corresponding to the given encoding process.[3]"

While the claims directed to a signal *per se* were rejected in Nuijten's application, several other independent claims were allowed, including a storage medium having a signal stored on it.[4] Similar to Nuijten's application, the present application recites claims to a storage medium: a computer-readable medium. Nuijten does not stand for the proposition that such a storage medium is unpatentable subject matter. To the contrary, the storage medium claims in Nuijten's application were allowed by the Patent Office. Thus, because a computer-readable medium, as set forth in the specification, is a storage medium for program code, it is not a signal per se, but only a device capable of storing,

[1] 500 F.3d 1346 (Fed. Cir. 2007).
[2] Office Action mailed October 16, 2007, p. 8.
[3] Nuijten, 500 F.3d at 1351 (emphasis in original).
[4] Id.

transmitting, or carrying instructions to a computer, Nuijten is not relevant case law. Further, because claims 19-23, 28, 30, and 32 do not claim signals per se, each claims patentable subject matter. Applicant respectfully requests the Examiner withdraw the rejection of claims 19-23, 28, 30, and 32.

V. § 102(b) – Gillespie – Claims 1-3, 5-13, 16, 17, 19-23, 26, 27, and 29-32

Applicant respectfully traverses the rejection of claims 1-3, 5-13, 16, 17, 19-23, 26, 27, and 29-32 under 35 U.S.C. § 102(b) as being anticipated by Gillespie.

To anticipate a claim under 35 U.S.C. § 102(b), a reference must disclose each and every element of the claimed invention. See M.P.E.P. § 2131.

Because Gillespie does not disclose "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed" as recited in amended claim 1, Gillespie does not anticipate claim 1. First, Gillespie does not disclose "if the velocity is less than a velocity threshold." The Examiner has cited column 36, lines 26-47 of Gillespie as disclosing this aspect of claim 1. Column 36, lines 26-47 recite:

> "A true drag can be identified if the finger's speed of motion prior to lift-off is above a small threshold. A press can be identified if the finger was stationary through the entire gesture, possibly ignoring small, inconsequential movements"

However, this does not disclose "if the velocity is less than a velocity threshold." The phrase "small, inconsequential movements" describes a distance, not a velocity. The movements can be at an extremely high velocity, so long as they are "small and inconsequential." Thus, Gillespie does not disclose "if the velocity is less than a velocity threshold."

Further, Gillespie does not disclose "if ... the change in pressure is greater than a change in pressure threshold." Gillespie discloses a pressure threshold, as can be seen in Figure 19, but not a change in pressure threshold. Thus, Gillespie does not anticipate claim 1. Applicant respectfully requests the Examiner withdraw the rejection of claim 19

Like claim 1, amended claim 19 recites "outputting a press signal if the velocity is less than the velocity threshold, the change in pressure is greater than a change in

pressure threshold, and a first interval has elapsed." Gillespie does not anticipate claim 19 for at least the same reasons as claim 1. Applicant respectfully requests the Examiner withdraw the rejection of claim 19

Further, because claims 2-13, 16-18, 20-23, and 26-32 each depend from and further limit either claim 1 or 19, each of these claims is patentable over Gillespie for at least the same reasons. Applicant respectfully requests the Examiner withdraw the rejection of claims 2-13, 16-18, 20-23, and 26-32.

VI. § 103(a) – Gillespie in view of Geaghan – Claim 4

Applicant respectfully traverses the rejection of claim 4 under 35 U.S.C. § 103(a) as being unpatentable over Gillespie in view of Geaghan.

To reject a claim under 35 U.S.C. § 103(a), the combined references must teach or suggest each and every element of the claimed invention. *See* M.P.E.P. § 2143.03.

Because Gillespie in view of Geaghan does not teach or suggest "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed" as recited in amended claim 1, from which claim 4 depends, claim 4 is patentable over the combined references. As discussed above, Gillespie does not teach or suggest the recited claim element. Further, Geaghan does not cure this deficiency.

Geaghan was cited for teaching an adjustable pressure threshold. However, this does not teach or suggest "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed" as recited in amended claim 1, from which claim 4 depends. Thus, claim 4 is patentable over Gillespie in view of Geaghan. Applicant respectfully requests the Examiner withdraw the rejection of claim 4.

VII. § 103(a) – Gillespie in view of Fujita – Claims 18 and 28

Applicant respectfully traverses the rejection of claims 18 and 28 under 35 U.S.C. § 103(a) as being unpatentable over Gillespie in view of Fujita.

To reject a claim under 35 U.S.C. § 103(a), the combined references must teach or suggest each and every element of the claimed invention. *See* M.P.E.P. § 2143.03.

Because Gillespie in view of Fujita does not teach or suggest "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed" as recited in amended claim 1, from which claim 18 depends, claim 18 is patentable over the combined references. As discussed above, Gillespie does not teach or suggest the recited claim element. Further, Fujita does not cure this deficiency.

Fujita was cited for teaching the use of haptic effects. However, this does not teach or suggest "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed" as recited in amended claim 1, from which claim 18 depends. Thus, claim 18 is patentable over Gillespie in view of Fujita. Applicant respectfully requests the Examiner withdraw the rejection of claim 18.

Like claim 1, amended claim 19, from which claim 28 depends, recites "outputting a press signal if the velocity is less than a velocity threshold, the change in pressure is greater than a change in pressure threshold, and a first interval has elapsed." Claim 28 is patentable over Gillespie in view of Fujita for at least the same reasons as claim 18. Applicant respectfully requests the Examiner withdraw the rejection of claim 28.

CONCLUSION

Applicant respectfully asserts that in view of the amendments and remarks above, all pending claims are allowable and Applicant respectfully requests the allowance of all claims.

Should the Examiner have any comments, questions, or suggestions of a nature necessary to expedite the prosecution of the application, or to place the case in condition for allowance, the Examiner is courteously requested to telephone the undersigned at the number listed below.

Respectfully submitted,

Date: 1/16/2008

Carl Sanders
Reg. No. 57,203

KILPATRICK STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101
(336) 607-7474 (voice)
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PTO/SB/06 (07-06)
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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
10/723,778	11/26/2003	

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	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT 01/16/2008	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	SMALL ENTITY ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 28	Minus	** 28	= 0	X $ =		OR	X $50=	0
Independent (37 CFR 1.16(h))	* 2	Minus	***3	= 0	X $ =		OR	X $210=	0
☐ 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	0

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

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
marquita D. jones

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

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/723,778	11/26/2003	Henry DaCosta	IMM174	4196

34300 7590 10/16/2007

PATENT DEPARTMENT (51851)
KILPATRICK STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

EXAMINER	
LIANG, REGINA	
ART UNIT	**PAPER NUMBER**
2629	

MAIL DATE	DELIVERY MODE
10/16/2007	PAPER

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.

Office Action Summary	Application No.	Applicant(s)	
	10/723,778	DACOSTA ET AL.	
	Examiner	Art Unit	
	Regina Liang	2629	

-- 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 *30 August 2007*.

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

3)☐ 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

4)☒ Claim(s) *1-13,16-23 and 26-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13, 16-23, 26-32* is/are rejected.

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

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

Application Papers

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

10)☐ 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).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

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).

a)☐ All b)☐ Some * c)☐ None of:

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) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is responsive to amendment filed 8/30/07. Claims 1-13, 16-23, 26-32 are pending in the application.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Specification

3. The disclosure is objected to because of the following informalities: the language "various other forms of commuter-readable media may transmit or carry instructions to a computer, including a router, private or public network, or other transmission device or channel, both wired and wireless" is confusing and awkward as to how does a media transmit instructions to a computer when it is well known a computer readable media does not have any transmit capability.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 1-13, 16-23, 26-32 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the

relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The original specification does not provide "outputting a press signal if the velocity is less than the velocity threshold" as is now claimed. Fig. 3 and section [0050] of the specification discloses "If the speed is less than the speed threshold, the change in pseudo pressure is compared to a threshold value 322. If the change in pseudo pressure is less than or equal to the threshold, the processor (106) returns to step 302 in the process. If the change in pseudo pressure is greater than the threshold, the processor (106) determines whether the first interval has elapsed 324. if so, the processor (106) concludes that the user is pressing 326 and the processor (106) returns to step 302 in the process". The specification discloses after the speed is less than the speed threshold, only if the change in pseudo pressure is greater than the threshold and determining the first interval has elapsed, then the processor outputting a press signal. As shown in Fig. 3, even thought the speed is less than the speed threshold, and if the change in pseudo pressure is less than or equal to the threshold, the processor returns to step 302 in the process and does not output a press signal. Therefore, the original specification does not provide "outputting a press signal if the velocity is less than the velocity threshold" as is now claimed in claims 1 and 19.

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> 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.

7. Claims 2-6, 20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As to claims 2-6, 20, "the adaptive pressure threshold value" is undefined.

Claim Rejections - 35 USC § 101

8. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

9. Claims 19-23, 28, 30, 32 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claims 19-28 are rejected under 35 U.S.C. 101 as being non-statutory because claims 19-28 although claim a computer-readable medium on which is encoded programming code, however, page 8, [0020] of the specification discloses "various other forms of commuter-readable media may transmit or carry instructions to a computer, including a router, private or public network, or other transmission device or channel, both wired and wireless", in light of the definition in the specification, the medium as claimed is that of a signal. As set forth in the Interim Guidelines, page 55, "A claimed signal has no physical structure, does not itself perform any useful, concrete and tangible result and, thus, does not fit within the definition of a machine". Therefore, claims 19-28 is nothing but a signal and signal is non-statutory.

Claim Rejections - 35 USC § 102

10. Claims 1-3, 5-13, 16, 17, 19-23, 26, 27, 29-32 are rejected under 35 U.S.C. 102(b) as being anticipated by Gillespie et al. (US Patent No. 5,880,411)

As to claims 1, 19, Gillespie discloses a method comprising: receiving a pressure signal (e.g. Z-value, Fig. 1) indicating a pressure from an input device (e.g. finger); determining a velocity associated with the pressure signal; comparing the velocity with a velocity threshold; and outputting a press signal if the velocity is less than the velocity threshold (col. 36, lines 26-47, which states" There are several ways to distinguish between a true drag and a press. **A true drag can be identified if the finger's speed of motion prior to lift-off is above a small threshold**. A press can be identified if the finger was stationary through the entire gesture, possibly ignoring small, inconsequential movements"; in other words, a press can identified if the finger's speed of motion prior to lift-off is below a small threshold).

As to claim 2, Gillespie also discloses an adaptive pressure threshold value (col. 23, lines 29-32), wherein the adaptive pressure threshold value (Z_{TH}) is associated with an absolute pressure threshold.

As to claim 3, Gillespie discloses adaptive pressure threshold value is associated with a position received from the input device (e.g. the Z-values is derived from the position signals X and Y).

As to claim 5, Gillespie discloses the adaptive pressure threshold value is associated with a user identifier (col. 23, lines 31-32).

As to claims 6, 16, 20, 26, Gillespie discloses the adaptive pressure threshold value comprises a first pressure threshold value, and further comprising: comparing the pressure signal

to a second pressure threshold value; and outputting the signal if the pressure signal is greater than both the first pressure threshold value and the second pressure threshold value (col. 24, lines 20-60).

As to claim 7, Gillespie discloses the pressure signal comprises a pseudo pressure signal (e.g. the pressure value is varied in accordance with the capacitance value).

As to claim 8, Gillespie discloses supplying a pressure filter (48-1...48-n, Fig. 3) to the pressure signal to create a filtered pressure signal.

As to claims 9-11, 17, 21-22, 27, Gillespie discloses the pressure filter comprises a first pressure filter comprising a first attribute (e.g. high frequency, col. 13, lines 34-44), and further comprising applying a second pressure filter to the pressure signal, the second pressure filter comprising a second attribute (e.g. low frequency, col. 15, line 55) that is different than the first attribute.

As to claims 12, 23, Gillespie discloses applying the pressure filter comprises applying the pressure filter utilizing a sliding window (col. 28, lines 47-58).

As to claim 13, Gillespie discloses the input device comprises a touch pad (10, Fig. 1).

As to claims 29, 30, Gillespie discloses determining a rate of change of pseudo-pressure associated with the pressure signal (determining the Z value applied by the user), comparing the rate of change of pseudo-pressure with a threshold (302, 320 in Fig. 17A) and outputting a pressing signal if the rate of change of pseudo-pressure is greater than the pseudo-threshold (Fig. 17A).

As to claims 31, 32, Gillespie discloses comparing the pressure signal to an adaptive pressure threshold value, and outputting the press signal if the pressure signal is greater than the

adaptive pressure threshold value (302, 320 in Fig. 17A).

Claim Rejections - 35 USC § 103

11. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gillespie in view Geaghan et al (US 2003/0063073 hereinafter Geaghan).

As to claim 4, Gillespie does not disclose the adaptive pressure threshold value can vary over time. However, Geaghan teaches the thresholds can be adjusted over time (lines 16-20 in [0040]). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gillespie to adjust the adaptive pressure threshold value over time as taught by Geaghan to distinguish valid touch inputs on a continuously updated basis.

12. Claims 18 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gillespie in view of Fujita et al. (US Patent No. 6,118,435).

As to claims 18 and 28, it is noted that Gillespie does not specifically disclose outputting a signal associated with a haptic effect, the haptic effect based at least in part on the pressure signal. Fujita is cited to teach a touch panel device similar to Gillespie. Fujita further discloses a signal associated with a haptic effect, the haptic effect based at least in part on the pressure signal (see abstract and Fig. 2). It would have been obvious to one of ordinary skill in the art to have modified Gillespie with the tactile force feedback as taught by Fujita so as to provide an interaction between the user and the computer.

Response to Arguments

13. Applicant's arguments with respect to claims 1-13, 16-23, 26-32 have been considered but are moot in view of the new ground(s) of rejection.

Applicant's remarks regarding the 101 rejection of claims 19-23, 28, 30, 32 are not persuasive. As set forth in the Interim Guidelines, page 55, "A claimed signal has no physical structure, does not itself perform any useful, concrete and tangible result and, thus, does not fit within the definition of a machine". "A signal, a form of energy, does not fall within either of the two definitions of manufacture. Thus, a signal does not fall within one of the four statutory classes of § 101." Page 57 of the Interim Guidelines. Furthermore, it has been decided by the CAFC in In re Nuijten that signals are not statutory. Therefore claims 19-23, 28, 30, 32 are not statutory.

Applicant's remarks regarding Gillespie are not persuasive, see the rejection above.

Conclusion

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

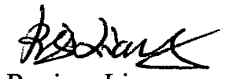
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Regina Liang whose telephone number is (571) 272-7693. The examiner can normally be reached on Monday-Friday from 8AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Hjerpe, can be reached on (571) 272-7691. 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).



Regina Liang
Primary Examiner
Art Unit 2674

10/11/07

Index of Claims



Application/Control No.	Applicant(s)/Patent under Reexamination
10/723,778	DACOSTA ET AL.
Examiner	**Art Unit**
Regina Liang	2629

√	Rejected	–	(Through numeral) Cancelled	N	Non-Elected	A	Appeal
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Claim		Date
Final	Original	10/10/07
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Search Notes

Application/Control No.	Applicant(s)/Patent under Reexamination
10/723,778	DACOSTA ET AL.
Examiner	**Art Unit**
Regina Liang	2629

SEARCHED			
Class	Subclass	Date	Examiner
updated	search	10/10/2007	RL

INTERFERENCE SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES (INCLUDING SEARCH STRATEGY)		
	DATE	EXMR
east search	10/10/2007	RL

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1	"20050110769"	US-PGPUB; USPAT	OR	OFF	2007/10/10 10:00
L2	1	"5880411".pn.	US-PGPUB; USPAT	OR	OFF	2007/10/10 10:00
L3	1	"5880411".pn. and (speed or velocity)	US-PGPUB; USPAT	OR	OFF	2007/10/10 10:08
L4	225231	(speed or velocity) with (pressure or press$3)	US-PGPUB; USPAT	OR	ON	2007/10/10 10:50
L5	4119	l4 same threshold	US-PGPUB; USPAT	OR	ON	2007/10/10 10:09
L6	898	velocity adj threshold	US-PGPUB; USPAT	OR	ON	2007/10/10 10:28
L7	8	l6 and 345/173.ccls.	US-PGPUB; USPAT	OR	ON	2007/10/10 10:28
L8	42	pseudo adj pressure	US-PGPUB; USPAT	OR	ON	2007/10/10 10:14
L9	211	pseudo adj3 pressure	US-PGPUB; USPAT	OR	ON	2007/10/10 10:14
L10	5	l9 and 345/173.ccls.	US-PGPUB; USPAT	OR	ON	2007/10/10 10:14
L11	2198	velocity near2 threshold	US-PGPUB; USPAT	OR	ON	2007/10/10 10:28
L12	30	l11 and 345/173.ccls.	US-PGPUB; USPAT	OR	ON	2007/10/10 10:51
L13	14352	(speed or velocity) near3 threshold	US-PGPUB; USPAT	OR	ON	2007/10/10 10:50
L14	65	l13 and 345/173.ccls.	US-PGPUB; USPAT	OR	ON	2007/10/10 11:02
L15	35	14 not 12	US-PGPUB; USPAT	OR	ON	2007/10/10 10:51
L16	361	l13 and "345"/$.ccls.	US-PGPUB; USPAT	OR	ON	2007/10/10 11:12
L17	296	16 not 14	US-PGPUB; USPAT	OR	ON	2007/10/10 11:02
L18	193	l17 and @ad<="20031126"	US-PGPUB; USPAT	OR	ON	2007/10/10 11:02
L19	18	l13 and "178"/$.ccls.	US-PGPUB; USPAT	OR	ON	2007/10/10 11:12

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1	"6610936".pn.	USPAT	OR	OFF	2007/10/10 11:59
L2	1	"5159159".pn.	USPAT	OR	OFF	2007/10/10 12:00
L3	1	"5159159".pn. and threshold	USPAT	OR	OFF	2007/10/10 12:01
L4	44	"5488204"	USPAT	OR	OFF	2007/10/10 12:01
L5	1	"5488204".pn.	USPAT	OR	OFF	2007/10/10 12:01
L6	1	"5488204".pn. and threshold	USPAT	OR	OFF	2007/10/10 12:03
L7	0	"20032144488" and threshold	US-PGPUB; USPAT	OR	OFF	2007/10/10 12:03
L8	0	"2003214488" and threshold	US-PGPUB; USPAT	OR	OFF	2007/10/10 12:03
L9	0	"2003214488"	US-PGPUB; USPAT	OR	OFF	2007/10/10 12:05
L10	2	"20030214488"	US-PGPUB; USPAT	OR	OFF	2007/10/10 12:06
L11	2	"20030214488" and threshold	US-PGPUB; USPAT	OR	OFF	2007/10/10 12:06

PTO/SB/06 (12-04)
Approved for use through 7/31/2006. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD
Substitute for Form PTO-875

RCE | Application or Docket Number 10/753,778

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))							790.00
SEARCH FEE (37 CFR 1.16(k), (l), or (m))							
EXAMINATION FEE (37 CFR 1.16(n), (o), or (p))							
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =		x 25 =		OR	x 50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =		x 100 =			x 200 =	
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))			180			360	
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	790.00

APPLICATION AS AMENDED – PART II

2/6/07

AMENDMENT A	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	SMALL ENTITY ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 28	Minus	** 28	= —	x 25 =		OR	x 50 =	
Independent (37 CFR 1.16(h))	* 2	Minus	*** 2	= —	x 100 =		OR	x 200 =	
Application Size Fee (37 CFR 1.16(s))									
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					180		OR	360	
					TOTAL ADDL FEE		OR	TOTAL ADDL FEE	

8/30/07

AMENDMENT B	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)	OR	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 28	Minus	** 28	= 0	x 25 =		OR	x 50 =	
Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0	x 100 =		OR	x 200 =	
Application Size Fee (37 CFR 1.16(s))									
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					180		OR	360	
					TOTAL ADDL FEE		OR	TOTAL ADDL FEE	0

* 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 number found in the appropriate box in column 1.

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

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

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Henry DaCosta et al
Application No.	:	10/723,778
For	:	**Systems and Methods for Adaptive Interpretation of Input from a Touch-Sensitive Input Device**
Filed	:	November 26, 2003
Examiner	:	Regina Liang
Art Unit	:	2629

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

AMENDMENT AND RESPONSE TO NON-FINAL OFFICE ACTION

Sir:

The following Amendment and Remarks are submitted in response to the Office Action mailed May 30, 2007.

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 7 of this paper.

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A method comprising:

~~determining an adaptive pressure threshold value based at least in part on user activity;~~

receiving a pressure signal indicating a pressure from an input device;

determining a velocity associated with the pressure signal;

comparing the velocity with a velocity threshold;

~~comparing the pressure signal to an the adaptive pressure threshold value;~~ and

outputting a press signal if the velocity is less than the velocity threshold ~~the pressure signal is greater than the adaptive pressure threshold value~~.

2. (Currently Amended) The method of claim 31, wherein the adaptive pressure threshold value is associated with an absolute pressure threshold.

3. (Currently Amended) The method of claim 31, wherein the adaptive pressure threshold value is associated with a position received from the input device.

4. (Currently Amended) The method of claim 31, wherein the adaptive pressure threshold value can vary over time.

5. (Currently Amended) The method of claim 31, wherein the adaptive pressure threshold value is associated with a user identifier.

6. (Currently Amended) The method of claim 31, wherein the adaptive pressure threshold value comprises a first pressure threshold value, and further comprising:

comparing the pressure signal to a second pressure threshold value; and

outputting the signal if the pressure signal is greater than both the first pressure threshold value and the second pressure threshold value.

7. (Original) The method of claim 1, wherein the pressure signal comprises a pseudo pressure signal.

8. (Original) The method of claim 1, further comprising applying a pressure filter to the pressure signal to create a filtered pressure signal.

9. (Original) The method of claim 8, wherein the pressure filter comprises a first pressure filter comprising a first attribute, and further comprising applying a second pressure filter to the pressure signal, the second pressure filter comprising a second attribute that is different than the first attribute.

10. (Original) The method of claim 9, wherein the first attribute comprises a first frequency value and the second attribute comprises a second frequency value.

11. (Original) The method of claim 10, wherein the second frequency value is lower than the first frequency value.

12. (Original) The method of claim 8, wherein applying the pressure filter comprises applying the pressure filter utilizing a sliding window.

13. (Original) The method of claim 1, wherein the input device comprises one of a touchpad, a touch panel, and a touch screen.

14. (Cancelled)

15. (Cancelled)

16. (Currently Amended) The method of claim 1, wherein the pressure signal comprises a first pressure signal and further comprising:

receiving a second pressure signal indicating a second pressure from the input device;

calculating a difference signal indicative of a difference between the first pressure signal and the second pressure signal;

comparing the difference signal to a difference threshold value; and

outputting the press signal if the difference signal is greater than the difference threshold value.

17. (Original) The method of claim 16, further comprising filtering the difference signal to create a filtered difference signal.

18. (Original) The method of claim 1, further comprising outputting a signal associated with a haptic effect, the haptic effect based at least in part on the pressure signal.

19. (Currently Amended) A computer-readable medium on which is encoded programming code, comprising:

~~program code for determining an adaptive pressure threshold value based at least in part on user activity interaction with a pressure sensitive device;~~

program code for receiving a pressure signal indicating a pressure from an input device;

program code for determining a velocity associated with the pressure signal;

program code for comparing the velocity with a velocity threshold;

~~program code for comparing the pressure signal to an the adaptive pressure threshold value;~~ and

program code for outputting a press signal if the velocity is less than the velocity threshold ~~the pressure signal is greater than the adaptive pressure threshold value~~.

20. (Currently Amended) The computer-readable medium of claim 32~~19~~, wherein the adaptive pressure threshold value comprises a first pressure threshold value, and further comprising:

program code for comparing the pressure signal to a second pressure threshold value; and

program code for outputting the signal if the pressure signal is greater than both the first pressure threshold value and the second pressure threshold value.

21. (Original) The computer-readable medium of claim 19, further comprising program code for applying a pressure filter to the pressure signal to create a filtered pressure signal.

22. (Original) The computer-readable medium of claim 21, wherein the pressure filter comprises a first pressure filter comprising a first attribute, and further comprising program code for applying a second pressure filter to the pressure signal, wherein the second pressure filter comprises a second attribute that is different than the first attribute.

23. (Original) The computer-readable medium of claim 21, wherein program code for applying the pressure filter comprises program code for applying the pressure filter utilizing a sliding window.

24. (Cancelled)

25. (Cancelled)

26. (Currently Amended) The computer-readable medium of claim 19, wherein the pressure signal comprises a first pressure signal and further comprising:

program code for receiving a second pressure signal indicating a second pressure from the input device;

program code for calculating a difference signal indicative of a difference between the first pressure signal and the second pressure signal;

program code for comparing the difference signal to a difference threshold value; and

program code for outputting the press signal if the difference signal is greater than the difference threshold value.

27. (Original) The computer-readable medium of claim 26, further comprising program code for filtering the difference signal to create a filtered difference signal.

28. (Original) The computer-readable medium of claim 19, further comprising program code for outputting a signal associated with a haptic effect, the haptic effect based at least in part on the pressure signal.

29. (New) The method of claim 1, further comprising:

determining a rate of change of pseudo-pressure associated with the pressure signal;

comparing the rate of change of pseudo-pressure with a pseudo-pressure threshold; and

outputting a press signal if the rate of change of pseudo-pressure is greater than the pseudo-pressure threshold

30. (New) The computer-readable medium of claim 19, further comprising:

program code for determining a rate of change of pseudo-pressure associated with the pressure signal;

program code for comparing the rate of change of pseudo-pressure with a pseudo-pressure threshold; and

program code for outputting a press signal if the rate of change of pseudo-pressure is greater than the pseudo-pressure threshold.

31. (New) The method of claim 1, further comprising comparing the pressure signal to an the adaptive pressure threshold value, and outputting the press signal if the pressure signal is greater than the adaptive pressure threshold value

32. (New) The computer-readable medium of claim 19, further comprising program code for comparing the pressure signal to an the adaptive pressure threshold value, and program code for outputting the press signal if the pressure signal is greater than the adaptive pressure threshold value

REMARKS

This paper is filed in response to the Office Action mailed May 30, 2007.

Claims 1-13, 16-23, and 26-32 are pending in this application. Claims 19-28 stand rejected under 35 U.S.C. § 101 as being directed to non-patentable subject matter. Claims 1-3, 5-17, and 19-27 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,880,411 to Gillespie et al ("Gillespie"). Claim 4 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Gillespie in view of U.S. Patent Publication No. 2003/0063073 to Geaghan et al ("Geaghan"). Claims 18 and 28 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Gillespie in view of U.S. Patent No. 6,118,435 to Fujita et al ("Fujita"). Paragraph 20 of the specification was objected to for being confusing and awkward.

Applicant has cancelled claims 14, 15, 24, and 25. Applicant has amended claims 1-6, 19, 20, and 26, and added new claims 29-32. No new matter is added by these amendments or new claims, and support may be found in the specification and claims as originally filed.

Reconsideration and allowance of all claims is respectfully requested in light of the amendments above and the remarks below.

I. § 101 – Claims 19-28

Applicant respectfully traverses the rejection of claims 19-28 under 35 U.S.C. § 101 as being directed to unpatentable subject matter.

The Examiner asserts that the term 'computer-readable medium' includes signals, which are believed to be unpatentable by the U.S. Patent and Trademark Office. Applicant respectfully disagrees with the assertion that signals are non-statutory.

Applicant has cancelled claims 24 and 25 rendering the rejection of those claims moot.

Patentable subject matter under 35 U.S.C. § 101 includes "any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof." Further, the U.S. Supreme Court has found that "Congress intended statutory subject matter to 'include anything under the sun that is made by

man.'" *Diamond v. Chakrabarty*, 447 U.S. 303, 309 (1980). But rather than enumerate a list of what is patentable, the court instead listed what is not patentable: "[t]he laws of nature, physical phenomena, and abstract ideas." The signals encompassed by the claims of the present invention are not laws of nature, physical phenomena, or abstract ideas. Rather, signals are articles of manufacture. The signals claimed are artificially-created waveforms, i.e. made by man, carrying specifically-defined and encoded information. Further, the utility of signals as computer-readable media is well-known and acknowledged by the United States Patent and Trademark Office: "a computer is able to execute the encoded functions, regardless of whether the format is a disk or a signal." 2005 Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility, Annex 4, November 22, 2005.

Because signals represent statutory articles of manufacture, the rejection under 35 U.S.C. § 101 is improper. Applicant respectfully requests the Examiner withdraw the rejection of claims 19-28.

II. § 102(b) – Gillespie – Claims 1-3, 5-17, and 19-27

Applicant respectfully traverses the rejection of claims 1-3, 5-17, and 19-27 under 35 U.S.C. § 102(b) as being anticipated by Gillespie.

To anticipate a claim under 35 U.S.C. § 102(b), a reference must disclose each and every element of the claimed invention. *See* M.P.E.P. § 2131.

Applicant has cancelled claims 14, 15, 24, and 25 rendering the rejection of those claims moot.

Because Gillespie does not disclose "outputting a press signal if the velocity is less than the velocity threshold" as recited in amended claim 1, Gillespie does not anticipate claim 1. The Office Action cites column 36, lines 26-47 to show that movement at a velocity below a threshold may be detected as a press event. See Office Action, p. 5. However, Gillespie does not disclose the detection of a press when a movement is at a velocity below a threshold. Rather, Gillespie discloses determining when a user attempts to perform a drag gesture using a touch pad. Gillespie discloses that an extended drag gesture may be detected by a quick liftoff of a finger from a surface. The velocity of the finger's movement across the pad is then determined, and if

the velocity is greater than a threshold, an extended drag gesture is detected. Gillespie further discloses that movements over a short distance will be detected as a press, and not a drag gesture. In other words, Gillespie teaches that a finger must move at least some minimal distance, and that the velocity of that movement must be greater than a threshold in order for an extended drag to be detected. However, Gillespie does not teach that a low velocity movement, i.e. below a velocity threshold, may be detected as a press. Therefore, Gillespie does not anticipate claim 1. Applicant respectfully requests the Examiner withdraw the rejection of claim 1.

Similar to claim 1, amended claim 19 recites "program code for outputting a press signal if the velocity is less than the velocity threshold." Gillespie does not anticipate claim 19 for at least the same reasons that Gillespie does not anticipate claim 1. Applicant respectfully requests the Examiner withdraw the rejection of claim 19.

Because claims 2, 3, 5-17, and 20-27 depend from and further limit claims 1 and 19, claims 2, 3, 5-17, and 20-27 are patentable over Gillespie for at least the same reasons. Applicant respectfully requests the Examiner withdraw the rejection of claims 2, 3, 5-17, and 20-27.

III. § 103(a) – Gillespie in view of Geaghan – Claim 4

Applicant respectfully traverses the rejection of claim 4 under 35 U.S.C. § 103(a) as being unpatentable over Gillespie in view of Geaghan.

To reject a claim under 35 U.S.C. § 103(a), the combined references must teach or suggest each and every element of the claimed invention. *See* M.P.E.P. § 2143.03.

Because Gillespie in view of Geaghan does not teach or suggest "outputting a press signal if the velocity is less than the velocity threshold" as recited in amended claim 1, from which claim 4 depends, claim 4 is patentable over the combined references. As discussed above, Gillespie does not teach or suggest the recited claim element. Further, Geaghan does not cure this deficiency.

Geaghan was cited for teaching an adjustable pressure threshold. However, this does not teach or suggest "outputting a press signal if the velocity is less than the velocity threshold" as recited in amended claim 1, from which claim 4 depends. Thus, claim 4 is

patentable over Gillespie in view of Geaghan. Applicant respectfully requests the Examiner withdraw the rejection of claim 4.

IV. § 103(a) – Gillespie in view of Fujita – Claims 18 and 28

Applicant respectfully traverses the rejection of claims 18 and 28 under 35 U.S.C. § 103(a) as being unpatentable over Gillespie in view of Fujita.

To reject a claim under 35 U.S.C. § 103(a), the combined references must teach or suggest each and every element of the claimed invention. *See* M.P.E.P. § 2143.03.

Because Gillespie in view of Fujita does not teach or suggest "outputting a press signal if the velocity is less than the velocity threshold" as recited in amended claim 1, from which claim 18 depends, claim 18 is patentable over the combined references. As discussed above, Gillespie does not teach or suggest the recited claim element. Further, Fujita does not cure this deficiency.

Fujita was cited for teaching the use of haptic effects. However, this does not teach or suggest "outputting a press signal if the velocity is less than the velocity threshold" as recited in amended claim 1, from which claim 18 depends. Thus, claim 18 is patentable over Gillespie in view of Fujita. Applicant respectfully requests the Examiner withdraw the rejection of claim 18.

Similar to claim 1, amended claim 19, from which claim 28 depends, recites "program code for outputting a press signal if the velocity is less than the velocity threshold." Claim 28 is patentable over Gillespie in view of Fujita for at least the same reasons as claim 18. Applicant respectfully requests the Examiner withdraw the rejection of claim 28

V. Objection to the Specification

The following portion of the specification was objected to for being confusing and awkward as computer-readable media allegedly do not have any transmit capability:

> "various other forms of computer-readable media may transmit or carry instructions to a computer, including a router, private or public network, or other transmission device or channel, both wired and wireless" Office Action, p. 2.

Respectfully, computer-readable media may have the ability to transmit. For example, various solid-state memory devices, including ROM (including devices such as EPROMs and EEPROMs), RAM, and ASICs include the capability to transmit data stored within their memory portions. Each of these devices is a computer-readable media, and each has transmit capability. Further, the devices recited in the quoted portion of the specification are known to include computer-readable media, such as, without limitation, RAM, ROM, and/or ASIC devices. As such, the quoted portion of the specification is clear and accurate. Applicant respectfully requests the Examiner withdraw the objection to the specification.

CONCLUSION

Applicant respectfully asserts that in view of the amendments and remarks above, all pending claims are allowable and Applicant respectfully requests the allowance of all claims.

Should the Examiner have any comments, questions, or suggestions of a nature necessary to expedite the prosecution of the application, or to place the case in condition for allowance, the Examiner is courteously requested to telephone the undersigned at the number listed below.

Respectfully submitted,

Date: August 30, 2007

/ Carl Sanders /

Carl Sanders
Reg. No. 57,203

KILPATRICK STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101
(336) 607-7474 (voice)
(336) 734-2629 (fax)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of	:	Henry DaCosta
Application No.	:	10/723,778
Filed	:	November 26, 2003
For	:	**SYSTEMS AND METHODS FOR ADAPTIVE INTERPRETATION OF INPUT FROM A TOUCH-SENSATIVE INPUT DEVICE**
Examiner	:	Regina Liang
Art Unit	:	2629

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

TRANSMITTAL

Sir:

Transmitted herewith is a copy of the following document(s) for filing in the above-identified application:

Amendment and Response Under 37 CFR § 1.111

The Commissioner is hereby authorized to charge any deficiency to Deposit Account Number 16-1435.

Respectfully submitted,

By: _____
Carl Sanders (Reg. No. 57,203)

Date: August 30, 2007
KILPATRICK STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101
(336) 607-7300

Certificate of Electronic Filing

I hereby certify that this correspondence is being electronically filed with The United States Patent Office via EFS-Web, on August 30, 2007.

_____
Carl Sanders

US2000 10277927.1 51851-279589

Electronic Acknowledgement Receipt

EFS ID:	2145003
Application Number:	10723778
International Application Number:	
Confirmation Number:	4196
Title of Invention:	Systems and methods for adaptive interpretation of input from a touch-sensitive input device
First Named Inventor/Applicant Name:	Henry DaCosta
Customer Number:	34300
Filer:	Carl Sanders
Filer Authorized By:	
Attorney Docket Number:	IMM174
Receipt Date:	30-AUG-2007
Filing Date:	26-NOV-2003
Time Stamp:	18:42:51
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	Amendment - After Non-Final Rejection	Office_Action_Response.pdf	110977 6dcc7bda151765a471ad00d38e8a7c19978dabee	no	11
Warnings:					

Information:					
2	Miscellaneous Incoming Letter	Transmittal.pdf	21164 0ea0aca2ee276dccc499b26f8335df1a46f7e454	no	1
Warnings:					
Information:					
			Total Files Size (in bytes):	132141	

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.

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/723,778	11/26/2003	Henry DaCosta	IMM174	4196

34300 7590 05/30/2007

PATENT DEPARTMENT (51851)
KILPATRICK STOCKTON LLP
1001 WEST FOURTH STREET
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EXAMINER	
LIANG, REGINA	
ART UNIT	**PAPER NUMBER**
2629	

MAIL DATE	DELIVERY MODE
05/30/2007	PAPER

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.

Office Action Summary	Application No.	Applicant(s)	
	10/723,778	DACOSTA ET AL.	
	Examiner	Art Unit	
	Regina Liang	2629	

-- 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 *27 February 2007*.

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

3)☐ 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

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-28* is/are rejected.

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

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

Application Papers

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

10)☐ 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).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

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).

a)☐ All b)☐ Some * c)☐ None of:

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) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *4/3/07*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 2/27/07 has been entered.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Specification

3. The disclosure is objected to because of the following informalities: the language "various other forms of commuter-readable media may transmit or carry instructions to a computer, including a router, private or public network, or other transmission device or channel, both wired and wireless" is confusing and awkward as to how does a media transmit instructions to a computer when it is well known a computer readable media does not have any transmit capability.

Appropriate correction is required.

Claim Rejections - 35 USC § 101

4. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claims 19-28 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claims 19-28 are rejected under 35 U.S.C. 101 as being non-statutory because claims 19-28 although claim a computer-readable medium on which is encoded programming code, however, page 8, [0020] of the specification discloses "various other forms of commuter-readable media may transmit or carry instructions to a computer, including a router, private or public network, or other transmission device or channel, both wired and wireless", in light of the specification, the medium as claimed include that of a signal. As set forth in the Interim Guidelines, page 55, "A claimed signal has no physical structure, does not itself perform any useful, concrete and tangible result and, thus, does not fit within the definition of a machine". Therefore, claims 19-28 are non-statutory.

Claim Rejections - 35 USC § 102

6. Claims 1-3, 5-17, 19-27 are rejected under 35 U.S.C. 102(b) as being anticipated by Gillespie et al. (US Patent No. 5,880,411)

As to claims 1, 19, Gillespie discloses a method comprising: determining an adaptive pressure threshold value based at least in part on user activity ("the threshold may be adjusted to suit the tastes of the individual user", col. 23, lines 29-32); receiving a pressure signal (e.g. Z-value, Fig. 1) indicating a pressure from an input device (e.g. finger); comparing the pressure signal to an adaptive pressure threshold value (302, 320, Fig. 17A); and outputting a signal if the pressure signal is greater than the adaptive pressure threshold value (see Fig. 17A).

As to claim 2, Gillespie discloses adaptive pressure threshold value (Z_{TH}) is associated with an absolute pressure threshold.

As to claim 3, Gillespie discloses adaptive pressure threshold value is associated with a position received from the input device (e.g. the Z-values is derived from the position signals X and Y).

As to claim 5, Gillespie discloses the adaptive pressure threshold value is associated with a user identifier (col. 23, lines 31-32).

As to claims 6, 16, 20, 26, Gillespie discloses the adaptive pressure threshold value comprises a first pressure threshold value, and further comprising: comparing the pressure signal to a second pressure threshold value; and outputting the signal if the pressure signal is greater than both the first pressure threshold value and the second pressure threshold value (col. 24, lines 20-60).

As to claim 7, Gillespie discloses the pressure signal comprises a pseudo pressure signal (e.g. the pressure value is varied in accordance with the capacitance value).

As to claim 8, Gillespie discloses supplying a pressure filter (48-1...48-n, Fig. 3) to the pressure signal to create a filtered pressure signal.

As to claims 9-11, 17, 21-22, 27, Gillespie discloses the pressure filter comprises a first pressure filter comprising a first attribute (e.g. high frequency, col. 13, lines 34-44), and further comprising applying a second pressure filter to the pressure signal, the second pressure filter comprising a second attribute (e.g. low frequency, col. 15, line 55) that is different than the first attribute.

As to claims 12, 23, Gillespie discloses applying the pressure filter comprises applying the pressure filter utilizing a sliding window (col. 28, lines 47-58).

As to claim 13, Gillespie discloses the input device comprises a touch pad (10, Fig. 1).

As to claims 14, 24, Gillespie discloses calculating a first value associated with the speed of movement across the input device; comparing the first value to a speed threshold value; and outputting the signal if the first value is less than the speed threshold value (see 362, Fig. 17D).

As to claims 15, 25, Gillespie discloses applying a speed filter to the first value before comparing the speed to the speed threshold value (col. 36, lines 26-47).

Claim Rejections - 35 USC § 103

7. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gillespie in view Geaghan et al (US 2003/0063073 hereinafter Geaghan).

As to claim 4, Gillespie does not disclose the adaptive pressure threshold value can vary over time. However, Geaghan teaches the thresholds can be adjusted over time (lines 16-20 in [0040]). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gillespie to adjust the adaptive pressure threshold value over time as taught by Geaghan to distinguish valid touch inputs on a continuously updated basis.

8. Claims 18 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gillespie in view of Fujita et al. (US Patent No. 6,118,435).

As to claims 18 and 28, it is noted that Gillespie does not specifically disclose outputting a signal associated with a haptic effect, the haptic effect based at least in part on the pressure signal. Fujita is cited to teach a touch panel device similar to Gillespie. Fujita further discloses a signal associated with a haptic effect, the haptic effect based at least in part on the pressure signal (see abstract and Fig. 2). It would have been obvious to one of ordinary skill in the art to have

modified Gillespie with the tactile force feedback as taught by Fujita so as to provide an interaction between the user and the computer.

Response to Arguments

9. Applicant's arguments filed 2/27/07 have been fully considered but they are not persuasive.

Applicant argues that Gillespie does not disclose "determining an adaptive pressure threshold value based at least in part on user activity"" as recited in claims 1 and 19. This argument is not persuasive because Gillespie teaches "the threshold may be adjusted to suit the tastes of the individual user" (col. 23, lines 29-32). It is believed that the broadly claimed limitations are still met by Gillespie.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Regina Liang whose telephone number is (571) 272-7693. The examiner can normally be reached on Monday-Friday from 8AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Hjerpe, can be reached on (571) 272-7691. 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).

Regina Liang
Primary Examiner
Art Unit 2674

5/22/07

Notice of References Cited	Application/Control No. 10/723,778	Applicant(s)/Patent Under Reexamination DACOSTA ET AL.	
	Examiner Regina Liang	Art Unit 2629	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2003/0063073 A1	04-2003	Geaghan et al.	345/173
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	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					
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*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
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PTO/SB/08a (08-03)
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4/03/07

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	10723778
Filing Date	2003-11-26
First Named Inventor	Henry DaCosta
Art Unit	2629
Examiner Name	Regina Liang
Attorney Docket Number	IMM174

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
/RL/	1	5488204	A	1996-01-30	Carver A. Mead	
/RL/	2	5889511	A	1999-03-30	Eng Yue Ong	
/RL/	3	7046235		2006-05-16	Takehiro Katoh	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	10723778
	Filing Date	2003-11-26
	First Named Inventor	Henry DaCosta
	Art Unit	2629
	Examiner Name	Regina Liang
	Attorney Docket Number	IMM174

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Index of Claims

Application/Control No.	Applicant(s)/Patent under Reexamination
10/723,778	DACOSTA ET AL.
Examiner	**Art Unit**
Regina Liang	2629

√	Rejected	–	(Through numeral) Cancelled	N	Non-Elected	A	Appeal
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Claim		Date
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Search Notes	Application/Control No.	Applicant(s)/Patent under Reexamination
	10/723,778	DACOSTA ET AL.
	Examiner: Regina Liang	Art Unit: 2629

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Class	Subclass	Date	Examiner
updated	above	5/15/2007	RL

INTERFERENCE SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES (INCLUDING SEARCH STRATEGY)		
	DATE	EXMR
east search	5/15/2007	RL

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1	"5488204".pn.	US-PGPUB; USPAT	OR	OFF	2007/05/15 11:46
L2	1	"5889511".pn.	US-PGPUB; USPAT	OR	OFF	2007/05/15 11:46
L3	1	"7046235".pn.	US-PGPUB; USPAT	OR	OFF	2007/05/15 11:47
L4	1	"6610936".pn.	US-PGPUB; USPAT	OR	OFF	2007/05/15 11:49
L5	1	"5159159".pn.	US-PGPUB; USPAT	OR	OFF	2007/05/15 11:50
L6	485392	threshold	US-PGPUB; USPAT	OR	OFF	2007/05/15 13:28
L7	5	l6 and (l1 l2 l3 l4 l5)	US-PGPUB; USPAT	OR	OFF	2007/05/15 11:50
L8	112965	threshold same (vari$4 or adjust$3)	US-PGPUB; USPAT	OR	OFF	2007/05/15 13:30
L9	67051	threshold with (vari$4 or adjust$3)	US-PGPUB; USPAT	OR	OFF	2007/05/15 13:30
L10	1252	l9 same software	US-PGPUB; USPAT	OR	OFF	2007/05/15 13:31
L11	413	l10 same (user or input)	US-PGPUB; USPAT	OR	ON	2007/05/15 13:34
L12	6	l11 and 345/173.ccls.	US-PGPUB; USPAT	OR	ON	2007/05/15 13:35
L13	15730	l9 same (user or input)	US-PGPUB; USPAT	OR	ON	2007/05/15 13:34
L14	283	l9 same (user near2 input)	US-PGPUB; USPAT	OR	ON	2007/05/15 13:34
L15	8	l14 and 345/173.ccls.	US-PGPUB; USPAT	OR	ON	2007/05/15 13:34
L16	132	l9 and 345/173.ccls.	US-PGPUB; USPAT	OR	ON	2007/05/15 13:36
L17	72	l13 and 345/173.ccls.	US-PGPUB; USPAT	OR	ON	2007/05/15 13:36
L18	42	l17 and @ad<="20031126"	US-PGPUB; USPAT	OR	ON	2007/05/15 13:36

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	Art Unit	2629
	Examiner Name	Regina Liang
	Attorney Docket Number	IMM174

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	First Named Inventor	Henry DaCosta
	Art Unit	2629
	Examiner Name	Regina Liang
	Attorney Docket Number	IMM174

CERTIFICATION STATEMENT

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

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

OR

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

☐ See attached certification statement.

☒ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☐ None

SIGNATURE

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

Signature	/Carl E. Sanders/	Date (YYYY-MM-DD)	2007-04-03
Name/Print	Carl E. Sanders	Registration Number	57,203

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

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

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

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

Electronic Patent Application Fee Transmittal

Application Number:	10723778
Filing Date:	26-Nov-2003
Title of Invention:	Systems and methods for adaptive interpretation of input from a touch-sensitive input device
First Named Inventor/Applicant Name:	Henry DaCosta
Filer:	Carl Sanders/Tammy Shearer
Attorney Docket Number:	IMM174

Filed as Large Entity

Utility 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:	1649044
Application Number:	10723778
International Application Number:	
Confirmation Number:	4196
Title of Invention:	Systems and methods for adaptive interpretation of input from a touch-sensitive input device
First Named Inventor/Applicant Name:	Henry DaCosta
Customer Number:	34300
Filer:	Carl Sanders/Tammy Shearer
Filer Authorized By:	Carl Sanders
Attorney Docket Number:	IMM174
Receipt Date:	03-APR-2007
Filing Date:	26-NOV-2003
Time Stamp:	14:31:14
Application Type:	Utility

Payment information:

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Payment was successfully received in RAM	$180
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		Total Files Size (in bytes):	738128		

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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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

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

PTO/SB/06 (12-04)
Approved for use through 7/31/2006. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD
Substitute for Form PTO-875

RCE

Application or Docket Number: 10/733,778

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))							790.00
SEARCH FEE (37 CFR 1.16(k), (l), or (m))							
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))							
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 = *		x 25 =		OR	x 50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 = *		x 100		OR	x 200	
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))			180			360	
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	790.00

APPLICATION AS AMENDED – PART II

2/16/07

AMENDMENT A	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	SMALL ENTITY ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 28	Minus	** 28	= —	x 25 =		OR	x 50 =	
Independent (37 CFR 1.16(h))	* 2	Minus	*** 2	= —	x 100 =		OR	200 =	
Application Size Fee (37 CFR 1.16(s))							OR		
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					180		OR	360	
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

AMENDMENT B	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)	OR	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	x 25 =		OR	x 50 =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	x 100 =		OR	200 =	
Application Size Fee (37 CFR 1.16(s))							OR		
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					180		OR	360	
					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 number found in the appropriate box in column 1.

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

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

02-07-07

AF



EXPRESS MAIL CERTIFICATE

Entered with RCE 2/27/07

"Express Mail" mailing label number:	EV 740581974 US
Date of Deposit:	February 6, 2007
Type of Document(s):	Transmittal (in duplicate); Amendment and Response to Final Office Action; and Return Postcard
Serial No.:	10/723,778
Date Filed:	November 26, 2003

I hereby certify that the documents identified above are being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and are addressed to Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Catherine A. Johnson

Catherine A. Johnson

PTO/SB/30 (07-06)
Approved for use through 09/30/2006. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Request For Continued Examination (RCE) Transmittal

Address to:
Mail Stop RCE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Application Number	10/723,778
Filing Date	11/26/2003
First Named Inventor	Henry DaCosta
Art Unit	2629
Examiner Name	Regina Liang
Attorney Docket Number	IMM174

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. See Instruction Sheet for RCEs (not to be submitted to the USPTO) on page 2.

1. Submission required under 37 C.F.R. 1.114 Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

a. ☒ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

i. ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
ii. ☒ Other Amendment and Response to Final Office Action submitted on February 6, 2007.

b. ☐ Enclosed

i. ☐ Amendment/Reply
ii ☐ Affidavit(s)/Declaration(s)
iii. ☐ Information Disclosure Statement (IDS)
iv. ☐ Other _____

2. Miscellaneous

a. ☐ Suspension of action on the above-identified application is requested under 37 C.F.R. 1.103(c) for a period of _____months. (Period of suspension shall not exceed 3 months; Fee under 37 C.F.R. 1.17(i) required)

b. ☐ Other _____

3. Fees *The RCE fee under 37 C.F.R. 1.17(e) is required by 37 C.F.R. 1.114 when the RCE is filed.*

a. ☐ The Director is hereby authorized to charge the following fees, or credit any overpayments, to Deposit Account No._____ . I have enclosed a duplicate copy of this sheet.

i. ☐ RCE fee required under 37 C.F.R. 1.17(e)
ii. ☐ Extension of time fee (37 C.F.R. 1.136 and 1.17)
iii. ☐ Other _____

b. ☐ Check in the amount of $ _____ enclosed

c. ☒ Payment by credit card (submitted via EFS-Web)

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

Signature	Carl	Date	February 27, 2007
Name (Print /Type)	Carl E. Sanders	Registration No.	57,203

CERTIFICATE OF MAILING OR TRANSMISSION

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop RCE, Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450 or facsimile transmitted to the U.S. Patent and Trademark Office on the date shown below.

Signature			
Name (Print /Type)		Date	

This collection of information is required by 37 CFR 1.114. 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 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Mail Stop RCE, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

Electronic Patent Application Fee Transmittal

Application Number:	10723778
Filing Date:	26-Nov-2003
Title of Invention:	Systems and methods for adaptive interpretation of input from a touch-sensitive input device
First Named Inventor/Applicant Name:	Henry DaCosta
Filer:	Carl Sanders/Tammy Shearer
Attorney Docket Number:	IMM174

Filed as Large Entity

Utility 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($)
Miscellaneous:				
Request for continued examination	1801	1	790	790
		Total in USD ($)		**790**

Electronic Acknowledgement Receipt

EFS ID:	1548138
Application Number:	10723778
International Application Number:	
Confirmation Number:	4196
Title of Invention:	Systems and methods for adaptive interpretation of input from a touch-sensitive input device
First Named Inventor/Applicant Name:	Henry DaCosta
Customer Number:	34300
Filer:	Carl Sanders/Tammy Shearer
Filer Authorized By:	Carl Sanders
Attorney Docket Number:	IMM174
Receipt Date:	27-FEB-2007
Filing Date:	26-NOV-2003
Time Stamp:	15:20:45
Application Type:	Utility

Payment information:

Submitted with Payment	yes
Payment was successfully received in RAM	$790
RAM confirmation Number	129
Deposit Account	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)	Multi Part /.zip	Pages (if appl.)

1	Request for Continued Examination (RCE)	RCE.pdf	22869	no	1
Warnings:					
This is not a USPTO supplied RCE SB30 form.					
Information:					
2	Fee Worksheet (PTO-06)	fee-info.pdf	8206	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	31075		

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.

PTO/SB/06 (12-04)
Approved for use through 7/31/2006. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 10723778	Filing Date: 11/26/2003	☐ To be Mailed

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)	SMALL ENTITY ☐		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 = *		X $25 =		OR	X $50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 = *		X $100 =			X $200 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))			+ $180			+$360	
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

		(Column 1)		(Column 2)	(Column 3)	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
	092806	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
AMENDMENT A	Total (37 CFR 1.16(i))	* 28	Minus	** 28	= 0	X $25 =		OR	X $50=	0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0	X $100 =		OR	X $200=	0
	☐ 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	

2-607

		(Column 1)		(Column 2)	(Column 3)					
		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
AMENDMENT B	Total (37 CFR 1.16(i))	* 28	Minus	** 28	=	X $25 =		OR	X $50 =	
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	=	X $100 =		OR	X $200 =	
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
	CALCULATE					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 number found in the appropriate box in column 1.

Legal Instrument Examiner:
Patsy Zimmerman

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

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/723,778	11/26/2003	Henry DaCosta	IMM174	4196

34300 7590 02/23/2007

PATENT DEPARTMENT (51851)
KILPATRICK STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

EXAMINER	
LIANG, REGINA	
ART UNIT	**PAPER NUMBER**
2629	

MAIL DATE	DELIVERY MODE
02/23/2007	PAPER

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

Advisory Action Before the Filing of an Appeal Brief	Application No. 10/723,778	Applicant(s) DACOSTA ET AL.	
	Examiner Regina Liang	Art Unit 2629	

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

THE REPLY FILED 06 February 2007 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

1. ☒ The reply was filed after a final rejection, but prior to or on the same day as filing a Notice of Appeal. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114. The reply must be filed within one of the following time periods:
   a) ☒ The period for reply expires 3 months from the mailing date of the final rejection.
   b) ☐ The period for reply expires on: (1) the mailing date of this Advisory Action, or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.

   Examiner Note: If box 1 is checked, check either box (a) or (b). ONLY CHECK BOX (b) WHEN THE FIRST REPLY WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

NOTICE OF APPEAL

2. ☐ The Notice of Appeal was filed on _____. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37 CFR 41.37(a).

AMENDMENTS

3. ☒ The proposed amendment(s) filed after a final rejection, but prior to the date of filing a brief, will not be entered because
   (a) ☒ They raise new issues that would require further consideration and/or search (see NOTE below);
   (b) ☐ They raise the issue of new matter (see NOTE below);
   (c) ☒ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
   (d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.

   NOTE: *See Continuation Sheet*. (See 37 CFR 1.116 and 41.33(a)).
4. ☐ The amendments are not in compliance with 37 CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).
5. ☐ Applicant's reply has overcome the following rejection(s): _____.
6. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
7. ☒ For purposes of appeal, the proposed amendment(s): a) ☒ will not be entered, or b) ☐ will be entered and an explanation of how the new or amended claims would be rejected is provided below or appended.
   The status of the claim(s) is (or will be) as follows:
   Claim(s) allowed: _____.
   Claim(s) objected to: _____.
   Claim(s) rejected: *1-28*.
   Claim(s) withdrawn from consideration: _____.

AFFIDAVIT OR OTHER EVIDENCE

8. ☐ The affidavit or other evidence filed after a final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
9. ☐ The affidavit or other evidence filed after the date of filing a Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing a good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
10. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

11. ☐ The request for reconsideration has been considered but does NOT place the application in condition for allowance because: _____.
12. ☐ Note the attached Information Disclosure Statement(s). (PTO/SB/08) Paper No(s). _____
13. ☐ Other: _____.

Regina Liang
Primary Examiner
Art Unit: 2629

Continuation of 3. NOTE: The newly added limitation in claims 1 and 19 change the scope of the claims, they require further consideration.

02-07-07

AF



EXPRESS MAIL CERTIFICATE

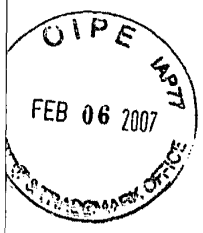
"Express Mail" mailing label number:	EV 740581974 US
Date of Deposit:	February 6, 2007
Type of Document(s):	Transmittal (in duplicate); Amendment and Response to Final Office Action; and Return Postcard
Serial No.:	10/723,778
Date Filed:	November 26, 2003

I hereby certify that the documents identified above are being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and are addressed to Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Catherine A. Johnson

Express Mail No. EV 740581974 US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE



Application of	:	DaCosta, et al.
Application No.	:	10/723,778
Filed	:	November 26, 2003
For	:	**SYSTEMS AND METHODS FOR ADAPTIVE INTERPRETATION OF INPUT FROM A TOUCH-SENSITIVE INPUT DEVICE**
Examiner	:	Wu, X.
Art Unit	:	2629

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

TRANSMITTAL

Sir:

Transmitted herewith are copies of the following document(s) for filing in the above-identified application:

Amendment and Response to Final Office Action

Shown below are the fees for the presentation of the amended claims:

	Claims Remaining	Highest # Previously Paid For	Extra	Rate	Fee
TOTAL	28	28	0	$50	$ 0
Ind. Cls.	2	3	0	$200	$ 0
Multiple Dependent Claim Added.....					NO
				TOTAL	$ 0

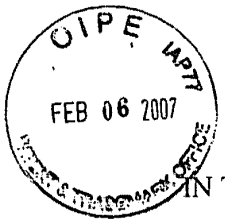
The Commissioner is hereby authorized to charge any deficiency to Deposit Account Number 16-1435. A duplicate of this transmittal is attached for that purpose.

Respectfully submitted,

Date: 2/6/2007

By: _____
Carl E. Sanders (Reg. No. 57,203)

KILPATRICK STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101
(336) 607-7300



Express Mail No. EV 740581974 US
Attorney Docket IMM174

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	DaCosta et al
Application No.	:	10/723,778
For	:	**Systems and Methods for Adaptive Interpretation of Input from a Touch-Sensitive Input Device**
Filed	:	November 26, 2003
Examiner	:	Xiao Min Wu
Art Unit	:	2629

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

AMENDMENT AND RESPONSE TO FINAL OFFICE ACTION

Sir:

The following Amendment and Remarks are submitted in response to the Office Action mailed November 27, 2006.

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 7 of this paper.

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A method comprising:

determining an adaptive pressure threshold value based at least in part on user activity;

receiving a pressure signal indicating a pressure from an input device;

comparing the pressure signal to the ~~an~~ adaptive pressure threshold value ~~based at least in part on a tick count~~; and

outputting a signal if the pressure signal is greater than the adaptive pressure threshold value.

2. (Original) The method of claim 1, wherein the adaptive pressure threshold value is associated with an absolute pressure threshold.

3. (Original) The method of claim 1, wherein the adaptive pressure threshold value is associated with a position received from the input device.

4. (Original) The method of claim 1, wherein the adaptive pressure threshold value can vary over time.

5. (Original) The method of claim 1, wherein the adaptive pressure threshold value is associated with a user identifier.

6. (Original) The method of claim 1, wherein the adaptive pressure threshold value comprises a first pressure threshold value, and further comprising:

comparing the pressure signal to a second pressure threshold value; and

outputting the signal if the pressure signal is greater than both the first pressure threshold value and the second pressure threshold value.

7. (Original) The method of claim 1, wherein the pressure signal comprises a pseudo pressure signal.

8. (Original) The method of claim 1, further comprising applying a pressure filter to the pressure signal to create a filtered pressure signal.

9. (Original) The method of claim 8, wherein the pressure filter comprises a first pressure filter comprising a first attribute, and further comprising applying a second pressure filter to the pressure signal, the second pressure filter comprising a second attribute that is different than the first attribute.

10. (Original) The method of claim 9, wherein the first attribute comprises a first frequency value and the second attribute comprises a second frequency value.

11. (Original) The method of claim 10, wherein the second frequency value is lower than the first frequency value.

12. (Original) The method of claim 8, wherein applying the pressure filter comprises applying the pressure filter utilizing a sliding window.

13. (Original) The method of claim 1, wherein the input device comprises one of a touchpad, a touch panel, and a touch screen.

14. (Original) The method of claim 1, further comprising:
calculating a first value associated with the speed of movement across the input device;
comparing the first value to a speed threshold value; and
outputting the signal if the first value is less than the speed threshold value.

15. (Original) The method of claim 14, further comprising applying a speed filter to the first value before comparing the speed to the speed threshold value.

16. (Original) The method of claim 1, wherein the pressure signal comprises a first pressure signal and further comprising:

receiving a second pressure signal indicating a second pressure from the input device;

calculating a difference signal indicative of a difference between the first pressure signal and the second pressure signal;

comparing the difference signal to a difference threshold value; and

outputting the signal if the difference signal is greater than the difference threshold value.

17. (Original) The method of claim 16, further comprising filtering the difference signal to create a filtered difference signal.

18. (Original) The method of claim 1, further comprising outputting a signal associated with a haptic effect, the haptic effect based at least in part on the pressure signal.

19. (Currently Amended) A computer-readable medium on which is encoded programming code, comprising:

program code for determining an adaptive pressure threshold value based at least in part on user activity;

program code for receiving a pressure signal indicating a pressure from an input device;

program code for comparing the pressure signal to the ~~an~~ adaptive pressure threshold value ~~based at least in part on a tick count~~; and

program code for outputting a signal if the pressure signal is greater than the adaptive pressure threshold value.

20. (Original) The computer-readable medium of claim 19, wherein the adaptive pressure threshold value comprises a first pressure threshold value, and further comprising:

program code for comparing the pressure signal to a second pressure threshold value; and

program code for outputting the signal if the pressure signal is greater than both the first pressure threshold value and the second pressure threshold value.

21. (Original) The computer-readable medium of claim 19, further comprising program code for applying a pressure filter to the pressure signal to create a filtered pressure signal.

22. (Original) The computer-readable medium of claim 21, wherein the pressure filter comprises a first pressure filter comprising a first attribute, and further comprising program code for applying a second pressure filter to the pressure signal, wherein the second pressure filter comprises a second attribute that is different than the first attribute.

23. (Original) The computer-readable medium of claim 21, wherein program code for applying the pressure filter comprises program code for applying the pressure filter utilizing a sliding window.

24. (Original) The computer-readable medium of claim 19, further comprising:

program code for calculating a first value associated with the speed of movement across the input device;

program code for comparing the first value to a speed threshold value; and

program code for outputting the signal if the first value is less than the speed threshold value.

25. (Original) The computer-readable medium of claim 24, further comprising program code for applying a speed filter to the first value before comparing the speed to the speed threshold value.

26. (Original) The computer-readable medium of claim 19, wherein the pressure signal comprises a first pressure signal and further comprising:

program code for receiving a second pressure signal indicating a second pressure from the input device;

program code for calculating a difference signal indicative of a difference between the first pressure signal and the second pressure signal;

program code for comparing the difference signal to a difference threshold value; and

program code for outputting the signal if the difference signal is greater than the difference threshold value.

27. (Original) The computer-readable medium of claim 26, further comprising program code for filtering the difference signal to create a filtered difference signal.

28. (Original) The computer-readable medium of claim 19, further comprising program code for outputting a signal associated with a haptic effect, the haptic effect based at least in part on the pressure signal.

REMARKS

This paper is filed in response to the Office Action mailed November 27, 2006.

Claims 1-28 are pending in this application. Claims 1-17 and 19-27 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,880,411 to Gillespie et al. (hereinafter referred to as "Gillespie"). Claims 18 and 28 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Gillespie in view of U.S. Patent No. 6,118,435 to Fujita et al (hereinafter referred to as "Fujita").

Applicant has amended claims 1 and 19. No new matter is added by these amendments, and support may be found in the specification and claims as originally filed.

Reconsideration and allowance of all claims are respectfully requested in view of the amendments above and remarks below.

Amendment to Claims 1 and 19

Applicant has amended claims 1 and 19 to recite "determining an adaptive pressure threshold value based at least in part on user activity." No new matter is added by these amendments, and support for the amendments may be found in the specification and claims as originally filed. For example, paragraph 28 recites that "variances may be based on activity of the user or upon the passage of time. The processor (106) may update the threshold stored in memory, store a separate set of adaptive thresholds, or calculate and apply the adaptive thresholds on an ongoing basis." In view of the foregoing amendments, Applicant respectfully asserts that all claims are allowable for at least the reasons below.

Claims 1-17 and 19-27 – § 102(b) – Gillespie

Applicant respectfully traverses the rejection of claims 1-17 and 19-27 under 35 U.S.C § 102(b) as being anticipated by Gillespie.

To anticipate a claim under 35 U.S.C. § 102(b), the reference must disclose each and every element of the claimed invention. *See* M.P.E.P. § 2131.

Because Gillespie does not disclose "determining an adaptive pressure threshold value based at least in part on user activity" as recited in amended claim 1, Gillespie does not

anticipate claim 1. Gillespie discloses a calibration mechanism for automatically calibrating a threshold for pressure, however, Gillespie discloses that the threshold is based upon the state of the touchpad without user contact. Gillespie does not disclose "determining an adaptive pressure threshold value based at least in part on user activity." Thus, Gillespie does not anticipate claim 1.

Like claim 1, claim 19 recites "determining an adaptive pressure threshold value based at least in part on user activity." Gillespie does not anticipate claim 19 for at least the same reason as claim 1. Applicant respectfully requests the Examiner withdraw the rejection of claims 1 and 19.

Because claims 2-17 and 20-27 depend from and further limit claims 1 and 19, claims 2-17 and 20-27 are patentable over Gillespie for at least the same reason. Applicant respectfully requests the Examiner withdraw the rejection of claims 2-17 and 20-27.

Claims 18 and 28 – § 103(a) – Gillespie in view of Fujita

Applicant respectfully traverses the rejection of claims 18 and 28 under 35 U.S.C. § 103(a) as being unpatentable over Gillespie in view of Fujita.

To reject a claim under 35 U.S.C. § 103(a), the combined reference must teach or suggest each and every element of the claimed invention. *See* M.P.E.P. § 2143.03

Because Gillespie in view of Fujita does not teach or suggest "determining an adaptive pressure threshold value based at least in part on user activity" as recited in claims 1 and 19, from which claims 18 and 28 depend, claims 18 and 28 are patentable over the combined references. As discussed above, Gillespie does not teach or suggest "determining an adaptive pressure threshold value based at least in part on user activity." Fujita does not cure this deficiency. Fujita discloses a particular implementation of a touch-sensitive screen. Fujita does not teach or suggest "determining an adaptive pressure threshold value based at least in part on user activity." Thus, claims 18 and 28 are patentable over Gillespie in view of Fujita. Applicant respectfully requests the Examiner withdraw the rejection of claims 18 and 28.

CONCLUSION

Applicant respectfully asserts that in view of the amendments and remarks above, all pending claims are allowable and Applicant respectfully requests the allowance of all claims.

Should the Examiner have any comments, questions, or suggestions of a nature necessary to expedite the prosecution of the application, or to place the case in condition for allowance, the Examiner is courteously requested to telephone the undersigned at the number listed below.

Respectfully submitted,

Date: 2/6/2007

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/723,778	11/26/2003	Henry DaCosta	IMM174	4196

34300 7590 11/27/2006

PATENT DEPARTMENT (51851)
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EXAMINER	
WU, XIAO MIN	

ART UNIT	PAPER NUMBER
2629	

DATE MAILED: 11/27/2006

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

PTO-90C (Rev. 10/03)

Office Action Summary	Application No.	Applicant(s)	
	10/723,778	DACOSTA ET AL.	
	Examiner	Art Unit	
	XIAO M. WU	2629	

-- 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 *28 September 2006*.

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

3)☐ 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

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-28* is/are rejected.

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

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

Application Papers

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

10)☐ 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).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

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).

a)☐ All b)☐ Some * c)☐ None of:

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) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *10/2/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 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 –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-17, 19-27 are rejected under 35 U.S.C. 102(b) as being anticipated by Gillespie et al. (US Patent No. 5,880,411)

As to claims 1, 19, Gillespie discloses a method comprising: receiving a pressure signal (e.g. Z-value, Fig. 1) indicating a pressure from an input device (e.g. finger); comparing the pressure signal to an adaptive pressure threshold value (302, 320, Fig. 17A) based at least in part on a tick count (e.g. the finger down time, see 312, Fig. 17A); and outputting a signal if the pressure signal is greater than the adaptive pressure threshold value (see Fig. 17A).

As to claim 2, Gillespie discloses adaptive pressure threshold value (Z_{TH}) is associated with an absolute pressure threshold.

As to claim 3, Gillespie discloses adaptive pressure threshold value is associated with a position received from the input device (e.g. the Z-values is derived from the position signals X and Y).

As to claim 4, Gillespie discloses the adaptive pressure threshold value can vary over time (col. 23, lines 29-31).

As to claim 5, Gillespie discloses the adaptive pressure threshold value is associated with a user identifier (col. 23, lines 31-32).

As to claims 6, 16, 20, 26, Gillespie discloses the adaptive pressure threshold value comprises a first pressure threshold value, and further comprising: comparing the pressure signal to a second pressure threshold value; and outputting the signal if the pressure signal is greater than both the first pressure threshold value and the second pressure threshold value (col. 24, lines 20-60).

As to claim 7, Gillespie discloses the pressure signal comprises a pseudo pressure signal (e.g. the pressure value is varied in accordance with the capacitance value).

As to claim 8, Gillespie discloses supplying a pressure filter (48-1...48-n, Fig. 3) to the pressure signal to create a filtered pressure signal.

As to claims 9-11, 17, 21-22, 27, Gillespie discloses the pressure filter comprises a first pressure filter comprising a first attribute (e.g. high frequency, col. 13, lines 34-44), and further comprising applying a second pressure filter to the pressure signal, the second pressure filter comprising a second attribute (e.g. low frequency, col. 15, line 55) that is different than the first attribute.

As to claims 12, 23, Gillespie discloses applying the pressure filter comprises applying the pressure filter utilizing a sliding window (col. 28, lines 47-58).

As to claim 13, Gillespie discloses the input device comprises a touch pad (10, Fig. 1).

As to claims 14, 24, Gillespie discloses calculating a first value associated with the speed of movement across the input device; comparing the first value to a speed threshold value; and outputting the signal if the first value is less than the speed threshold value (see 362, Fig. 17D).

As to claims 15, 25, Gillespie discloses applying a speed filter to the first value before comparing the speed to the speed threshold value (col. 36, lines 26-47).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 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.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 18 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gillespie et al. (US Patent No. 5,880,411) in view of Fujita et al. (US Patent No. 6,118,435).

As to claims 18 and 28, it is noted that Gillespie does not specifically disclose outputting a signal associated with a haptic effect, the haptic effect based at least in part on the pressure signal.. Fujita is cited to teach a touch panel device similar to Gillespie. Fujita further discloses a signal associated with a haptic effect, the haptic effect based at least in part on the pressure signal (see abstract and Fig. 2). It would have been obvious to one of ordinary skill in the art to have modified Gillespie with the tactile force feedback as taught by Fujita so as to provide an interaction between the user and the computer.

Response to Arguments

6. Applicant's arguments filed 9/28/2006 have been fully considered but they are not persuasive. Applicant argues that Gillespie does not disclose "comparing the pressure signal to an adaptive pressure threshold value based at least in part on a tick count" as recited in claims 1 and 19. This argument is not persuasive because Gillespie clearly shows comparing the pressure signal (302, 320, Fig. 17A) and an adaptive pressure threshold value (e.g. Zth, Ztap) based at least in part on a tick count (e.g. finger down time, see Fig. 17 A and col. 41, line 55 to col. 42, line 3). It is believed that the broadly claimed structures are still met by Gillespie.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to XIAO M. WU whose telephone number is 571-272-7761. The examiner can normally be reached on 6:30 am to 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, RICHARD HJERPE, can be reached on 571-272-7691. 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).

x.w.
November 18, 2006

XIAO M. WU
Supervisory Patent Examiner
Art Unit 2629

PTO/SB/08a (08-03)
Approved for use through 07/31/2006. OMB 0851-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 7

Complete if Known	
Application Number	10/723,778
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Not yet assigned
Examiner Name	Not yet assigned
Attorney Docket Number	IMM174 (51851/279589)

OIPE
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IMM174

U.S. PATENT DOCUMENTS

Examiner Initials *	Cite No.[1]	Document Number: Number - Kind Code[2] (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
XW	1	2,972,140	2/14/1961	Hirsch	
	2	3,157,853	11/17/1964	Hirsch	
	3	3,220,121	11/30/1965	Cutler	
	4	3,497,668	2/24/1970	Hirsch	
	5	3,517,446	6/30/1970	Corlyon et al.	
	6	3,623,064	11/23/1970	Kagan	
	7	3,902,687	6/25/1973	Hightower	
	8	3,903,614	9/9/1975	Diamond et al	
	9	3,911,416	10/7/1995	Feder	
	10	4,127,752	11/28/1978	Lowthorp	
	11	4,160,508	7/10/1979	Salsbury	
	12	4,236,325	10/2/1980	Hall et al.	
	13	4,262,549	4/21/1981	Schwellenbach	
	14	4,333,070	6/1/1982	Barnes	
	15	4,464,117	8/7/1984	Forest	
	16	4,484,191	11/20/1984	Vavra	
	17	4,513,235	4/23/1985	Acklam et al.	
	18	4,581,491	4/8/1986	Boothroyd	
	19	4,599,070	7/8/1986	Hladky et al.	
	20	4,708,656	11/24/1987	De Vries et al.	
	21	4,713,007	12/15/1987	Alban	
	22	4,758,165	7/19/1988	Tieman, et al.	
	23	4,772,205	9/20/1988	Chlumsky, et al.	
	24	4,794,392	12/27/1988	Selinko	
	25	4,885,565	12/5/1989	Embach	
	26	4,891,764	1/2/1990	McIntosh	
	27	4,926,879	5/22/1990	Sevrain, et al.	
	28	4,930,770	6/5/1990	Baker	
	29	4,934,694	6/19/1990	McIntosh	
	30	5,019,761	5/28/1991	Kraft	
	31	5,022,384	6/11/1991	Freels	
	32	5,022,407	6/11/1991	Horch et al.	
	33	5,035,242	7/30/1991	Franklin	
	34	5,038,089	8/6/1991	Szakaly	
	35	5,078,152	1/7/1992	Bond	
	36	5,121,091	6/9/1992	Fujiyama	
	37	5,165,897	11/24/1992	Johnson	
	38	5,175,459	12/29/1992	Danial et al.	
	39	5,186,695	2/16/1993	Mangseth et al.	

PTO/SB/08a (08-03)
Approved for use through 07/31/2006. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 2 of 7

Complete if Known	
Application Number	10/723,778
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Not yet assigned
Examiner Name	Not yet assigned
Attorney Docket Number	IMM174 (51851/279589)

XW	40	5,212,473	5/18/1993	Louis	
	41	5,240,417	8/31/1993	Smithson et al.	
	42	5,271,290	12/21/1993	Fischer	
	43	5,275,174	1/4/1994	Cook	
	44	5,283,970	2/8/1994	Aigner	
	45	5,299,810	4/5/1994	Pierce	
	46	5,302,132	4/12/1994	Corder	
	47	5,309,140	5/3/1994	Everett, Jr., et al.	
	48	5,334,027	8/2/1994	Wherlock	
	49	5,389,849	2/14/1995	Asano, et al.	
	50	5,436,622	7/25/1995	Gutman et al.	
	51	5,437,607	8/1/1995	Taylor	
	52	5,461,711	10/24/1995	Wang, et al.	
	53	5,466,213	11/14/1995	Hogan	
	54	5,547,382	8/20/1996	Yamasaki	
	55	5,575,761	11/19/1996	Hajianpour	
	56	5,600,777	2/4/1997	Wang, et al.	
	57	5,638,060	6/10/1997	Kataoka, et al.,	
	58	5,719,561	2/17/1998	Gonzales	
	59	5,736,978	4/7/1998	Hasser, et al.	
	60	5,766,016	6/16/1998	SInclair	
	61	5,785,630	7/28/1998	Bobick et al.	
	62	5,887,995	3/30/1999	Holehan	
	63	5,917,906	6/29/1999	Thronton	
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	65	6,008,800	12/28/1999	Pryor	
	66	6,067,081	5/23/2000	Hahlganss, et al.	
	67	6,081,536	6/27/2000	Gorsuch, et al.	
	68	6,111,577	8/29/2000	Zilles et al.	
	69	6,118,435	9/12/2000	Fujita et al.	
	70	6,140,987	10/31/2000	Stein, et al	
	71	6,151,332	11/21/2000	Gorsuch, et al.	
	72	6,160,489	12/12/2000	Perry et al.	
	73	6,198,206	3/6/2001	Saarmaa et al.	
	74	6,215,778	4/10/2001	Lomp, et al.	
	75	6,218,966	4/17/2001	Goodwin et al.	
	76	6,219,034	4/17/2001	Elbing, et al.	
	77	6,236,647	5/22/2001	Amalfitano	
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PTO/SB/08a (08-03)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 3 of 7

Complete If Known	
Application Number	10/723,778
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Not yet assigned
Examiner Name	Not yet assigned
Attorney Docket Number	IMM174 (51851/279589)

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Sheet 4 of 7

Complete if Known	
Application Number	10/723,778
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Not yet assigned
Examiner Name	Not yet assigned
Attorney Docket Number	IMM174 (51851/279589)

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document: Country Code[3] - Number[4] - Kind Code[5] (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	T[6]
XW	121	EP 0349086	1/3/1990	Stork Kwant B.V.		
	122	JP 01-003664	7/19/1990	Taito Corporation		
	123	JP 02-109714	1/13/1992	Epoch Co. and Key-Planning Co.		
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	133	JP 2002-259059A	9/13/2002	Motoyama et al.		

OTHER DOCUMENTS

Examiner Initials *	Cite No.[1]	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.
XW	134	ADELSTEIN, "A Virtual Environment System For The Study of Human Arm Tremor," Ph.D. Dissertation, Dept. of Mechanical Engineering, MIT, June 1989.
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 5 of 7

Complete if Known	
Application Number	10/723,778
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Not yet assigned
Examiner Name	Not yet assigned
Attorney Docket Number	IMM174 (51851/279589)

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 6 of 7

Complete if Known	
Application Number	10/723,778
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Not yet assigned
Examiner Name	Not yet assigned
Attorney Docket Number	IMM174 (51851/279589)

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 7 of 7

Complete if Known	
Application Number	10/723,778
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Not yet assigned
Examiner Name	Not yet assigned
Attorney Docket Number	IMM174 (51851/279589)

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Examiner Signature	/Xiao Wu/	Date Considered	11/19/2006

*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. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	10723778	DACOSTA ET AL.
	Examiner	Art Unit
	WU, XIAO M	2629

✓	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	11/19/2006								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
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	22	✓								
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	24	✓								
	25	✓								
	26	✓								
	27	✓								
	28	✓								

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	10723778	DACOSTA ET AL.
	Examiner	Art Unit
	WU, XIAO M	2629

SEARCHED			
Class	Subclass	Date	Examiner
update search		11/18/2006	x.w.

SEARCH NOTES		
Search Notes	Date	Examiner

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

PTO/SB/06 (12-04)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 10723778	Filing Date: 11/26/2003	☐ To be Mailed

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)	SMALL ENTITY ☐		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $25 =		OR	X $50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $100 =			X $200 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))			+ $180			+$360	
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

		(Column 1)		(Column 2)	(Column 3)	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
	092806	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
AMENDMENT A	Total (37 CFR 1.16(i))	* 28	Minus	** 28	= 0	X $25 =		OR	X $50=	0
	Independent (37 CFR 1.16(h))	* 3	Minus	** 3	= 0	X $100 =		OR	X $200=	0
	☐ 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)		(Column 2)	(Column 3)					
		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	X $25 =		OR	X $50 =	
	Independent (37 CFR 1.16(h))	*	Minus	**	=	X $100 =		OR	X $200 =	
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
	CALCULATE					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 number found in the appropriate box in column 1.

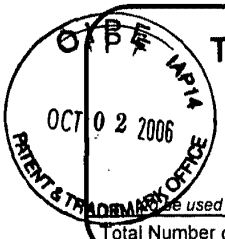
Legal Instrument Examiner:
Patsy Zimmerman

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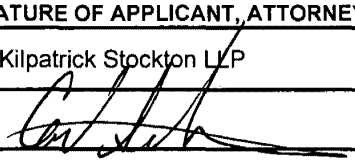
Total Number of Pages in This Submission	70

Application Number	10/723,778
Filing Date	November 26, 2003
First Named Inventor	Costa et al.
Art Unit	2629
Examiner Name	Xiao Min Wu
Attorney Docket Number	IMM174 (51851-279589)

ENCLOSURES ***(check all that apply)***

☐ Fee Transmittal Form	☐ Drawing(s)	☐ After Allowance Communication to TC
☐ Fee Attached	☐ Licensing-related Papers	☐ Appeal Communication to Board of Appeals and Interferences
☐ Amendment / Reply	☐ Petition	☐ Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
☐ After Final	☐ Petition to Convert to a Provisional Application	☐ Proprietary Information
☐ Affidavits/declaration(s)	☐ Power of Attorney, Revocation Change of Correspondence Address	☐ Status Letter
☐ Extension of Time Request	☐ Terminal Disclaimer	☒ Other Enclosure(s) *(please identify below)*: Re-submission of PT/SB/08a; 66 references; and return postcard
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SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm	Kilpatrick Stockton LLP		
Signature			
Printed Name	Carl E. Sanders		
Date	September 27, 2006	Reg. No.	57,203

CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below.

Signature	Kay Farmer		
Typed or printed name	Kay Farmer	Date	September 27, 2006

This collection of information is required by 37 CFR 1.5. 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 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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Attorney Docket No. IMM174

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

OIPE IAP14
OCT 0 2 2006
PATENT & TRADEMARK OFFICE

Applicants	:	Henry da Costa, et al.
Ser. No.	:	10/723,778
Filed	:	November 26, 2003
For	:	System and Method for Adaptive Interpretation of Input From a Touch – Sensitive Input Device
Examiner	:	Not yet assigned
Art Unit	:	Not yet assigned

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

INFORMATION DISCLOSURE STATEMENT

Dear Sir:

Applicant has submitted references listed on the enclosed Information Disclosure Statement in electronic form on the enclosed compact disc. Pursuant to 37 C.F.R. §§1.56, 1.97 and 1.98, the attention of the Patent and Trademark Office is hereby directed to the references listed on the attached Form-PTO SB/08a. If the Examiner desires hard copies of some or all of these references, Applicant will provide these expeditiously upon Examiner's request.

This Information Disclosure Statement is being submitted before the mailing of a first Office Action in this application. The Commissioner is hereby authorized to charge any additional fees under 37 C.F.R. 1.16 or 1.17 which may be required during the entire pendency of this application, or to credit any overpayment, to Deposit Account No. 16-1435. A duplicate of this sheet is attached for that purpose.

It is respectfully requested that the references listed on the attached form be expressly considered by the Examiner and be made of record in the application and appear among the "References Cited" on any patent to issue therefrom. For the documents listed in "Other Documents," Applicant has listed the dates which are shown on the documents. Applicant makes no representation as to the publication dates, if any, of the documents. Further, and although the form supplied by the PTO contains the header of "Other Prior Art," Applicant makes no representation or statement that the references listed are or are not prior art.

Respectfully submitted,

Dated: March 8, 2004 By: _____

John C. Alemanni (Reg. No. 47,384)

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Sheet 1 of 7

Complete if Known	
Application Number	10/723,778
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Not yet assigned
Examiner Name	Not yet assigned
Attorney Docket Number	IMM174 (51851/279589)

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Examiner Initials *	Cite No.[1]	Document Number Number - Kind Code[2] (*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
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Sheet 2 of 7

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First Named Inventor	Henry da Costa, et al.
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Attorney Docket Number	IMM174 (51851/279589)

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Sheet 3 of 7

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Application Number	10/723,778
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Not yet assigned
Examiner Name	Not yet assigned
Attorney Docket Number	IMM174 (51851/279589)

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Sheet 4 of 7

Complete if Known	
Application Number	10/723,778
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Not yet assigned
Examiner Name	Not yet assigned
Attorney Docket Number	IMM174 (5185.1/279589)

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Examiner Initials*	Cite No.[1]	Foreign Patent Document: Country Code[3] - Number[4] - Kind Code[5] (*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	T[6]
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Sheet 5 of 7

Complete if Known	
Application Number	10/723,778
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Not yet assigned
Examiner Name	Not yet assigned
Attorney Docket Number	IMM174 (51851/279589)

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Sheet 6 of 7

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Application Number	10/723,778
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Not yet assigned
Examiner Name	Not yet assigned
Attorney Docket Number	IMM174 (51851/279589)

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Sheet 7 of 7

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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. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

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(12) **EUROPEAN PATENT APPLICATION**

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(54) **Control system.**

(57) An electronic processing circuit 17 compares digital signals representing the position of a number of mutually connected operating members to the contents of an electronic memory 18. On detecting a difference indicating the adjustment of the position of one of the operating members, the circuit 17 actuates those motors of motors 4, 5, 6 which are associated with the non-adjusted operating members in order to make them follow the adjustment. Excessive adjustments indicating a disturbance are shown on an indicator 19.

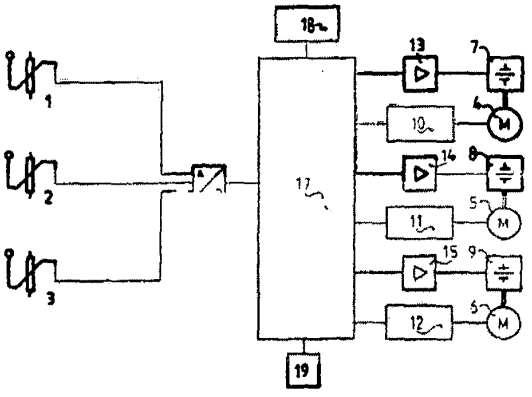


FIG. 1

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CONTROL SYSTEM

The invention relates to a control system consisting of a number of operating members that are connected mutually and to a device for operation, whereby each operating member is coupled to an associated feeding element in the form of a potentiometer, a follower member with an adjustable motor is added to each operating member to cause the other operating members to follow when an operating member is adjusted, and a memory for storing the position of the last adjusted operating member.

Such a control system is known from the Netherlands patent specification 179.421. In the known control system the memory is formed by a potentiometer added to each feeding element. The position of the potentiometer shows the position of the last adjusted operating member. Should an operating member be actuated the added potentiometers then follow the adjustment, which new position then serves as reference during a subsequent adjustment of one of the operating members. On the basis of the difference between the reference value and the momentary adjusted position of the operating member an error signal is formed which serves as control signal to bring about following of the remaining operating members and the associated potentiometers serving as memory.

Potentiometers are comparatively bulky and expensive, while the accuracy of the adjustment is also limited.

The invention has for its object to obviate these drawbacks. This is achieved according to the invention in that the memory is formed by an electronic memory recording a digital value and in that means are arranged for adapting the content of the memory to the position of an operating member.

As a result of the invention the stated drawbacks are overcome since the adapting of the reference value stored in the electronic memory can be performed rapidly while its size is moreover limited. Such a memory and the associated control circuits can furthermore be integrated into the circuit means, amplifiers and the like already available.

In order to obtain the digital signals each feeding element is connected to the memory via an analog-digital converter.

In the case of a control system whereby control signals for causing operating members to follow are first formed when a predetermined difference is exceeded between the value stored in the memory and the value representing the position of an adjusted operating member, in accordance with the invention the predetermined difference for the last adjusted operating member is chosen smaller than that for the other operating members. A certain priority results which enables the possibility that the last adjusted operating member can still be adjusted for small differences by a fine-adjustment.

The electronic embodiment of the memory according to the invention also makes it possible to form control signals for a disturbance indicator when predetermined values are exceeded. When the formed signals display abnormal behaviour this indicates a disturbance and this can be indicated in a simple manner.

The invention will be elucidated with reference to a diagram of an embodiment as according to the annexed drawings.

Connected to each operating member is a feeding element in the form of the respective potentiometers 1, 2 and 3. Added to each operating member is a follower member in the form of the respective adjustable motors 4, 5 and 6. By means of the analog-digital converter 16 the position of the potentiometers 1, 2 and 3 is continually sampled and passed via the electronic processing circuit 17 to a suitable place in the memory 18. When one of the operating members is adjusted a difference will be detected by the electronic processing unit 17 between the momentary sampled value of the potentiometer added to the relevant operating member and the values stored in the memory 18. On the basis of this difference a control signal is formed which brings about rotation of the adjustable motors 4, 5 and 6 which are associated with the other operating members in the correct direction and over the correct distance. Because the couplings associated with the motors are energized, that is, those couplings of the couplings 7, 8 and 9 which are associated with the non-actuated operating members, the other operating members are adjusted through the relevant amplifiers. Associated with each operating member are the respective amplifiers 13, 14 and 15. The motors 4, 5 and 6 are coupled through the respective circuits 10, 11 and 12 to the electronic processing unit 17 in order to be able to feed the correct control signals to the relevant motors. During the control process the reference value in the memory 18 is also adapted to the adjustment of the operating members so that, as is usual in a control process, the error or control signal takes a continually smaller value until the differential value between feed potentiometer and feed back potentiometer lies below a set value ("dead" band).

When abnormal values are detected in the electronic processing unit 17, which indicates a disturbance, this is shown on the indicator 19 which

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generates an audio or visual signal to the user.

Claims

1. Control system consisting of a number of operating members that are connected mutually and to a device for operation, whereby each operating member is coupled to an associated feeding element (1, 2, 3) in the form of a potentiometer, a follower member with an adjustable motor (4, 5, 6) is added to each operating member to cause the other operating members to follow when an operating member is adjusted, and a memory (18) for storing the position of the last adjusted operating member, **characterized in that** said memory (18) is formed by an electronic memory recording a digital value and in that means (17) are arranged for adapting the content of said memory to the position of an operating member.

2. Control system as claimed in claim 1, **characterized in that** each feeding element is connected to the memory through an analog-digital converter (16).

3. Control system as claimed in claim 1, whereby control signals for causing operating members to follow are first formed when a predetermined difference is exceeded between the value stored in the memory (18) and the value representing the position of an adjusted operating member, **characterized in that** the predetermined difference for the last adjusted operating member is smaller than that of the other operating members.

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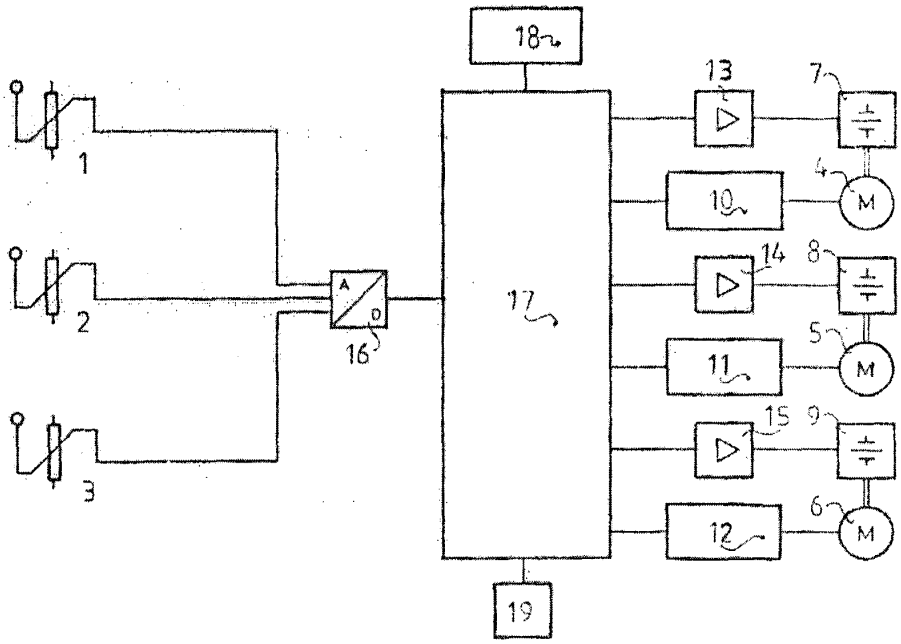


FIG. 1

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European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 89 20 1704

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y,D	NL-A-7601464 (STORK KWANT B.V.) * page 2, line 16 - page 3, line 29; figure 1 *	1-3	G05B19/04
Y	DE-A-1763450 (LICENCIA PATENT-VERWALTUNGS-GMBH) * page 2, line 13 - page 3, line 13; figure 1 *	1-3	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

G05B
G05D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	04 SEPTEMBER 1989	GOETZ P.A.

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
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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(19) **JAPANESE PATENT OFFICE (JP)**

(11) **Japanese Laid-Open Patent Application (Kokai) No. H2-185278**

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(54) Title of the Invention: Light Beam Gun Shooting Game Apparatus

(21) Application No.: H1-3664

(22) Filing Date: January 12, 1989

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MSX 0047861

EX1021 - 341

Specification

1. Title of Invention

Light Beam Gun Shooting Game Apparatus

2. Claims

(1) A light beam gun shooting game apparatus having a game controller comprising a central processing unit (hereinafter called CPU), a programmable ROM (hereinafter called PROM) and RAM for supporting the operation of said CPU, and a screen RAM wherewith image signals are written and read out in accordance with commands from said CPU, wherein prescribed video signals are formed according to a predetermined program, and a desired image containing a target is shown on a display device, while a target in said image is shot at using a light beam gun, wherein:

the configuring elements cited below in (a) to (f) are comprised, namely:

(a) a console,

(b) a video display device provided in said console,

(c) a light beam gun attached to said console, oriented relative to [said] video display device, such that the angle of elevation and azimuth angle can be freely changed,

(d) a potentiometer attached to said light beam gun, for detecting the angle of elevation and azimuth angle of [said] light beam gun,

(e) an analog/digital converter for converting the output of said potentiometer to a digital signal, and

(f) a judgment circuit for comparing the address of a target in one frame with the output of said analog/digital converter, every time the trigger of said light beam gun is pulled, and outputting an on-target signal when the target address and the shooting direction coincide.

(2) The light beam gun shooting game apparatus according to claim 1, wherein said light beam gun is provided in a plurality.

3. Detailed Description of Invention

(Industrial Field of Use)

This invention relates to improvements in a light beam gun shooting game apparatus.

(Prior Art)

Light beam gun shooting game apparatuses wherein prescribed video signals are formed according to a predetermined program, and a desired image containing a target is shown on a display device, while the target in the image is shot at using a light beam gun, are publicly known.

According to the configuration of a conventional publicly known light beam gun shooting game apparatus, a light beam gun is supported in a gun holding device so that the angle of elevation and the azimuth angle of the light beam gun can be freely changed,

MSX 0047862

and a lens and light receiving element are provided inside the gun barrel. When a player takes aim at a target in an image containing a target shown on a display device, and pulls the trigger of the light beam gun, the video signal for one frame only of the display device changes to a monochrome constant-level signal. When, during that time, the above-described light receiving element detects the image of a spot that scans the screen, the strike point is known by the address corresponding thereto, and, by comparing that with the address of a target existing on a normal game screen, either a hit or a miss is judged.

As a consequence, with a conventionally known light beam gun shooting game apparatus, the screen flickers because, every time the trigger of the light beam gun is pulled, the screen is made a monochrome screen for one frame only. That tendency is particularly conspicuous when the game is played by a plurality of players, and this has been a problem in terms of destroying player interest in the game.

(Problems Invention Would Resolve)

An object of the present invention, which was devised in order to resolve the problems described above, is to provide a new light beam gun shooting game apparatus configured such that hits and misses can be judged accurately, without making the screen a monochrome screen for one frame only when judging hits and misses, such that the flickering that appears on the display screen can be eliminated, and such that players can become completely absorbed in the game.

(Means for Resolving Problems)

The above-described object is attained by a light beam gun shooting game apparatus configured so that the direction of the gun barrel when shooting is measured by a potentiometer, the address of a screen RAM corresponding to the strike point on the screen is calculated, that is compared with the address of the target, and hits and misses are judged.

(Operation)

In the present invention, as described in the foregoing, when the trigger of the light beam gun is pulled, the position of a target in one frame of the screen and the position of the muzzle in the one frame of the screen calculated from the angle of elevation and azimuth angle of the light beam gun directed toward the above-described screen are compared, and thereby a hit or miss is judged. Therefore, it is possible to eliminate flickering on the display screen that appears every time the trigger of the light beam gun is pulled, as [occurs] with a conventional light beam gun shooting game apparatus, and to further increase player interest in the game.

(Embodiments)

The details of the present invention are now described concretely using the drawings.

Fig. 1 is an external view of one embodiment of a light beam gun shooting game apparatus related to the present invention, Fig. 2 is an external view showing the configuration of the light beam gun thereof, Fig. 3 is a partially cutaway explanatory diagram showing the internal mechanism of the light beam gun, Fig. 4 is a partially

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cutaway view showing the internal mechanism of a gun holding apparatus, and Fig. 5 is a block diagram of the circuit configuration of the light beam gun shooting game apparatus related to the present invention.

In Fig. 1 to 4, item 1 is a light beam gun shooting game apparatus, 2 a console, 3 a video display screen, 4 a light beam gun, 4a the muzzle of the above-described light beam gun, 4b the trigger of the above-described light beam gun, 5 a money insertion slot, 6 a game start switch, 7 a money collection door, 8 an arm, 9 a gun master, 10 solenoid coil, 11 a microswitch, 12 a return spring, 13 a plunger, 14 a movable base, 15 a sub-base, 16 a first gear that turns together with the above-described movable base 14, 17 a second gear that turns in accordance with the arm 8, 18 a potentiometer for measuring azimuth angles, 19 a potentiometer for measuring angles of elevation, and 20 a turning-center shaft.

In Fig. 5, furthermore, where the numbers that are the same as those used in Fig. 1 to 4 indicate the same configuring elements, item 21 is an I/O port, 22 a PROM, 23 a CPU, 24 a RAM, 25 and 26 analog/digital converters, 27 an audio generator circuit, 28 a speaker, 29 a timing pulse generator, 30 a screen RAM, 31 a judgment circuit, and 32 a video signal generator circuit.

Descriptions pertaining to Fig. 1 to 4 are given first.

The light beam gun shooting game apparatus 1 relating to the present invention has provided, in the console 2, the video display screen 3 and two light beam guns 4 and 4 relatively oriented to the above-described video display screen 3.

The arm 8, which supports the light beam gun 4, is configured so as to be able to turn about a vertical center shaft on the movable base 14 together with the movable base 14, and so as to be able to tilt within a certain angle about the turning-center shaft 20 of the second gear 17.

Accordingly, the light beam gun 4 is configured so that the angle of elevation and azimuth angle can be changed to desired angles, but also so that, when the angle of elevation and azimuth angle reach certain angles, further movement is limited by the action of a moving range stopper case (not shown).

The configuration is further made so that, when the azimuth angle of the light beam gun 4 changes, the movable base 14 turns about the center shaft thereof, the potentiometer 18 for measuring the azimuth angle is turned by the first gear 16, and, when the angle of elevation of the light beam gun 4 is changed, the potentiometer 19 for measuring the angle of elevation is turned by the second gear 17 that turns together with the arm 8. Provision is [thus] made so that the direction of the light beam gun 4 can be known by the outputs from the above-described potentiometer 18 for measuring the azimuth angle and potentiometer 19 for measuring the angle of elevation.

Thereupon, when the aim is fixed on a target, and the trigger 4b of the above-described light beam gun 4 is pulled, a current is applied [sic] to the solenoid coil 10, the above-described solenoid coil 10 moves the plunger 13 forward and backward, in the direction of the gun barrel, against the elastic force of the return spring 12, thereby causing a vibration shaft (not shown) that is connected to the above-described plunger 13

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to strike the chassis, whereby a [mechanical] shock is imparted to the light beam gun 4, giving the player the sensation of firing a gun.

A description pertaining to Fig. 5 is given next.

The I/O port 21 receives input signals from a publicly known money depositing apparatus and from the game start switch 6, etc., encodes those signals and sends them to the CPU 23, etc., and also receives signals from the above-described CPU 23 and controls the functions of the above-described input/output devices.

In the PROM 22 are stored the program and object patterns and the like necessary for the game. As necessary, these data are supplied to the CPU 23.

The CPU 23, responding to inputs from the I/O port 21, sends necessary command signals to the audio generator circuit 27, screen RAM 30, and judgment circuit 31. In the screen RAM 30 are stored a one-screen volume of image data for displaying background and targets and the like on the video screen.

The audio generator circuit 27, responding to signals from the CPU 23, generates prescribed audio signals according to the progress of the game, drives the speaker 28, and produces sound effects and the like.

When the trigger 4b of the light beam gun 4 is pulled, azimuth angle and angle of elevation detection signals for the above-described light beam gun 4 are output by the potentiometer 18 for measuring azimuth angles and the potentiometer 19 for measuring angles of elevation. Those detection signals, after being converted to digital signals by the analog/digital converters 25 and 26, are input to the judgment circuit 31. Those digital signals correspond to addresses in the screen RAM 30 which correspond with the direction of the light beam gun 4, that is, with the strike point.

The judgment circuit 31 compares the outputs of the above-described analog/digital converters 25 and 26 with the address of the target and, when those coincide, outputs an on-target signal to the CPU 23.

Thereupon, when an on-target signal is issued, image data representing a destroyed target are written to the screen RAM 30 by a signal from the CPU 23, and the image of the destroyed target is shown on the video display screen 3.

(Effectiveness of Invention)

Because the present invention is configured as described in the foregoing, when based on the present invention, when the trigger of a light beam gun is pulled, hits or misses are judged by comparing the address of the target in one frame of the screen, and the address of a strike point on the screen calculated on the basis of the angle of elevation and azimuth angle of the light beam gun oriented toward the above-described screen. Therefore, [the light beam gun shooting game apparatus relating to the present invention] is one wherewith flickering that appears on the display screen every time the trigger of the light beam gun is pulled, as occurs with a conventional apparatus, can be eliminated, and players can become completely absorbed in the game.

Furthermore, the present invention is not limited to or by the embodiment described in the foregoing. More specifically, for example, although in this embodiment an upright type shooting game is assumed, [the present invention] can be applied to other

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types, such as similar games like aerial combat games, for example. The present invention comprehends all modified embodiments that could be arrived at easily, from the above-described embodiment, by one skilled in the art.

4. Brief Description of Drawings

Fig. 1 is an external view of one embodiment of a light beam gun shooting game apparatus related to the present invention, Fig. 2 is an external view showing the configuration of the light beam gun thereof, Fig. 3 is a partially cutaway explanatory diagram showing the internal mechanism of the light beam gun, Fig. 4 is a partially cutaway view showing the internal mechanism of a gun holding apparatus, and Fig. 5 is a block diagram of the circuit configuration of the light beam gun shooting game apparatus related to the present invention.

1	light beam gun shooting game apparatus
2	console
3	video display screen
4	ight beam gun
4a	muzzle
4b	trigger
5	money insertion slot
6	game start switch
7	money collection door
8	arm
10	solenoid coil
12	return spring
13	plunger
14	movable base
15	sub-base
16	first gear
17	second gear
18	potentiometer for measuring azimuth angles
19	potentiometer for measuring angles of elevation
21	I/O port
22	PROM
23	CPU
24	RAM
25, 26	analog/digital converters

MSX 0047866

27 audio generator circuit
28 speaker
29 timing pulse generator
30 screen RAM
31 judgment circuit
32 video signal generator circuit

Patent Applicant: Taito Corporation
Agent: (7524) Shoutaro Mogami, Patent Attorney

MSX 0047867

EX1021 - 347

1 light beam gun shooting game apparatus
2 console
3 video display screen
4 ight beam gun
4a muzzle
4b trigger
5 money insertion slot
6 game start switch

Figure 1

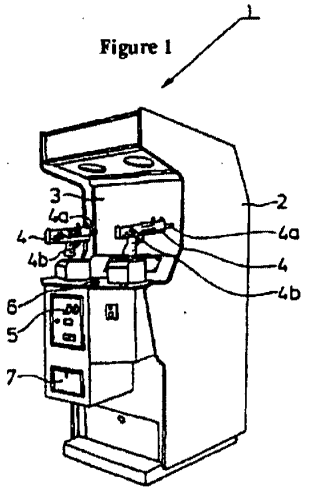


Figure 2

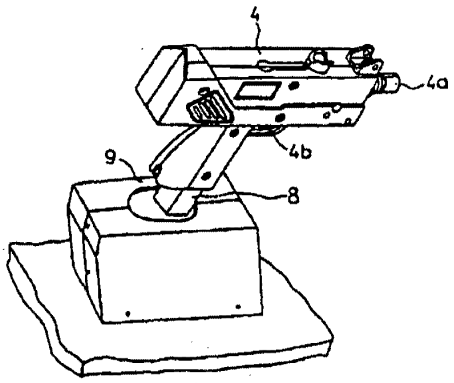


Figure 3

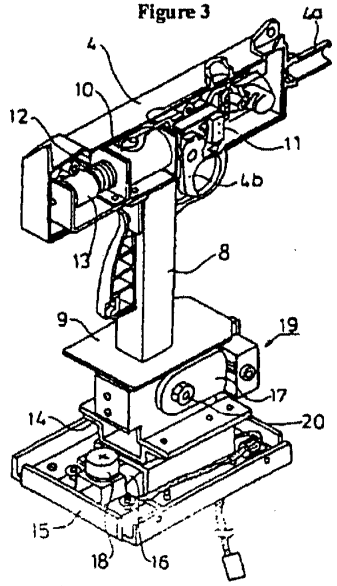
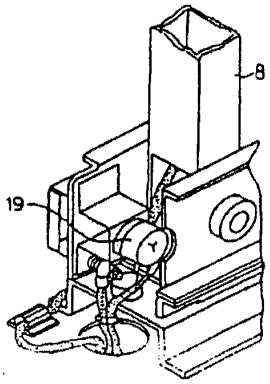


Figure 4



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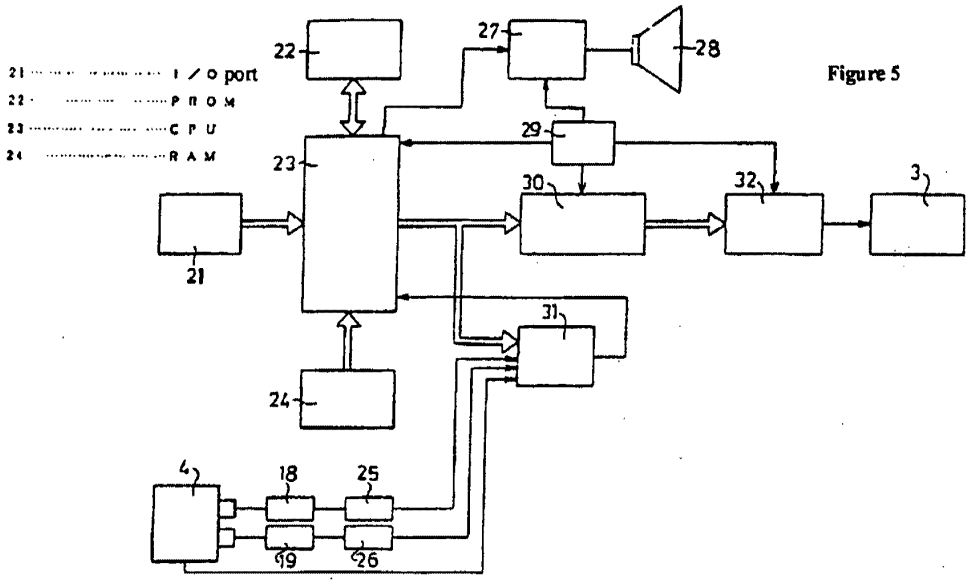


Figure 5

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EX1021 - 349

(19) **JAPANESE PATENT OFFICE (JP)**

(11) **Japanese Laid-Open Patent Application (Kokai) No. H4-8381**

(12) **Official Gazette for Laid-Open Patent Applications (A)**

(51)	Int. Cl.[5]	Classification Symbols	JPO File Nos.
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(43) Disclosure Date: January 13, 1992

Number of Claims: 1

Request for Examination: Submitted

(Total of 7 pages [in original])

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(54) Title of the Invention: Tactile Sensation Game Machine

(21) Application No.: H2-109714

(22) Filing Date: April 25, 1990

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EX1021 - 350

SPECIFICATION

1. TITLE OF INVENTION

Tactile Sensation Game Machine

2. CLAIMS

A tactile sensation game machine, wherein a target image screen is provided at the front surface of a base mounted inside an outside spherical surface's mounting cylinder and a hit switch for generating vibration when hits occur is provided at the rear surface and they can oscillate vertically and laterally respectively; a pursuit scope corresponding to said target image screen and a tactile sensation lever having a trigger member linked to said switch are respectively provided at a control body that can oscillate along the mounting cylinder's outside spherical surface; and the vibration amplitude of the tactile sensation lever is changed by an amplitude variation means when firing and when hitting.

3. DETAILED DESCRIPTION OF THE INVENTION

Industrial Field of Utilization

The present invention pertains to a tactile sensation game machine that simulates controlling and operating a spacecraft fighter or automobile or the like and makes it possible to enjoy the sensation of controlling them.

Prior Art

A tactile sensation game machine performs predetermined control in response to a changing screen that simulates high-speed driving or space battles, for example, and enables one to enjoy control techniques and the sensation of shooting and so forth, so in recent years it has become popular as a game machine enjoyed by young and old.

In this type of tactile sensation game machine, a mechanical vibration transmitted via a control lever, handle, steering wheel, etc. (hereinafter "tactile sensation member") when controlling/operating or shooting is an important factor in providing a feeling of being there that corresponds to the screen. Therefore so-called game centers and the like have implemented devices that incorporate large-size screens into cockpits that are almost as big as the real thing and provide tactile sensation vibration by means of large-size motors or hydraulic devices. Meanwhile, tactile sensation game machines [played] on a desktop that enable one to enjoy a game overflowing with the feeling of being there are continuing to spread in the field of everyday toys. In this case, particularly in space battle games and so forth that incorporate combat scenes, it is sometimes the case that the characteristics of the tactile sensation vibration that impart a feeling of gravity and a feeling of speed determine its appeal as a game machine.

Therefore various means have been proposed to provide change to mechanical vibration. For example, an improvement that has been considered is linking a plurality of motors to a tactile sensation member and suitably switching the vibration characteristics of the tactile sensation member when changing the control mode, thus generating a more realistic tactile sensation vibration.

Problems the Invention Is to Solve

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Nevertheless, the aforesaid conventional tactile sensation game machine requires individual mechanisms consisting of motors and vibration generating members linked to the motors for each type of tactile sensation vibration mode, so the device may become large, complicated, and expensive.

The present invention considered these points. Its object is to provide a tactile sensation game machine provided with a vibration generating means that can generate various vibration modes with a simple mechanism.

Means for Solving the Problems

In order to achieve the aforesaid object, the present invention is constituted so that a target image screen is provided at the front surface of a base mounted inside an outside spherical surface's mounting cylinder and a hit switch for generating vibration when hits occur is provided at the rear surface and they can oscillate vertically and laterally respectively; a pursuit scope corresponding to the aforesaid target image screen and a tactile sensation lever having a trigger member linked to the aforesaid switch are respectively provided at a control body that can oscillate along the mounting cylinder's outside spherical surface; and the vibration amplitude of the tactile sensation lever is changed by an amplitude variation means when firing and when hitting. A plurality of tactile sensation vibrations can be generated with a single vibration generating means, and it is possible to implement a tactile sensation game machine that is small and simple.

Embodiment

Below, the present invention shall be explained based on the embodiment shown in the attached drawings.

FIG. 1 is an oblique view of the entirety of this application's tactile sensation game machine. FIG. 2 is an oblique view with a partial cut-out of the same. FIG. 3 is an oblique view showing the structure of the base and oscillation mechanism. FIG. 4 is an oblique view showing the structure of the tactile sensation vibration switch's pressing means. FIG. 5 is a sectional view showing the relationship between the base and pursuit body. FIG. 6 is a sectional view showing the relationship between the tactile sensation vibration switch's pressing means and the base. FIG. 7 is an oblique view showing the structure of the amplitude variation means. FIGS. 8(a) and (b) are drawings explaining the cam's amplitude variation principle.

In the drawings, 1 is a stand. The stand 1 houses a battery accommodation chamber and sound-generating circuits, etc. (not shown in the drawing); support columns 1a are provided at both sides. The stand 1 permits the main body 100 of this application's game machine to be stably supported on a desktop.

Item 2 is a mounting cylinder; the mounting cylinder 2 consists of a shell body whose outside has a spherical surface and having apertures 2a and 2b at the front and back. Its two ends are mounted on the aforesaid stand 1's support columns 1a.

Item 3 is a base. The base 3 is provided with a bracket-shaped frame body 31 mounted inside the aforesaid mounting cylinder 2; a target image screen 4 is provided in the front end of the member 31 and a hit switch 5 is provided in the back end with an oscillation mechanism 6 therebetween respectively. The target image screen 4 consists of a rotary disk made of transparent plastic; printed thereon are images corresponding to the

MSX 0047872

game contents: for example, target image M_1 of silhouettes of fighters flying in formation, etc. The hit switch 5 is for operating the sound and vibration generating circuit when there is a hit; it oscillates vertically and laterally relative to the body 3, so it goes on only when it matches the same straight line as a trigger member 9 to be described later.

The aforesaid oscillation mechanism 6 is provided with two oscillation arms and two drive cams; it is constituted so that it can oscillate the aforesaid target image screen 4 and hit switch 5. That is, in FIG. 3, 61 is a first oscillation arm; the first oscillation arm 61 consists of a nearly bracket-shaped frame body whose upper piece 61a is longer than the lower piece 61b, and is disposed in a nested manner with the aforesaid bracket-shaped frame body's base 3 and pivotally supported by shafts J_1 and J_1 so that it can oscillate. The oscillation arm 61's upper piece 61a is provided with a long hole N_1 in the front part; an eccentric rotary disk 62 is fitted into the long hole N_1. Also, the first oscillation arm 61 is constituted so that it can oscillate laterally in response to the rotation of the eccentric rotary disk 62.

Item 63 is a second oscillation arm; the second oscillation arm 63 also consists of a nearly bracket-shaped frame body, and is pivotally supported by a shaft J_2 at a center piece 61c of the aforesaid first oscillation arm 61 so that it can oscillate. The second oscillation arm 63 is respectively provided with the aforesaid target image screen 4 at its front end and the aforesaid hit switch 5 at its back end, with a pin P_1 and long hole N_2 interposed, and a pin P_2 parallel to the aforesaid shaft J_2 at the side of the center piece 61c. The pin P_2 is for driving the second oscillation arm 63, so it is fitted into an indentation 64a in a cam follower 64 that is pivotally supported at the upper part of the base 3 by the aforesaid shaft J_1. The cam follower 64 is anchored to an irregularly curved cam 65 that is capable of forming a complicated oscillation pattern. Here, the irregularly curved cam 65 is pivotally supported and integrated with a gear G_1; it is driven via a gear G_2, which is integrated with the aforesaid eccentric rotary disk 62 and meshes with the gear G_1. Also, the gear G1 and irregularly curved cam 65 rotate due to the rotation of the eccentric rotary disk 62 and gear G_2, as a result of which the cam follower 64 oscillates irregularly, and furthermore the pin P_2 is driven forward and in reverse (relative to the base 3) via the cam follower 64's indentation 64a. Therefore the second oscillation arm 63 oscillates irregularly in a vertical direction relative to the base 3 centered on the shaft J_2.

The lateral oscillation of the first oscillation arm 61 and the vertical oscillation of the second oscillation arm 63 are combined in this manner, so the target image screen 4 at the front end of the second oscillation arm 63 is constituted so that it oscillates irregularly in both vertical and lateral directions.

Furthermore, a light-emitting lamp L is provided behind the target image screen 4 (inside the aforesaid base 3), and is constituted so that the image screen 4 is illuminated by the light-emitting lamp L. Also, a transparent disk T, for example, printed with a background image such as the entirety of a space city, etc., is provided between the target image screen 4 and light-emitting lamp L; it rotates at a constant speed and creates an constantly changing background.

MSX 0047873

EX1021 - 353

The aforesaid hit switch 5 is for generating the sound and vibration when there is a hit, so it consists of a plate-like member 51 provided at the back end of the aforesaid second oscillation arm 63 with the pin P_1 and long hole N_2 interposed. A pressing part 5a is provided at its back end and a reflecting mirror 5b is provided at its front end. The switch 5 oscillates irregularly vertically and laterally due to the combined oscillation of the first oscillation arm 61 and second oscillation arm 63 as described earlier, so it is constituted so that it is operable only when a pressing member 9f to be described later is set on the same line. Then, when pressing occurs, a sound and vibration generating circuit (not shown in the drawing) is connected to a predetermined mode, the aforesaid reflecting mirror 5b is brought near the light-emitting lamp L, and the backlight of the target image screen 4 rapidly becomes bright. Item B is a spring that tensions the member 51 in the projecting direction.

Item 7 is a control body; the control body 7 is provided with a guide part 7a along the outer spherical surface of the aforesaid mounting cylinder 2, and consists of a shell body 71 covering the outside of the mounting cylinder 2. Oscillation (in polar coordinates) is possible in any direction relative to the mounting cylinder 2 via this guide part 7a (FIG. 4, FIG. 5, FIG. 6). Also, the control body 7's shell body 71 is provided with a pursuit scope 8 corresponding to the aforesaid target image screen 4 and with a tactile sensation lever 10 that has a trigger member 9 that can be linked to the aforesaid switch 5 and with a vibration generating part 11. They are constituted so that the vibration of the tactile sensation lever 10 changes when firing and when hitting.

The aforesaid pursuit scope 8 is positioned at the front surface of the game machine main body, and consists of a window-shaped semi-transparent plate incised with an aiming mark M_2 in its center. It is constituted so that it freely oscillates integrally with the aforesaid control body 7. The scope 8's aiming mark M_2 overlaps the aforesaid target image screen 4's target image M_1 when the aforesaid trigger member 9 at the rear surface of the control body 7 and the aforesaid tactile sensation switch 5 match on the same line.

The aforesaid trigger member 9 sequentially links the pressing operation of a firing button 9a provided at the front of the aforesaid tactile sensation lever 10, and the aforesaid switch 5's pressing part 5a is pressed by a pressing member 9f at the rear. That is, when the firing button 9a, which is provided at the front of the tactile sensation lever 10 at the right side so that it can freely extend and sink, is pressed,

(1) A curved member 9b passing through the inside of the lever 10 is pressed to the interior,

(2) Because of this, a pin P_3 projectingly provided at its end causes an oscillating piece 9c to rotate relative to a shaft J_3,

(3) Because of this, the oscillating piece 9c's pin P_4 moves a plate-shaped member 9d toward the rear of the game machine,

(4) Because of this, the plate-shaped member 9d causes a moveable plate 9e to oscillate relative to a shaft J_4,

(4)[sic] Because of this, the pressing member 9f is moved to the front (toward the front of the game machine),

and the aforesaid pressing part 5a is pressed.

MSX 0047874

EX1021 - 354

The aforesaid tactile sensation levers 10 and 10 are grip members for transmitting sound and vibration when a missile is launched and sound and vibration when there is a hit to the user of the game machine. They resemble the control lever of a fighter and are provided at both sides of the aforesaid control body 7. That is, the tactile sensation levers 10 and 10 consist of grip parts 10a and 10a projecting at the outside of the outer shell body 100, while fitted into long holes N_3 and N_3 provided at their ends is an amplitude variation cam 12 (amplitude variation means) of the aforesaid vibration generating part 11 provided inside the outer shell body of the main body 100; it can oscillate in response to the rotation of the amplitude variation cam 12 centered on the shaft J_3. Here the vibration generating part 11 is provided with an angular tube body 11a having a drive motor (not shown in the drawing) inside; it is provided in the center of the control body 7 along the direction toward the inside of the aforesaid mounting cylinder 2.

Here, the amplitude variation cam 12, as shown in FIG. 7 and FIG. 8, consists of a fan-shaped moveable piece 13 and a driven rotary body 14. The aforesaid tactile sensation levers 10 and 10 are oscillated at different amplitudes according to the forward and reverse movement of the drive piece 13.

The fan-shaped moveable piece 13 is provided with a standing drive pin P_5 that is linked to a motor in the aforesaid vibration generating part 11's angular tube body 11a at an eccentric location equivalent to the fan's "pivot"; it is constituted so that it can be rotated forward or in reverse by the motor (in the drawing, forward is direction a and reverse is direction b). In contrast to this, the driven rotary body 14 has a long hole N_4 to ensure a different eccentricity at each end; the drive pin P_3 [sic] of the drive piece 13 passes through it. The driven rotary body 14 is also provided with a bracket-shaped receiving member U that can lock with the front part of the rotation direction regardless of whether the drive piece 13 rotates forward or in reverse. Here, the long hole N_4 and the receiving member U are eccentrically provided relative to the center of the driven rotary body 14. Therefore they are constituted so that when rotating forward (direction a) as shown in FIG. 8(a), the center of the drive piece 13's pin P_3 [sic] and the center of the driven rotary body 14 establish eccentricity S_1 corresponding to one end of the long hole N_4, and when rotating in reverse (direction b) the center of the drive piece pin 13's pin P_3 [sic] and the center of the driven rotary body 14 establish eccentricity S_2 corresponding to the other end of the long hole N_4 (however, $S_1 < S_2$). That is, [this constitution] generates a small-amplitude vibration corresponding to small eccentricity S_1 when rotating forward and generates a large-amplitude vibration corresponding to large eccentricity S_1 [sic] when rotating in reverse, and this can be transmitted to the aforesaid tactile sensation levers 10 and 10.

Item 21 is a shoot-down counter. The counter 21 is provided at the front surface of the game machine main body 100 near the aforesaid vibration generating part 11; it is constituted so that is linked to the motor inside the vibration generating part 11 via a catch 20. The counter can rotate via the catch 20 only when the motor runs in reverse; moreover, it can rotate only by a fixed angle. That is, it is constituted so that it operates each time this application's game machine switches hit modes; the number of hits is incremented one by one, and displayed on the front surface of the main body 100.

Furthermore, this embodiment is constituted so that the small vibration when rotating forward imitates the firing vibration when firing a missile and the large vibration

MSX 0047875

when rotating in reverse imitates the shock vibration of a hit, and an imitation sound is simultaneously created, but of course the characteristics of this vibration and sound can be suitably modified according to the contents of the game.

In the aforesaid embodiment, when the stand 1 is set on a desktop, the pursuit scope 8 is positioned so that it is directly before the player and at an angle that is easy to see. When a power switch 15 is turned on, BG sounds suitable for a space game are generated, and the oscillation means 6 makes the target image screen 4 oscillate irregularly vertically and laterally in front of the background image T, which is rotating at a constant speed. Now the player grasps the tactile sensation levers 10 and 10 with both hands, and appropriately oscillates the pursuit body 7 [sic] so that the aiming mark M_1 on the pursuit scope 8 and the target mark M_2 on the target image 4 match. Then, when the mark M_1 and mark M_2 match, if the firing button 9a of the trigger member 9 is pressed with the right thumb, the member 9f is pressed toward the switch 5's pressing member 5a via members 9b, 9c, 9d, and 9e.

When this happens, if the centerlines of the member 9f and the member 5a do not match, the missile launch sound is created and the vibration generating part 11's motor rotates forward, and the fan-shaped rotary member 13 rotates the driven rotary body 14 via drive pin P_4 positioned at one end of the long hole N_4 by the receiving member U, and a small-amplitude vibration of eccentricity S_1 is transmitted to the tactile sensation levers 10 and 10.

On the other hand, if the centerlines of the member 9f and the member 5a successfully match, the member 51 moves toward the front and switches on in hit mode, and the reflecting mirror 5b moves near the light-emitting lamp L, and the background image T and target image 4 rapidly brighten; an explosion sound is simultaneously created. Then the motor in the vibration generating part 11 rotates in reverse, the driven rotary body 14 rotates with eccentricity S_2, and a large-amplitude [vibration] is transmitted to the tactile sensation levers 10 and 10 via the drive pin P_4 positioned at the other end of the long hole N_4. In addition, each time reverse rotation begins, the shoot-down marker 20 [sic] rotates the counter 21 by exactly the predetermined angle, and the number of shoot-downs is incremented one by one.

Effect of the Invention

The present invention, as described above, is characterized as being constituted so that a target image screen is provided at the front surface of a base mounted inside an outside spherical surface's mounting cylinder and a hit switch for generating vibration when hits occur is provided at the rear surface and they can oscillate vertically and laterally respectively; a pursuit scope corresponding to the aforesaid target image screen and a tactile sensation lever having a trigger member linked to the aforesaid switch are respectively provided at a control body that can oscillate along the mounting cylinder's outside spherical surface; and the vibration amplitude of the tactile sensation lever is changed by an amplitude variation means when firing and when hitting. Therefore the tactile sensation vibration can be changed in each mode—when pursuing, when firing, and when hitting—and interest in the game machine can be increased. Moreover, the amplitude variation means has a simple structure consisting of an eccentric member and a cam, so the device structure is also simple.

MSX 0047876

EX1021 - 356

As a result, [the present invention] has an excellent effect in making it possible to provide a tactile sensation game machine that provides varied and realistic tactile sensation modes while keeping a simple and inexpensive device structure.

4. BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an oblique view of the entirety of this application's tactile sensation game machine. FIG. 2 is an oblique view with a partial cut-out of the same. FIG. 3 is an oblique view showing the structure of the base and oscillation mechanism. FIG. 4 is an oblique view showing the structure of the tactile sensation vibration switch's pressing means. FIG. 5 is a sectional view showing the relationship between the base and pursuit body. FIG. 6 is a sectional view showing the relationship between the tactile sensation vibration switch's pressing means and the base. FIG. 7 is an oblique view showing the structure of the amplitude variation cam. FIGS. 8(a) and (b) are drawings explaining the cam's amplitude variation principle.

1 Stand

2 Mounting cylinder

3 Base

4 Target image screen

5 Hit switch

5a Pressing part

5b Reflecting mirror

6 Oscillation mechanism

7 Control body

8 Pursuit scope

9 Trigger member

10 Tactile sensation lever

11 Oscillation generating means

11a Angular tube body

12 Amplitude variation cam (vibration variation means)

13 Fan-shaped moveable piece

14 Driven rotary body

15 Power switch

20 Catch

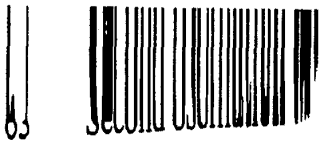
21 Counter

31 Frame body

61 First oscillation arm

62 Eccentric rotary disk

MSX 0047877



64 Cam follower
65 Irregularly curved cam
71 Shell body
L Light-emitting lamp
P_1, P_2, P_3, P_4 Pin
N_1, N_2, N_3, N_4 Long hole
J_1, J_2, J_3, J_4 Shaft
S_1, S_2 Eccentricity
M_1 Target image
M_2 Aiming mark
U Receiving member
G_1, G_2 Gear
B Spring
T Transparent disk

Agent: Yukihiro Hamura, Patent Attorney [seal]

MSX 0047878

EX1021 - 358

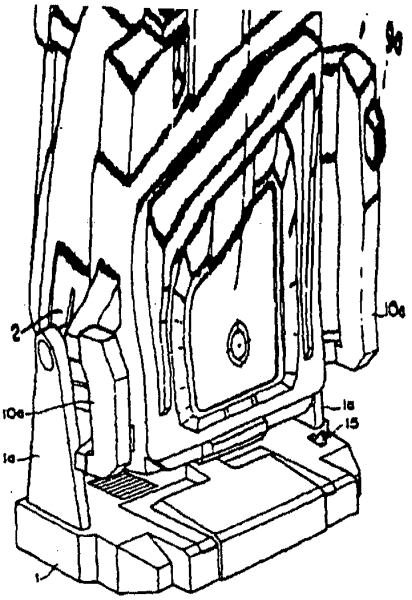


Figure 2

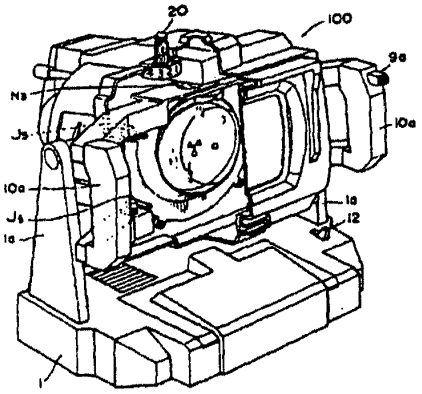
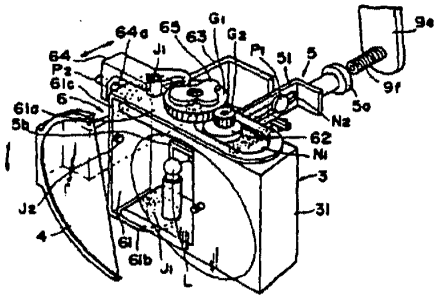


Figure 3



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Figure 4

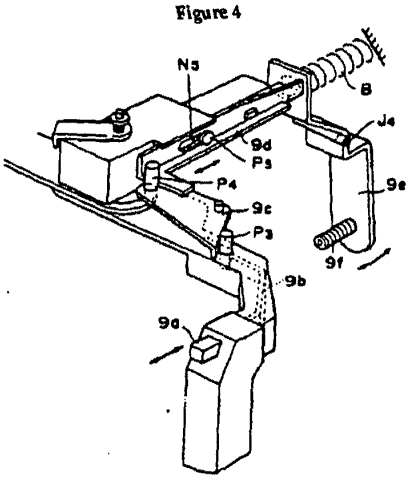


Figure 5

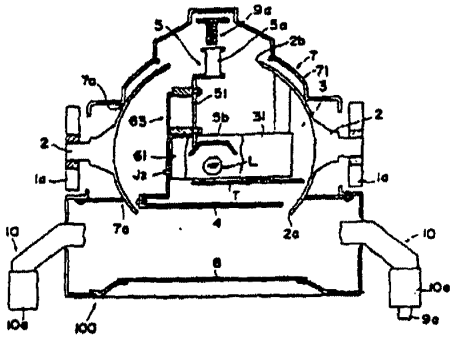


Figure 6

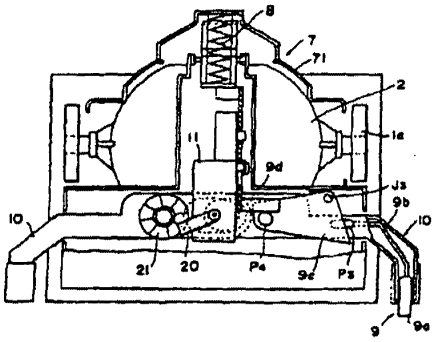


Figure 7

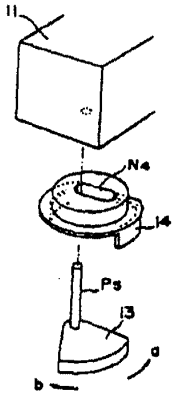
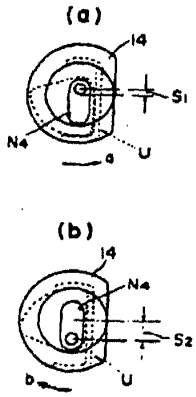


Figure 8



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EX1021 - 360

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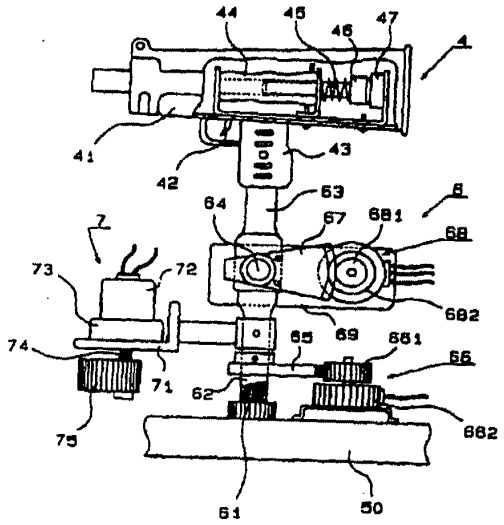
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(54) [Title of the Invention] Video Gun Shooting Game Machine, and Method for Controlling this Machine

(57) [Abstract]

[Object] It is an object of the present invention to inexpensively provide a novel video gun shooting game machine which has a simple structure and with which hits on a friend can be sensed directly through the body, and to provide a method for controlling this game machine.

[Constitution] A vibration generator is provided to a simulated gun or its support device, a vibration generating command signal is generated along with a player-hit signal by a game control circuit when it is determined that the player has been hit, and as a result the vibration generator is operated for a specific length of time so as to impart vibration to the simulated gun.



[Claims]

[Claim 1] A method for controlling a video gun shooting game machine, in which the player engages in a mock gun battle with an enemy appearing on the screen of a video display device (2), which displays the developing situation of the game according to a predetermined game program, by using a simulated gun (4) whose barrel (41) direction can be controlled and which is equipped with an apparatus capable of generating a hit location signal corresponding to the direction of the barrel (41) when the player aims at the screen of the video display device (2) and pulls a trigger (42), an enemy-hit signal is generated and sent to a game control circuit (3) when the enemy is present at a hit location on the screen corresponding to the signal generated by the hit location signal generator, or a player-hit signal is generated when the player is hit by a bullet fired by the enemy, the progress of the game is varied by these signals, and points are tallied according to the injury sustained by the player and enemy as a result of these hits,

wherein said method for controlling a video gun shooting game machine is characterized in that a vibration generator (7) is provided to a simulated gun (4) or its support device (6), a vibration generating command signal is generated along with a player-hit signal by a game control circuit (3) when it is determined that the player has been hit, and as a result the vibration generator (7) is operated for a specific length of time so as to impart vibration to the simulated gun (4).

[Claim 2] The method for controlling a video gun shooting game machine according to Claim 1, wherein the duration of the vibration imparted to the simulated gun (4) is controlled according to the injury sustained when the player is hit.

[Claim 3] A video gun shooting game machine, comprising:

a game control circuit (3) loaded with a predetermined game program;

a video display device (2) that is controlled by the game control circuit (3) and displays the developing situation of the game; and

a simulated gun (4) whose barrel (4) can be aimed at the screen of the video display device (2), and which is equipped with an apparatus capable of generating a hit location signal corresponding to the direction of the barrel when the player pulls a trigger (42),

in which the player engages in a mock gun battle with an enemy appearing on the screen of the video display device (2), an enemy-hit signal is generated and sent to the game control circuit (3) when the enemy is present at a hit location on the screen corresponding to the signal generated by the hit location signal generator, or a player-hit signal is generated when the player is hit by a bullet fired by the enemy, the progress of the game is varied by these signals, and points are tallied according to the injury sustained by the player and enemy as a result of these hits,

wherein said video gun shooting game machine is characterized in that a vibration generator (7) is provided to the simulated gun (4) or its support device (6), and a circuit is provided for operating the vibration generator (7) for a specific length of time when a player-hit signal is generated.

MSX 0047883

[Claim 4] The video gun shooting game machine according to Claim 3, wherein the vibration generator (7) comprises a motor (72) supported by a bracket (71) attached to a vertically rotating support shaft (62) that supports the simulated gun (4), and an eccentric weight (75) attached to an output shaft (74) of the motor (72) via a reduction gear (73).

[Detailed Description of the Invention]

[0001]

[Field of Industrial Utilization]

The present invention relates to a video gun shooting game machine and to a method for controlling this game machine.

[0002]

[Prior Art]

Video gun shooting game machines comprising a game control circuit loaded with a predetermined game program, a video display device that is controlled by the game control circuit and displays the developing situation of the game, and a simulated gun whose barrel can be aimed at the screen of the video display device and which is equipped with an apparatus capable of generating a hit location signal corresponding to the direction of the barrel when the player pulls a trigger, in which the player engages in a mock gun battle with an enemy appearing on the screen of the video display device, an enemy-hit signal is generated and sent to the game control circuit when the enemy is present at a hit location on the screen corresponding to the signal generated by the hit location signal generator, or a player-hit signal is generated when the player is hit by a bullet fired by the enemy, the progress of the game is varied by these signals, and points are tallied according to the injury sustained by the player and enemy as a result of these hits, are commonly known and have become very popular.

[0003] Various devices have been employed to make these games as realistic as possible by providing an apparatus for generating the feel of an impact or the sound of a bullet being fired when the trigger is pulled. Unfortunately, with conventional game machines of this type, when the player is shot, the image of an explosion or the like merely appears on the screen of the video display device, or a sound effect is generated, so the player cannot directly feel the hit, and consequently the game lacks realism or does not provide the feel of a simulated experience.

[0004] Realism and the feel of a simulated experience have recently become very important in video games, which is why game machines have become much bulkier, but a machine which allows the player to physically feel a hit on a friendly position by means of a simulator, for example, is extremely large and expensive, and is therefore not well suited to application to relatively inexpensive video gun shooting game machines. Accordingly, there have as yet been no proposals for video game machines that give the player a physical sensation of being shot.

[0005]

[Problems Which the Invention is Intended to Solve]

MSX 0047884

It is an object of the present invention to inexpensively provide a video gun shooting game machine with which hits on a friendly position can be sensed directly through the body, and to provide a method for controlling this game machine.

[0006]

[Means Used to Solve the Above-Mentioned Problems]

The stated object is achieved by providing a vibration generator to a simulated gun or its support device in the above-mentioned conventional video gun shooting game machine, and providing a circuit for operating this vibration generator for a specific length of time when a player-hit signal is generated.

[0007] The stated object is also achieved by providing a vibration generator to the support device of a simulated gun in a method for controlling the above-mentioned conventional video gun shooting game machine, generating a vibration generating command signal along with a player-hit signal from a game control circuit when it is determined that the player has been hit, which results in the vibration generator being operated for a specific length of time and vibration being imparted to the simulated gun.

[0008]

[Examples]

An example of the present invention will now be described through reference to the appended drawings. Fig. 1 is a diagram illustrating the overall structure of the video gun shooting game machine pertaining to the present invention, Fig. 2 is a diagram illustrating an example of the structure of the simulated gun used in this video gun shooting game machine, and Fig. 3 is a flow chart of the game.

[0009] In Fig. 1, 1 is the overall game machine, 10 is the cabinet thereof, 2 is a video display device attached to the cabinet 10, 3 is a game control circuit built into the cabinet 10, 4 is a simulated gun, 5 is a firing stand that houses a support device 6 for the simulated gun 4 and a vibration generator 7, 50 is a cabinet for this stand, and 8 is a signal transmission cable.

[0010] The program required for the game is loaded ahead of time into the game control circuit 3, and the developing situation of the game, including the image of the enemy that is the target in the gun battle, the background, obstacles, and so forth, is displayed on the video display device 2. The player uses the simulated gun 4 provided to the firing stand 5 to conduct a gun battle with the enemy appearing on the video display device.

[0011] Fig. 2 shows the details of the support device 6 and the vibration generator 7. 41 is the barrel[1] of the simulated gun 4, 42 is the trigger, and 43 is the grip. Inside the barrel 41 are housed a firing signal generator (not shown) and a firing sound and impact generator consisting of a solenoid 44, a compression spring 45, a weighted plunger 46, and a shock-absorbing rubber bushing 47.

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[1] Translator's note: The Japanese word for barrel is used throughout the document, although from the drawings it does not appear to be a barrel per se, and might be more properly called the gun body.

MSX 0047885

EX1021 - 367

[0012] When the trigger 42 is pulled, pulse current flows to the solenoid 44, while the firing signal generator sends out a pulse signal. When current flows to the solenoid 44, the weighted plunger 46 is pulled into the solenoid 44 against the elastic force of the compression spring 45, and then when the power is cut off, the weighted plunger 46 is repelled by the elastic force of the compression spring 45, and hits the shock-absorbing rubber bushing 47, which produces a firing sound and makes the barrel recoil. As the player continues to pull the trigger 42, the firing sounds and impacts are continuously generated.

[0013] The simulated gun support device 6 comprises a fixed support shaft 61 fixed to the bottom of the cabinet 50, a rotating support shaft 62, a fork 63 linked at its upper end to the grip 43, a pin 64 that bendably links the rotating support shaft 62 and the fork 63, a segment 65 that is attached to the rotating support shaft 62 and rotates together with the rotating support shaft 62, a potentiometer 66 that is controlled by the segment 65, a segment 67 that is attached to the fork 63 coaxially with the coupler pin 64 and that rotates together with the fork 63, a potentiometer 68 that is controlled by the segment 67, and a potentiometer supporting bracket 69 that is attached to the rotating support shaft 62.

[0014] The lower end of the rotating support shaft 62 is tubular in shape and rotatably fitted to the fixed support shaft 61, while the upper end is crimped flat. The forked portion at the lower end of the fork 63 flanks the flat part at the upper end of the rotating support shaft 62, and the two components are bendably coupled by the coupler pin 64. The potentiometer 66 comprises an input gear 661 and a converter 662, and is fixed to the cabinet 50 via a suitable bracket, and its input gear 661 meshes with the segment 65 that rotates together with the rotating support shaft 62.

[0015] The bracket 69 is welded to the rotating support shaft 62, and the potentiometer 68 is attached to this bracket 69. The potentiometer 68 comprises an input gear 681 and a converter 682, and is attached to the bracket 69, and its input gear 681 meshes with the segment 67 that rotates together with the fork 63.

[0016] Therefore, the orientation of the simulated gun 4 is controlled biaxially by the rotating support shaft 62 and the coupler pin 64, so the player can freely control the direction of the barrel 41 by turning the grip 43 to the right and left and pointing it up and down, allowing him to aim and fire at the image of the enemy appearing on the screen of the video display device 2. The azimuth and angle of elevation of the barrel 41 are converted into electrical signals by the potentiometer 66 and the potentiometer 68, respectively, and these signals are sent to the game control circuit 3.

[0017] As discussed above, when the player pulls the trigger 42, a fire signal is generated from the signal generator housed in the barrel 41, and this fire signal is also sent to the game control circuit 3. When a fire signal is generated, if the azimuth and elevation angle of the barrel 41 are within a predetermined range corresponding to the image of the enemy on the screen of the video display device 2, then the fired bullet is deemed to have hit the enemy, and the player earns points corresponding to the injury sustained by the enemy, but if the enemy accurately aims and fires at the player before the players knocks the enemy down, this is deemed a defeat of the player, and the player loses one friendly commando. The object of the game is to earn as many points as possible before all friendly commandos are wiped out.

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[0018] With a conventional video gun shooting game machine, an apparatus was provided for imparting some kind of shock or recoil to the barrel 41 when the player pulled the trigger, and this did give the player a sense of realism or simulation, but the only thing that happened when a friend was shot was that a crash image was displayed on the screen or a suitable simulated sound was generated, so the game was not interesting enough to keep a single player engrossed for a long period of time.

[0019] The structure of this game is illustrated by the flow chart in Fig. 3. First, the player inserts the required coin or the like to start the game. The enemy and the background and obstacles required for the game are displayed on the video screen, and the enemy attacks the player while hiding behind trees, houses, or other such obstacles. The player continues firing at the hiding enemy with the simulated gun as long as he is not hit by a bullet from the enemy. The enemy falls down, explodes, and disappears when struck by a bullet from the simulated gun, and the player earns points.

[0020] Meanwhile, if a bullet fire by the enemy hits the player, the player is injured, and life memory decreases. At the same time, an explosion pattern is displayed on the screen, and the life memory panel flashes. The game up to this point is the same as in the past.

[0021] With the video gun shooting game machine pertaining to the present invention, however, right after the above process, the vibration generator 7 is activated and the player's gun vibrates violently to the left and right. The vibration at this time makes it difficult for the player to aim, so he has to firmly hold on to the grip 43 and use all his strength to steady the simulated gun 4 and keep firing, which makes it seem like intense hand-to-hand combat. After a predetermined time corresponding to the injury sustained by the player has elapsed, the vibration generator 7 is switched off and the vibration of the simulated gun 4 stops.

[0022] As discussed above, and shown in Fig. 2, with the video gun shooting game machine pertaining to the present invention, the vibration generator 7 is provided to the simulated gun support device 6, and when the player is shot, this vibration generator imparts powerful vibration to the simulated gun 4, and this vibration is transmitted to the body of the player, making him feel as if he is really a part of the game. This vibration also hampers the player's ability to fire and makes it harder for him to play the game, so the player must hold on tightly to the grip and keep returning fire. This raises the player's excitement level and keeps him interested in the game.

[0023] In this example, the vibration generator 7 comprises a bracket 71 attached to the rotating support shaft 62, a motor 72, a reduction gear 73, and an eccentric weight 75 attached to the output shaft 74 of this reduction gear. If the game controller 3 recognizes an injury on the player side, the game controller 3 operates the motor 72 for a specific length of time at a predetermined speed according to the extent of the injury to the player.

[0024] The rotation of the motor 72 is transmitted by the output shaft 74 through the reduction gear 73, and the eccentric weight 75 is rotated at high speed, which generates a powerful vibration. Accordingly, the rotating support shaft 62 is subjected to powerful rotational vibration, and consequently the barrel 41 is also vibrated to the left and right. This allows the player to physically feel a hit, and furthermore this vibration makes it more difficult to aim and hampers the player's ability to fire, so the player has to hold on tightly to the grip while returning fire, which inexorably draws the player into the game

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and makes the battle experience even more realistic, so the interest in the game is even higher.

[0025] The constitution of the present invention is not limited to the example given above. For instance, the simulated gun can be a laser gun or one with a built-in CCD, and the gun need not be in the form of a rifle, and can instead be a bazooka, missile launcher, machine gun, pistol, or the like. Furthermore, the structure of the support device is not limited to the biaxial system described above, and depending on how a hit with the simulated gun is determined, a coil spring support system or a freely jointed system can be employed. It is also possible to do away with the support device and make the simulated gun completely hand-held. Also, the vibration generator need not be attached to the support device, its base, or the like, and can instead be attached directly to the simulated gun or can be built into the simulated gun. Furthermore, many different kinds of vibration generator can be used, such as a solenoid type, magnetic vibrator type, air motor type, spring type, or hammer concussion type, and the machine can also be designed so that the player can select or adjust the energy level of the vibration as desired. All of these variations are encompassed by the present invention.

[0026]

[Effect of the Invention]

The present invention has the constitution and operation described above, and therefore provides an extremely interesting video gun shooting game machine.

[Brief Description of the Drawings]

Fig. 1 is a diagram illustrating the overall structure of the video gun shooting game machine pertaining to the present invention.

Fig. 2 is a diagram illustrating an example of the structure of the simulated gun.

Fig. 3 is a flow chart of the game.

[Key]

1 overall game machine

2 video display device

3 game control circuit

4 simulated gun

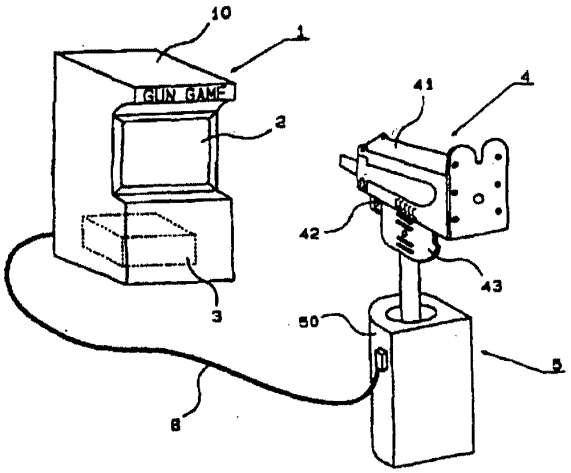
5 firing stand

6 simulated gun support device

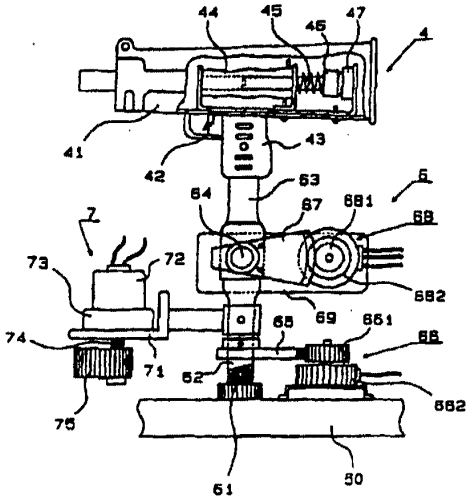
7 vibration generator

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[Figure 1]

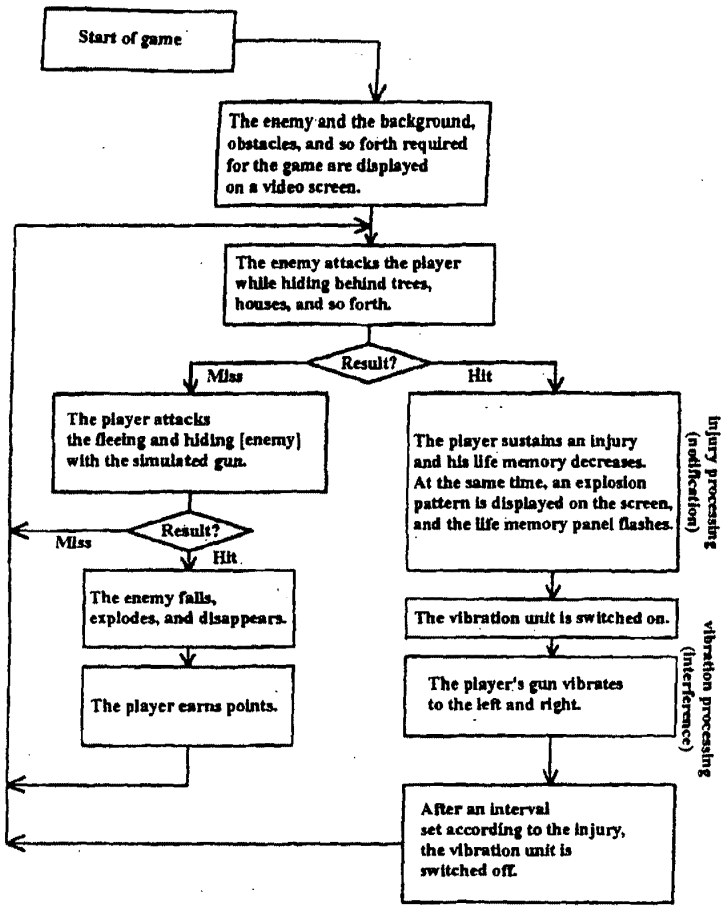


[Figure 2]



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[Figure 3]



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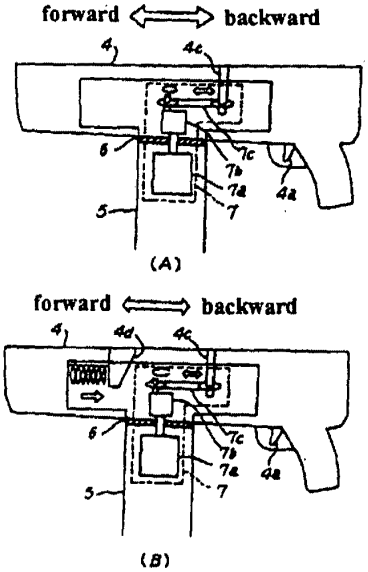
EX1021 - 374

(54) [Title of the Invention] Gun Unit for Game Machine Equipped with Sliding Vibration Mechanism

(57) [Abstract]

[Object] To obtain a gun unit used for an electronic game machine or other such game machine, which makes a player feel as if he is actually firing a machine gun.

[Constitution] A support shaft 5 of a gun unit is equipped with a slider 6 for carrying a gun body 4 of the gun unit and sliding it back and forth, and a reciprocating vibrating mechanism 7 for vibrating the gun body 4 carried by the slider 6 back and forth according to an operating command from the game machine. The reciprocating vibrating mechanism 7 comprises, as shown in the drawings for example, a motor 7a, an eccentric cam 7b inserted into a rotor of the motor 7a, and a link 7c for coupling a coupler 4c provided inside the gun body 4 and a coupler of the eccentric cam 7b, and generates reciprocating motion.



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[Claims]

[Claim 1] A gun unit for an electronic game machine or other such game machine equipped with sliding vibration mechanism, wherein said game machine gun unit is characterized in that a support shaft of the gun unit is equipped with a slider for carrying a gun body of the gun unit and sliding it back and forth, and a reciprocating vibrating mechanism for vibrating the gun body carried by the slider back and forth according to an operating command from the main body of the game machine.

[Claim 2] The gun unit for a game machine equipped with sliding vibration mechanism according to Claim 1, wherein the gun body is coupled with the support shaft, and there is provided an elastic member disposed such that tensile force or restoring force acts in the rearward direction of the gun body.

[Detailed Description of the Invention]

[0001]

[Field of Industrial Utilization]

The present invention relates to a gun unit used in an electronic game machine or other such game machine, and more particularly relates to a game machine gun unit equipped with a vibrating mechanism for simulating the recoil when a bullet is fired.

[0002]

[Prior Art]

Electronic game machines installed in amusement centers and so forth include so-called gun games, in which the player uses a simulated gun (such as a pistol) to fire at a target displayed on the screen of a display device. In general, with a gun game, the firing direction and position are detected by a position detector at the point when the player pulls the trigger of the gun, a firing sound or other such sound effect is outputted by the electronic game machine, and whether the bullet hit its target or not is determined on the basis of the detection information in the position detector. If the shot was a hit, a hit scene is displayed on the screen and a hit sound is outputted. Since the gun used with such games does not actually fire any bullets, the game is given a more realistic feel by vibrating the gun unit with a vibrating mechanism inside the gun unit at the point when the gun trigger is pulled, so as to simulate the recoil produced when a gun is fired.

[0003] Figs. 2 A and B are cross sections of first and second structure examples for a game machine gun unit equipped with a conventional vibrating mechanism. The gun unit consists of an integrally molded gun 1 and support shaft 2, and a vibrating mechanism 3 is provided inside the gun 1. The rotatable support shaft 2 can be tilted in the directions of the arrows L1 and L2 around a pivot point C of a turning mechanism (not shown) located underneath, which allows the player to aim the gun at the target.

[0004] Fig. 2A is an example in which a solenoid magnet is used as the vibrating mechanism 3. The solenoid magnet 3S consists of an electromagnet composed of a cylindrical coil that generates a magnetic field, and an armature (rotor) that moves reciprocally along the center axis of this coil. When the player pulls the trigger 1a of the gun 1, the solenoid magnet 3S is actuated, and the reciprocal motion of the armature

MSX 0047893

EX1021 - 376

causes the distal end thereof to hit a protrusion 1S. This striking of the protrusion 1S tilts the gun unit in the direction of arrow L2 around the pivot point C, and the continuous tilting caused by repeated firing results in vibration. This vibration is transmitted to the player's hand from a grip 1b linked directly to the support shaft 2, which allows the player to physically feel the firing recoil.

[0005] Fig. 2B is an example of a gun unit in which the vibrating mechanism 3 provided inside the gun 1 is made up of a motor 3M and an eccentric weight 3W. In this example, when the player pulls the trigger 1a of the gun 1, the motor 3M inside the vibrating mechanism 3 is actuated, and the rotational movement of the eccentric weight 3W attached to the rotating shaft of the motor 3M causes the gun unit to vibrate in a circle with respect to the rotational axis. This vibration is transmitted from the grip 1b to the player's hand, and this gives the player the sensation of firing a gun, produced by gentle vibrations.

[0006]

[Problems Which the Invention is Intended to Solve]

However, with the conventional gun unit described above, the gun and the support shaft were integrated, with the support shaft itself serving as the grip. Since the grip was vibrated indirectly by vibrations from a source provided inside the gun, only gentle vibrations were transmitted to the player. Also, since the vibration direction was different from that of a real gun, the sensation was far removed from that produced by the recoil of an actual hand gun or machine gun.

[0007] The present invention was conceived in light of the above situation, and it is an object thereof to eliminate the above-mentioned drawbacks and provide a gun unit for a game machine, equipped with a sliding vibrating mechanism that feels as if an actual gun is being fired.

[0008]

[Means Used to Solve the Above-Mentioned Problems]

The present invention relates to a gun unit equipped with a sliding vibrating mechanism and used in electronic game machines and other such game machines. The stated object of the present invention is achieved by equipping a support shaft of a gun unit with a slider for carrying a gun body of the gun unit and sliding it back and forth, and a reciprocating vibrating mechanism for vibrating the gun body carried by the slider back and forth according to an operating command from the main body of the game machine.

[0009]

[Operation of the Invention]

With the present invention, a support shaft is equipped with a sliding vibrating mechanism, and the gun body is vibrated by being slid back and forth according to a drive command from the main body of the game machine, so the vibrations produced by the reciprocal movement of the gun are transmitted directly to the hand holding the gun. Furthermore, the gun body and the support shaft are coupled, and an elastic member is disposed such that tensile force or restoring force acts in the rearward direction of the gun body. As a result, the movement speed is faster in the direction opposite the direction in

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which the bullet is fired, so the movement of a recoiling gun body can be accurately reproduced.

[0010]

[Examples]

An example of the present invention will now be described in detail through reference to the drawings. Fig. 1A is a cross section of a first structure example of a game machine gun unit equipped with the sliding vibrating mechanism of the present invention. As shown in Fig. 1A, the gun body 4 and the support shaft 5 are separate parts in this gun unit. The support shaft 5 of the gun unit is provided with a slider 6 for sliding the gun body 4 back and forth, and a reciprocating vibrating mechanism 7 for vibrating the gun body 4 carried by the slider 6 back and forth according to an operating command from the main body of the game machine (not shown).

[0011] The reciprocating vibrating mechanism 7 comprises, as shown in Fig. 1A for example, a motor 7a, an eccentric cam 7b inserted into a rotor of the motor 7a, and a link 7c for coupling a coupler 4c provided inside the gun body 4 and a coupler of the eccentric cam 7b. The slider 6 comprises, for example, a slider unit that carries the gun body 4, and a track rail, and is designed so that the gun body 4 can slide back and forth along the track rail. The vibrating mechanism 7 here is not limited to the structure shown in Fig. 1A, and may employ a solenoid magnet instead.

[0012] The following is an example of how the gun unit of the present invention operates with a structure such as this. When the player pulls the trigger 4a of the gun body 4, the motor 7a is driven according to a command from the main body of the game machine (not shown), the rotation motion of an eccentric cam 5c becomes reciprocal motion and is transmitted through the link 7c to the coupler 4c inside the gun body 4, and the gun body 4 reciprocally moves a specific distance back and forth along the track rail inside the slider 6. The stroke is controlled by the drive command from the main body of the game machine, and the speed of the reciprocal motion can be varied according to the type of gun and how the game develops.

[0013] Fig. 1B is a cross section in which a speed changing means for changing the movement speed in the forward and rearward directions of the gun body 4 is added to the vibrating mechanism 7 shown in Fig. 1A. This allows the movement of the gun body to be modulated. An elastic member receiver 4d is provided inside the gun body 4, and the gun body 4 and the support shaft 5 are coupled via an elastic member 5e at the forward position of the vibration source. With this structure, when the gun body 4 slides forward along the track rail inside the slider 6, the elastic member 5e is compressed, and the restoring force thereof is exerted to the rear. As a result, the gun body 4 moves quickly in the rearward direction and slowly in the forward direction. Generating action such as this allows the movement of a gun body as it recoils when fired to be reproduced more accurately.

[0014] Further, in the above example, an electric actuator was used as the sliding vibrating mechanism for vibrating the gun body back and forth, but a "pneumatic actuator" or "hydraulic actuator," which controls the output of an energy accumulator (such as an air compressor or a hydraulic power unit) with valves and pneumatically or

hydraulically drives a cylinder, may be used instead. From the standpoints of response, momentum, durability, cost, and so forth, however, the sliding vibrating mechanism shown in Fig. 1 is superior in overall performance. Also, the elastic member 5e in Fig. 1B was a cylindrical coil spring, but is not limited to this, and may instead be a spiral spring, flat spring, or the like. Also, the disposition of the elastic member 5e is not limited to acting compressively, and may instead act in tensile fashion.

[0015]

[Effect of the Invention]

As discussed above, with the game machine gun unit equipped with a sliding vibrating mechanism of the present invention, a sliding vibrating mechanism is provided to a support shaft, and the gun is slid back and forth according to drive commands from the main body of the game machine, so vibration produced by the reciprocal motion of the gun is transmitted directly to the hand holding the gun, allowing the player to experience a powerful sensation of firing a gun. Furthermore, a speed changing means is provided so that the movement speed is faster in the direction opposite the direction in which a bullet is fired, so it feels as if a real machine gun is being fired.

[Brief Description of the Drawings]

Fig. 1 consists of cross sections of first and second structure examples for a game machine gun unit equipped with the sliding vibrating mechanism of the present invention.

Fig. 2 consists of cross sections of first and second structure examples for a game machine gun unit equipped with a conventional vibrating mechanism.

[Key]

4 gun body

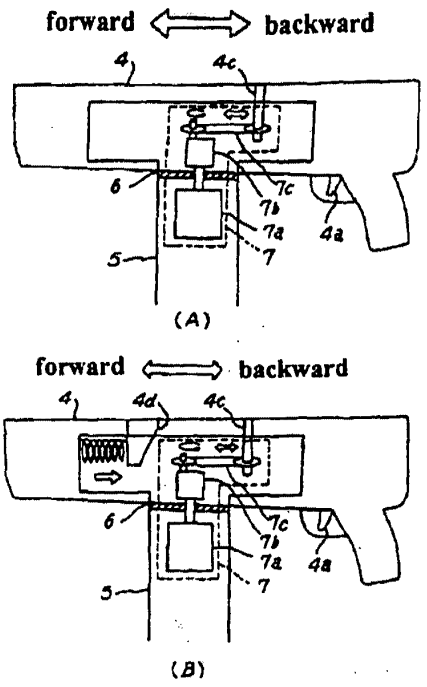
5 support shaft

6 slider

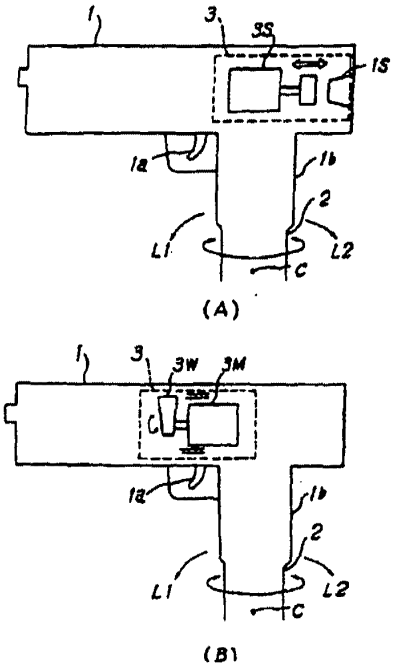
7 vibrating mechanism

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[Figure 1]



[Figure 2]



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EX1021 - 380

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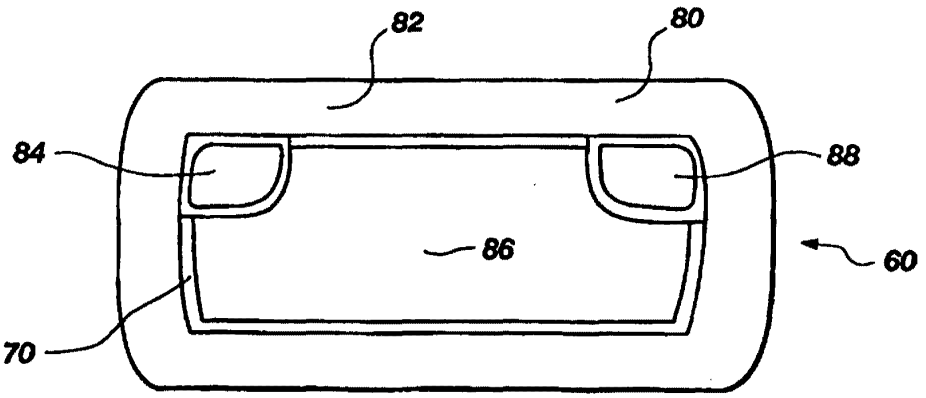
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(57) Abstract

A method and apparatus for providing tactile feedback to a user moving their fingers across the touch-sensitive surface (80) of a touchpad or tablet (60). Different regions (82, 86) of the touch-sensitive surface (80) are differentiated from each other by providing different human perceptible textural surfaces within the regions (82, 86). A different texture provides immediate tactile feedback to a user through a finger making contact with the touchpad (60). Increased functionality is important because it solves problems which are inherent to small touchpad surfaces used as computer input devices to drag an object from one side of a display (20) to another without repeatedly raising a finger to repeat the dragging motion because of the limited surface area of the touchpad surface (60). Providing increased functionality such as a drag extend function solves the movement problem. The present invention then solves the problem of conveying to the user through touch, information about the location of the finger without having to look away from the display (20), thereby facilitating input and cursor manipulation for a computer (16).

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APPARATUS AND METHOD FOR TACTILE FEEDBACK FROM INPUT DEVICE

BACKGROUND OF THE INVENTION

1. FIELD OF THE INVENTION

This invention pertains to computer input and pointing devices used to control cursor movement on a display. More particularly, this invention pertains to touch-sensitive data input and pointing devices for data input to computers and other devices which benefit from interaction with a user.

2. PRIOR ART

Input devices for computers are well known in the art. There are several types of input devices including the familiar "mouse." The mouse has become so popular because, when combined with a graphical user interface (GUI), it is so much easier to use than typed keyboard commands. Instead, a cursor is caused to move on a display screen, the cursor being controlled by movements of the mouse being translated into corresponding cursor movements. The mouse has been accepted as a "user friendly" input device for both experienced and novice computer users. The popularity which the mouse has achieved in the art can be given large credit for fostering the explosive growth of the personal computer industry since a mouse provides a simple means for users to input data to a computer.

While mice are currently the most popular non-keyboard input device, a mouse generally requires a free-rolling surface, *i.e.* a table top, on which it can operate. Disadvantageously, a mouse is not well suited for use in cramped spaces or with a portable computer, particularly laptop, notebook, sub-notebook, and palmtop computers. In answer to the long existing need for a more convenient input device suitable for both portable and desktop computers, various alternative input devices have been proposed. Such alternative input devices include devices commonly referred to as track balls, track pens, track point devices, as well as various devices which sense the position of a pointing object on a position sensing surface. The devices which sense the position of a pointing object on a sensing surface generally have the advantages of being simple to use, being easily integrated with current computers and other computing devices, reliability, ruggedness, compactness, and the ability to be transported and used in a variety of locations.

Numerous types of input devices utilize a position sensing surface. Examples are provided in the following patent references: U.S. Pat. No. 3,886,311, Rodgers et al. (Writing pen for detecting time varying electrostatic field produced by a writing tablet); U.S. Patent No. 4,672,154, to Rodgers et al. (Cordless stylus which emits a directional electric field from the tip of a conductive pen cartridge sensed by a digitizer tablet having an X-Y coordinate system); U.S. Pat. No. 4,680,430 to Yoshikawa et al. (A tablet-like coordinate detecting apparatus including a resistive film for determining the coordinate position data of a point on a plane indicated by the touch of a finger tip or other load); U.S. Patent No. 4,103,252 to Bobick (A position sensing tablet with electrodes located on the boundaries of a sensing region which detects a human touch by the change in capacitive charge caused by the touch which

varies the time constant of an RC network which is part of an oscillator); U.S. Patent No. 4,736,191 to Matzke (A touch activated control device comprising individual conductive plates wherein a user's touch on the dielectric layer overlaying the plates is detected by individually charging and discharging each of the sectors in the plates in a sequential manner to determine the increased capacitance of the sector); U.S. Patent No. 4,550,221 to Mabusth (A touch sensitive control device which translates touch location to output signals and which includes a substrate that supports first and second interleaved, closely spaced, non-overlapping conducting plates); U.S. Patent No. 4,639,720 to Rympalski et al. (An electronic sketch pad which contains a graphics input pad having an array of transparent capacitive pixels, the capacitance characteristics of which are changed in response to the passing of a conductive tipped stylus over the surface of the pad); and, European Patent Publication No. 574,213 (A proximity sensor includes a sensor matrix array which senses changes in capacitance between horizontal and vertical conductors connected to the position sensing pad to determine x, y, & z position information).

A particularly useful and advantageous input device is disclosed in U.S. Patent No. 5,305,017 to Gerpheide. The Gerpheide patent discloses devices and methods which overcome the drawbacks inherent in other devices which utilize a sensing tablet or sensing surface. The devices and methods of the Gerpheide patent include a touch sensitive input pad upon which a user conveniently inputs position information with a finger. In operation, the user's finger tip is brought in close proximity to the top surface of the position sensing surface of the touch sensitive pad. The device of the Gerpheide patent detects the position of the finger tip in the x and y directions of the touchpad as well as the

finger's proximity in the z direction in relation to the sensing surface. In addition to a finger, the pointing object can be any other conductive object.

The above mentioned input devices are easily distinguished from each other by focusing on a particular characteristic which each device does or does not possess. Specifically, each input device may either be used by moving a stylus across the touch-sensitive surface, or a human finger, or both. The input devices of interest are only those which are useable by touching the touch-sensitive surface with a finger.

The different input devices allow for various sensing apparatus of the touch-sensitive devices to detect the finger and translate movement of the finger into corresponding movement of a cursor on a display screen. This patent has within its scope of interest those touchpad-type devices which readily provide tactile feedback to the user, and which control a cursor on a display device. Practically speaking, the greatest feedback occurs when using touchpads and tablets operated by a user's finger.

One of the advantages of using a touchpad or tablet as an input device is that space is conserved. This means that the touchpad or tablet are not moved around, as is a mouse, in order to manipulate a cursor on a display screen. Instead, a finger is moved across a touch-sensitive surface, while the touchpad or tablet advantageously remains stationary. This characteristic is very important when space constraints are premium, such as on an airplane or a crowded desk.

With the advent of these new touchpad and tablet devices have also come enhancements to make them easier to use and to provide additional benefits over mice and other input devices. In particular, the Gerpheide patent application, Serial Number 08/413,199, teaches a SYSTEM AND METHOD FOR EXTENDING THE DRAG FUNCTION OF A COMPUTER POINTING DEVICE. This patent application is

particularly useful to touchpads and tablets because it makes optimum use of the available touchpad surface area. When a cursor is manipulated to drag an object across a display screen, typically the user cannot complete the operation in a single continuous stroke of a finger. The reason is that although it is common practice to make a small finger movement on a touchpad correspond to a larger cursor movement on a display by magnifying relative motion, available touchpad surface area is still finite. Therefore, in the middle of a drag operation during which the user is maintaining contact with a touchpad, the user is forced to lift the finger. In conventional computer input devices, lifting the finger terminates the drag operation. The user must reselect the object which was being dragged by the cursor, and then continue movement. Depending upon the distance to be moved, this operation might be repeated several times.

The Gerpheide patent advantageously provides new functionality to the touchpad by creating a delay in drag cancellation. Specifically, when dragging an object with a cursor, lifting the finger does not immediately result in termination of drag operation. Instead, a delay in termination provides sufficient time for a user to lift the finger, move it to a new location on the touchpad, and resume dragging the object as if the finger had never been lifted.

Implementation of the drag extend function described above is accomplished by creating regions on the touchpad surface which provide new functionality. For example, moving a finger into an appropriate region activates a desired function. With drag extend, the most logical location for a region which can activate the function is the perimeter of a touchpad. This is because the user's finger is going to reach the edge of the touchpad. By creating a border region around the entire touchpad perimeter, the drag extend function can

be activated while dragging in any direction. It should be apparent from the explanation above that endowing a border region with extended functions such as drag extend can be advantageous for the user.

A problem which is not readily apparent from the description given above is that a user is not always aware of the location of their finger on the touchpad. A user is manipulating the position of a cursor on a display screen, and therefore is concentrating on watching the display and not the touchpad. The problem arises when a user wants to use, for example, the drag extend function. The surface of a touchpad is typically uniformly smooth to the perception of human touch. Typically, there is no tactile indication to assist a user in determining whether a finger is within the border region or not. Consequently, when the user executing the drag operation lifts the finger from the touchpad, the drag function might terminate. In essence, no way is readily provided for a user to know when a finger has entered the border region.

One attempt at a solution to this problem of inadequate tactile feedback is provided by Logan et al. in U.S. Patent No. 5,327,161. Generally, the Logan patent apparently addresses the issues of replacing an ordinary mouse with a touchpad type device. Specifically, the patent teaches providing extended functionality to a touchpad by placing touch-sensitive sensor strips on a physically raised outer perimeter or bevel around the touchpad, but not actually on the touchpad surface. When a finger comes in contact with the touch-sensitive strips, extended functionality is provided to the user.

One of the several disadvantages of the Logan patent is that construction of the touchpad is needlessly complicated. Specifically, Logan requires a raised bevelled edge to be created around the touchpad perimeter to provide the physical tactile feedback to

the user that an edge of the touchpad has been reached. The touch-sensitive strips are formed independent of the touchpad material, and they require additional circuitry, sensors, and a coordinating processor to determine when the touchpad surface and the touch-sensitive strips are being activated simultaneously.

Another disadvantage is that Logan does not teach how nearing the perimeter of the touchpad can be useful. Instead, Logan only provides tactile feedback when the user actually strikes the bevelled edges of the touchpad. The user is given no tactile warning that an edge is approaching.

Illustrated in FIG. 1 is a representation of a computer system 16 to which is attached a mouse 10 which acts as a cursor locator input device. The movement of the mouse 10 is translated into movement of a cursor on a display 20 coupled to the computer 16 in real time. In many cases, it is desirable that any input device to be used with the computer 16 be compatible therewith. Alternatively, a cursor locating device can interface directly with the computer 16, for example via an operating system or some other technique which does not require a mouse driver.

In order to be compatible with the computer 16, any input device must provide "click", "drag" and "gesture" functions which can also be provided by the mouse 10. The click function entails depressing and releasing one of the mouse buttons 12 or 14. The click function may entail single, double, triple or even half clicks. For example, a one and a half click is where the user uses a finger to press down on a button or surface, raises the finger to release, then presses down and holds the button or surface with the finger again. The drag function entails moving the cursor over text or an object on the display 20, depressing a mouse button 12 or 14, keeping the mouse button depressed while "dragging" the text or object to a new location on the

display 20, and releasing the mouse button to position the text or object on the new location on the display 20. Finally, gestures are symbols or other figures created by tracing alphanumeric characters on the touchpad.

Also represented in FIG. 1 is a touch-sensitive positioning device, generally referred to at 26, which includes a position sensing surface 22 and a pointing object 24. Early versions of these touch-sensitive touch-pad type devices included mechanical buttons, such as those shown at 28 and 30 which provide the functions of mouse buttons 12 and 14, respectively.

However, advancements have made it possible to have a touch-sensitive device which no longer requires mechanical switch buttons to carry out the click function. Instead, the touch-sensitive devices require a user to simply lift a finger and tap once, twice, three times or with half-taps on the touch-sensitive surface. The tapping motion is detectable by the touch-sensitive circuitry which informs the driver or application software of the input action.

FIG. 2A is a schematic side elevational view of a touchpad input device 40 illustrating a touch-sensitive bezel 42 of the system of taught in U.S. Patent No. 5,327,161 by Logan et al. Logan has significant disadvantages which are overcome by the present invention. However, to understand the improvements, it is necessary to have a little background in order to illustrate them.

As shown, the touch-sensitive surface is recessed 44 down into a touchpad 40. At the borders of the touchpad 40 are four beveled edges 42 to which is attached a piezoelectric or some similar sensor device 46. When a user's finger presses against the beveled surface 42, the attached sensor 46 registers the contact and signals activation of a computer input function. This view also shows the mechanical switch 48 below the

touch-sensitive touchpad 40 which is activated by pressure on the surface 50 above. The touch-sensitive surface 50 has no other features, other than a dotted line 52 shown in FIG. 2B.

FIG. 2B is a top view of the touchpad 40 shown in FIG. 2A. The notable feature is the dotted line 52 defining a perimeter of the touchpad surface 50 already mentioned. With this complete view, an illustration of what Logan describes as continued cursor movement can now be explained.

The beveled edges 42, or alternatively the dotted line 52, can indicate to the user when continued cursor movement is activated. This occurs in Logan when a finger presses down on the touchpad surface 50 within the dotted line 52, selects an object on a display screen, and closes the mechanical switch 48. When the user moves the finger to an edge 42 until it touches, or alternatively crosses the dotted line 52, the continued cursor movement mode is activated, and the cursor continues to move in the same direction it was originally moving until the finger is removed from the beveled edge 42 or lifted from the touchpad surface 50.

The method and apparatus has several shortcomings, some of which are described below. First, the touchpad 40 uses a mechanical switch 48 to indicate that a drag function is being activated. A mechanical switch 48 is inherently prone to failure because the physical components can become contaminated and the switch may fail due to wear.

Second, there is no warning to the user that a finger is approaching an edge 42 of the touchpad 40. Consequently, the user may not wish to activate the continued cursor movement mode, but may do so inadvertently.

Third, the sensors 46 on the beveled edges 42 are not part of the touchpad sensor array. Therefore they

require additional circuitry to decode signals received therefrom.

Fourth, the dotted line 52 around the perimeter of the touchpad surface 50 is only a visual indicator for where the continued cursor movement mode begins. The user is thus required to view the touchpad 40 anytime confirmation is required of the present location of the finger on the touchpad surface 50. This slows down a user of the touchpad 40.

The drawbacks of Logan et al. include insufficient tactile feedback indicating when a special function has been activated. They also include the additional circuitry which is required in a system which does not integrate sensing of movement into a perimeter of the touchpad with the already available touchpad circuitry.

Thus, it would be an advance in the art to provide a touch-sensitive finger actuable touchpad or tablet which provides tactile feedback to the user who is manipulating a cursor on a display screen, when a finger has passed into a special functions region of the surface, and without requiring additional circuitry or modification to existing designs.

OBJECTS AND SUMMARY OF THE INVENTION

In view of the above described state of the art, the present invention seeks to realize the following objects and advantages.

It is a primary object of the present invention to provide a method and apparatus for providing tactile feedback for an electronic touch-sensitive computer input and cursor manipulation device.

It is another object of this invention to provide a method and apparatus for providing tactile feedback for electronic touch-sensitive computer input devices which is particularly adapted for use with a touch-sensitive touchpad or tablet type computer input and pointing devices.

It is yet another object of this invention to provide a method and apparatus for providing tactile feedback for electronic touch-sensitive computer input devices which can operate with a user's finger as the only pointing object.

It is still a further object to provide a method and apparatus for providing tactile warning to a user that a finger moving on the touchpad surface is approaching an edge, but before reaching the edge.

These and other objects are realized in a method and apparatus for providing a tactile feedback response to a user moving their finger across the touch-sensitive surface of a touchpad or tablet. Different regions of the touch-sensitive surface are differentiated from each other by providing a different human perceptible textural surface within the regions. A different texture provides immediate tactile feedback to the user through the finger making contact with the touchpad. Increased functionality is important because it solves problems which are inherent to the small touchpad surfaces used as computer input devices. Particularly, it is a problem to drag an object from one side of a display to another without repeatedly raising a finger to repeat the dragging motion because of the limited surface area of the touchpad surface. Providing increased functionality such as a drag extend function solves the movement problem. The present invention then solves the problem of conveying to the user through touch, information about the location of the finger without having to look away from the display screen, thereby facilitating input and cursor manipulation for a computer. The apparatus of the present invention preferably includes an electronic touch-sensitive touchpad or tablet which can be actuated by a human finger, an associated processing device such as a computer, and a display screen whereon a cursor being manipulated by the touchpad is displayed.

The method of the present invention includes the step of creating a touchpad having regions of different textures. This is accomplished by either manufacturing the touchpad surface with the different textures, or adhering differently textured materials to the touchpad surface after manufacture. It is also conceivable that the different regions could be manufactured separately, and then mounted together such that there is a generally continuous touchpad surface over which the user's finger can slide. However, this approach is prohibitively more expensive and unnecessary.

These and other objects, features, advantages and alternative aspects of the present invention will become apparent to those skilled in the art from a consideration of the following detailed description taken in combination with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram of a computer system having as input devices a mouse and a touchpad;

FIG. 2A is a side elevational view representing the prior art in touchpad surfaces which attempt to provide tactile feedback to the user;

FIG. 2B is a top view of the touchpad device shown in FIG. 2A;

FIG. 3 is a block diagram of a computer system having as an input device a touchpad with a non-mechanical electronic switch;

FIG. 4A is a top view of a touchpad touch-sensitive device made in accordance with the principles of the present invention;

FIG. 4B is a side elevational view of a touchpad touch-sensitive device of FIG. 4A;

FIG. 4C is a top view of a touchpad touch-sensitive device made in accordance with an alternate embodiment of the present invention;

FIG. 4D is an alternative embodiment showing a top view of a touchpad touch-sensitive device having two separate touch regions;

FIG. 5A is an alternative embodiment of a touch-sensitive surface which provides tactile feedback;

FIG. 5B is a modification of FIG. 5A; and

FIG. 5C is a modification of FIG. 5A.

DETAILED DESCRIPTION OF THE INVENTION

In order to better appreciate how the above-recited and other advantages and objects of the invention are obtained, reference will now be made to the drawings in which the various elements of the present invention will be given numerical designations and in which the invention will be discussed so as to enable one skilled in the art to make and use the invention.

FIG. 3 is a block diagram which shows the system of FIG. 1, but with two important changes. The mouse 10 has been removed, and the touch-sensitive device 26 is now replaced with a touch-pad 32 with no buttons. While a stylus can be used with touchpads, the present invention requires the enhanced tactile response which human fingers provide over a stylus. The touchpad has a position sensing surface which senses the position of a pointing object, such as a user's finger, which is manipulated by the user.

It is particularly preferred that the touch sensitive pointing device which is described in U.S. Patent No. 5,305,017 be used with the present invention. The touch sensitive pointing device described in U.S. Patent No. 5,305,017 is particularly advantageous in that the cursor positioning, clicking, and dragging functions can all be accurately carried out by a user using only a single finger as a pointing object. Other advantages of the touch sensitive pointing device described in U.S. Patent No. 5,305,017 are described therein or will be apparent from use of the invention.

U.S. Patent No. 5,305,017 is now incorporated herein by reference in its entirety. Using the information set forth in U.S. Patent No. 5,305,017, U.S. Patent Application No. 08/413,199, and the information set forth herein, a system for carrying out the present invention can be readily arrived at by those skilled in the art. Importantly, the present invention is readily adaptable for use with numerous other pointing devices which can use a finger as the pointing device.

The touch-sensitive pointing device of the present invention is connected to the computer 16. The computer 16 is connected to a display 20 upon which various text and other objects are displayed and a cursor is located.

FIG. 4A is a top view of a touchpad 60 made in accordance with the principles of the present invention in a preferred embodiment. The touchpad 60 has a generally planar touch-sensitive planar surface 62. However, in the preferred embodiment, the touchpad surface 62 is divided into two regions. The border region 64 is defined as the area which makes a continuous loop around the perimeter of the surface 62. The inner region 66 is defined as the area of the surface which lies within the border region 64. It should be realized that although two regions are created in a preferred embodiment, a plurality of regions can exist. The regions become useful if they are distinguishable by touch.

The regions should be considered to have a sharp boundary 68 which does not allow overlap. In this way, the regions 64, 66 can be separated by a ridge 70 which runs along a boundary 69 between the regions 64, 66 in a preferred embodiment. More specifically, a thin material 70, but easily discernible to the touch, is slightly raised above the generally planar surface 62. This feature is shown in the side elevational view of FIG. 3B.

FIG. 3B shows in a cut-away view that a ridge material 70 rises above the touchpad surface 62 along the lines X-X. Those skilled in the art will appreciate that the ridge material 70 can be pressed at the time of manufacture of the touchpad 60, or it can be applied to the touchpad surface 62 after said generally planar surface has been formed.

FIGs. 4C and 4D are all alternative touchpad surfaces 78, 80 with the ridged material defining a plurality of different shaped regions 64, 66. These regions 72, 74 define at least two different computer input and cursor manipulation functions. Therefore, it is possible but not required that different regions share the same functions, or that each region has a different function. FIG. 4C shows a touch-sensitive surface 78 of a touchpad 60 with a small area 90 of what was the inner region 66 in FIG. 3A now becoming part of the border region 72. This still means that the ridged material still defines the boundary 68 between regions. It is only the size of the regions which has been altered.

FIG. 4D shows a different alternative embodiment for a layout of the touchpad surface 80. Specifically, the two separate regions 84, 88 are created within the inner region 86. These two regions 84, 88 function so as to emulate right and left mouse buttons such as those shown in FIG. 1.

FIG. 5A is another alternative embodiment of the present invention which differs from FIG. 4 in the method of implementing tactile feedback to the user of a location of the finger on the touchpad surface, without having to glance at the touchpad. Specifically, the embodiment envisions implementing a human perceptible textured surface on the touch-sensitive surface.

To create the desired tactile response for the user, different regions 90, 92 have differently textured

surfaces. Typically, touchpad surfaces are manufactured with a generally uniformly smooth surface. FIG. 5A illustrates a top view of a touchpad 94 having a border region 90 similar in shape to the border region 64 in FIG. 4A, but with a relatively heavily textured surface compared to the inner region 92. Those skilled in the art will appreciate that texturing the border region 90 is easily accomplished during manufacture of the touchpad surface by using a die or other technique to press the textured surface. Alternatively, the textured surface might be applied to the border region 90 after manufacture.

FIG. 5B illustrates the same top view as shown in FIG. 5A, but modifies the embodiment by adding to the touchpad surface the ridged material of FIG. 4 along the boundary between different regions 94, 96.

FIG. 5C illustrates the same top view as shown in FIG. 5A, but with the relatively textured border region 90 now being smooth, and the relatively smooth inner region 92 now being textured.

So as to illustrate some of the most advantageous benefits of the present invention, a comparison of the Logan et al. drawbacks previously listed will now be compared to the present invention so as to understand why the method and apparatus is improved.

First, instead of a mechanical switch to indicate when a function is being activated, the present invention employs a non-mechanical electronic switch. In this way, there are fewer components, and no mechanical components to wear out.

Second, because the border region is textured differently from the inner region, the user knows instantly that the finger is in close proximity to a touchpad edge, but not yet in contact.

Third, the touchpad of the present invention has no sensors other than those coupled to the generally planar

surface. Therefore, complexity and cost of the present invention is kept lower than Logan et al.

Fourth, any visual indicator which might be included in the present invention might simply be to color the textured material or the ridged material. Any visual indicator is then useful for the times when occasional glances are made at the touchpad surface.

To further explain the benefits of the present invention, it is helpful to walk through the continued cursor movement mode of the prior art and compare it to the drag extend function which is incorporated by reference into this specification.

The present invention in a preferred embodiment provides a touch-sensitive input device surface having at least one generally planar sensor surface. The finger of the user slides over the surface to thereby manipulate a cursor on an associated computer controlled display. Disposed on the surface are a plurality of spaced-apart regions separated by a ridge of material which rises above the generally planar sensor surface. The user will begin the drag extend function by manipulating a cursor on the computer controlled display so as to select an object on the display while the user's finger is within an inner region such as inner region 66 in FIG. 4A. After selection, the user moves the finger to drag the selected object across the display. When the user's finger crosses the ridge of material 70, the drag extend function is accessed by the touchpad microcontroller, and activated. The user's finger can now stop and be raised off the surface 62 of the touchpad 60. Instead of the selected object being automatically deselected, a timer now begins to count. This countdown timer provides the user with time to move the finger back to the inner region 66 and place the finger on the touchpad surface 62. If the countdown timer has not expired, the user can continue to drag the selected object across the display. If the countdown

timer has expired, the selected object is deselected, and the user must reselect the object in order to continue dragging it across the display.

Advantageously, the user was made aware that the finger could be safely lifted off the touchpad surface because the finger slipped up and over the ridge 70. The user was not required to actually look at the touchpad surface 66 in order to determine the location of the finger because of the tactile feedback provided by the ridge.

In an alternative embodiment, the time in which the countdown timer takes to expire is user selectable so as to customize the computer input device to user requirements.

It is important to remember that the drag extend function is not the only function which the touchpad can implement. The drag extend function is simply provided as an example of the increased functionality offered by the present invention. The invention simply improves tactile feedback to make manipulation of a cursor on a computer-controlled display easier for the user.

An alternative to the method described above is using one of the alternative touchpad surfaces as described in the other figures. The tactile feedback is provided by moving over regions whose surfaces are formed with different textures.

It is to be understood that the above-described embodiments are only illustrative of the application of the principles of the present invention. Numerous modifications and alternative arrangements may be devised by those skilled in the art without departing from the spirit and scope of the present invention. The appended claims are intended to cover such modifications and arrangements.

CLAIMS

What is claimed is:

1. A method for providing human perceptible tactile differentiation to a human finger when using a touch-sensitive cursor manipulation device of a computer controlled display, thereby enabling a user to manipulate a cursor on the display without viewing the cursor manipulation device and determining a location of the finger, the method comprising the steps of:

(a) providing a touch-sensitive cursor manipulation device having at least one generally planar sensor surface for contact and movement thereover of a finger;

(b) disposing on the generally planar sensor surface a plurality of spaced-apart regions separated by a ridge of material which rises above the generally planar sensor surface such that a finger moving over said surface from one of the spaced-apart regions to another will touch said ridge of material; and

(c) providing a plurality of cursor manipulation functions in a stored program in the computer which controls the display, said functions being actuable through contact by the finger with the touch-sensitive cursor manipulation device, wherein at least one of the plurality of cursor manipulation functions is only actuable by moving the finger from a first region to a second region of the plurality of spaced-apart regions.

2. The method as defined in claim 1 wherein the step of providing the plurality of cursor manipulation functions in the stored program in the computer includes providing a drag extend function which comprises the steps of:

(a) manipulating the touch-sensitive device such that a finger is caused to select an object on the display with a cursor;

(b) sliding the finger across the surface of the touch-sensitive device from a first region to a second

region, thereby causing a corresponding movement of the selected object across the display and activation of the drag extend function in the stored program;

(c) lifting the finger off the surface, yet not deselecting the selected object;

(d) placing the finger in contact with the surface within the first region;

(e) sliding the finger across the surface; and

(f) repeating steps (b) through (e) until the selected object is dragged to a desired location on the display.

3. The method as defined in claim 1 wherein the step of disposing on the generally planar sensor surface a plurality of spaced-apart regions on the touch-sensitive device further comprises the step of separating the first region from the second region by forming the ridge of material on a boundary between the first and second regions.

4. The method as defined in claim 3 wherein the step of disposing on the generally planar sensor surface a plurality of spaced-apart regions on the touch-sensitive device further comprises the steps of:

(a) disposing the first region about a first perimeter of the generally planar surface of the touch-sensitive device; and

(b) disposing the second region within the first perimeter of the generally planar surface so as not to overlap the first region.

5. The method as defined in claim 1 wherein the steps of disposing on the generally planar sensor surface a plurality of spaced-apart regions on the touch-sensitive device further comprises the step of disposing at least a third region on the touch-sensitive

device so as to simulate a mouse button, said third region not overlapping the first or second regions.

6. The method as defined in claim 1 wherein the step of providing a touch-sensitive cursor manipulation device further comprises the step of providing a touchpad.

7. A method for providing human perceptible tactile differentiation to a human finger when using a touch-sensitive cursor manipulation device of a computer controlled display, thereby enabling a user to manipulate a cursor on the display without viewing the cursor manipulation device and determining a location of the finger, the method comprising the steps of:

(a) providing a touch-sensitive cursor manipulation device having at least one generally planar sensor surface for contact and movement thereover of a finger;

(b) disposing on the generally planar sensor surface a plurality of spaced-apart textured regions in which the texture of each region is different from the texture of at least one other region; and

(c) providing a plurality of cursor manipulation functions in a stored program in the computer which controls the display, said functions being actuable through contact by the finger with the touch-sensitive cursor manipulation device, wherein at least one of the plurality of cursor manipulation functions is only actuable by moving the finger from a first textured region to a second textured region of the plurality of spaced-apart textured regions.

8. The method as defined in claim 6 wherein the step of providing the plurality of cursor manipulation functions in the stored program in the computer includes providing a drag extend function which comprises the steps of:

(a) manipulating the touch-sensitive device such that a finger is caused to select an object on the display with a cursor;

(b) sliding the finger across the textured surface of the touch-sensitive device from a first textured region to a second textured region, thereby causing a corresponding movement of the selected object across the display and activation of the drag extend function in the stored program;

(c) lifting the finger off the surface, yet not deselecting the selected object;

(d) placing the finger in contact with the surface within the first region;

(e) sliding the finger across the surface; and

(f) repeating steps (b) through (e) until the selected object is dragged to a desired location on the display.

9. The method as defined in claim 7 wherein the step of disposing on the generally planar sensor surface a plurality of spaced-apart textured regions on the touch-sensitive device further comprises the steps of:

(a) disposing the first textured region about a first perimeter of the generally planar surface of the touch-sensitive device; and

(b) disposing the second textured region within the first perimeter of the generally planar surface so as not to overlap the first region.

10. The method as defined in claim 7 wherein the step of disposing a plurality of textured regions on the touch-sensitive input device comprises the more specific step of disposing thereon a first perceptibly textured region and a differently textured and humanly distinguishable second perceptibly textured region.

11. The method as defined in claim 10 wherein the steps of disposing on the generally planar sensor surface a plurality of spaced-apart textured regions on the touch-sensitive device further comprises the step of disposing at least a third textured region on the touch-sensitive device so as to simulate a mouse button, said third textured region not overlapping the first or second textured regions, and being differently textured and humanly distinguishable from the first and second textured regions.

12. The method as defined in claim 7 wherein the step of providing a touch-sensitive cursor manipulation device further comprises the step of providing a touchpad.

13. A system for providing human perceptible tactile differentiation to a human finger when using a touch-sensitive cursor manipulation device of a computer controlled display, said system comprising:

(a) sensing surface means for sensing contact by a human finger on the sensing surface means, said contact corresponding to a touch function sequence;

(b) a plurality of spaced-apart textured regions disposed on the sensing surface means, the texture of each region being different from the texture of at least one other region; and

(c) a plurality of cursor manipulation functions stored in a memory of the computer which controls the display, said functions being actuable through contact by the finger with the sensing surface means, wherein at least one of the plurality of cursor manipulation functions is only actuable by moving the finger from a first textured region to a second textured region of the plurality of spaced-apart textured regions.

14. The system as defined in claim 13 wherein the sensing surface means is a touchpad.

15. A system for providing human perceptible tactile differentiation to a human finger when using a touch-sensitive cursor manipulation device of a computer controlled display, said system comprising:

(a) sensing surface means for sensing contact by a human finger on the sensing surface means, said contact corresponding to a touch function sequence;

(b) a plurality of spaced-apart regions disposed on the sensing surface means, said regions being separated by a ridge of material which rises above the sensing surface means such that a finger moving over said sensing surface means and moving from one of the spaced-apart regions to another will touch said ridge of material; and

(c) a plurality of cursor manipulation functions stored in a memory of the computer which controls the display, said functions being actuable through contact by the finger with the sensing surface means, wherein at least one of the plurality of cursor manipulation functions is only actuable by moving the finger from a first region to a second region of the plurality of spaced-apart regions.

16. The system as defined in claim 13 wherein the sensing surface means is a touchpad.

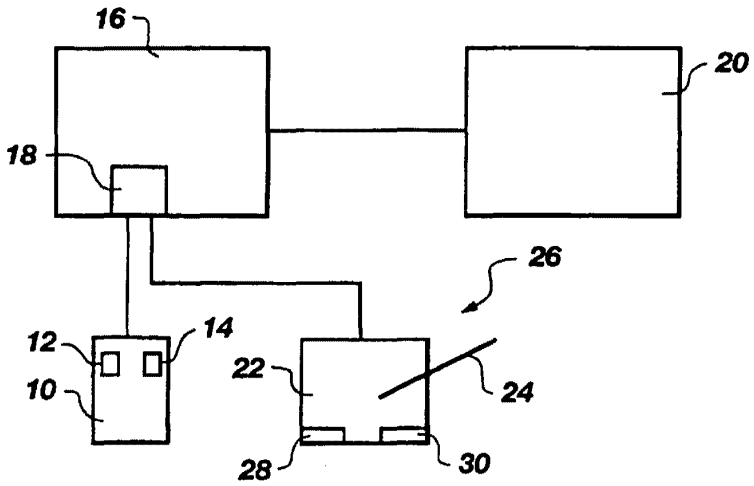


Fig. 1

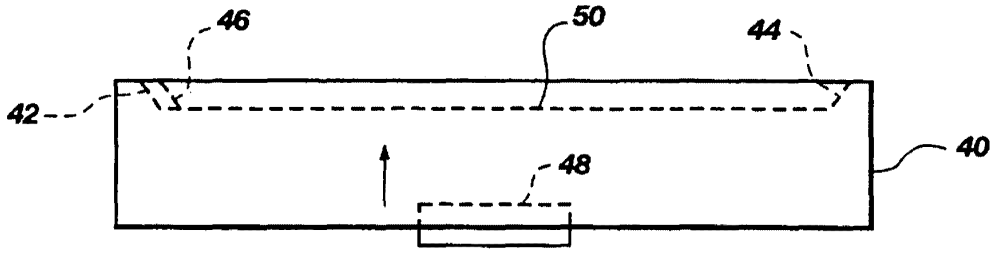


Fig. 2A

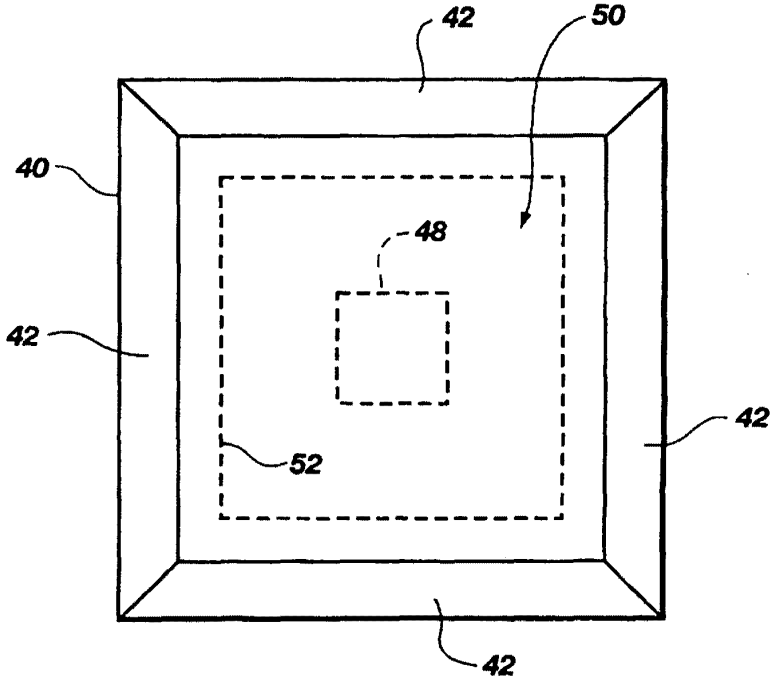


Fig. 2B

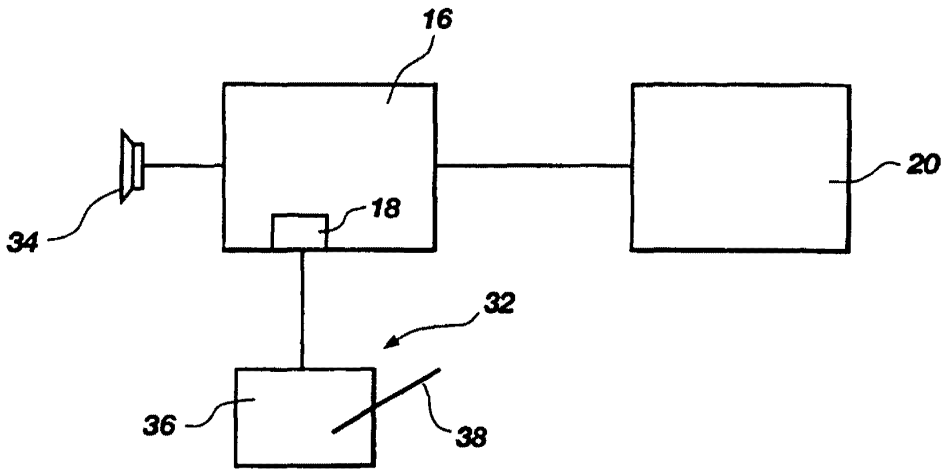


Fig. 3

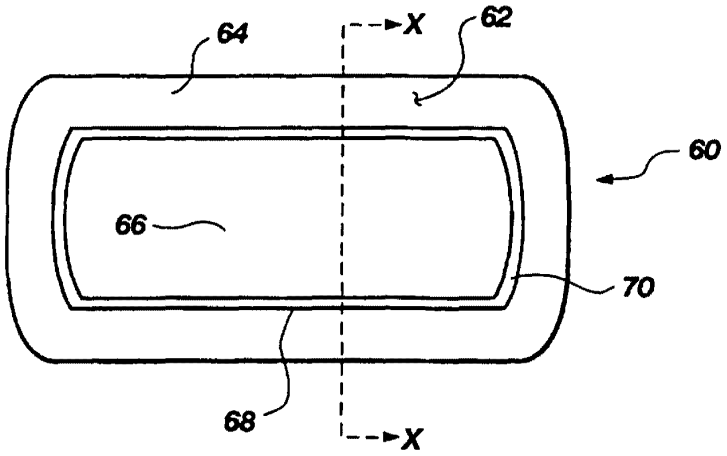


Fig. 4A

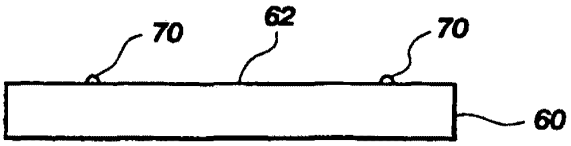


Fig. 4B

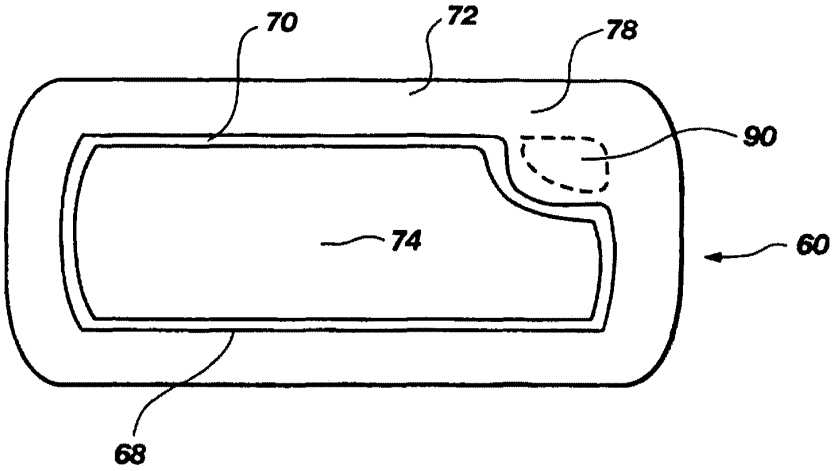


Fig. 4C

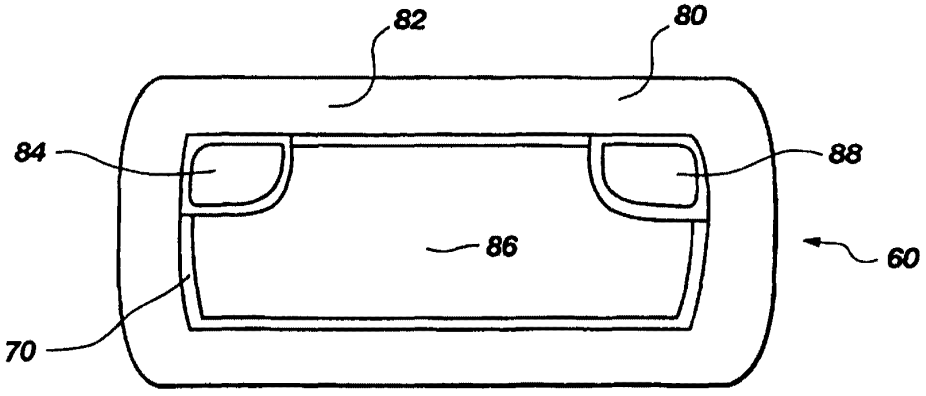


Fig. 4D

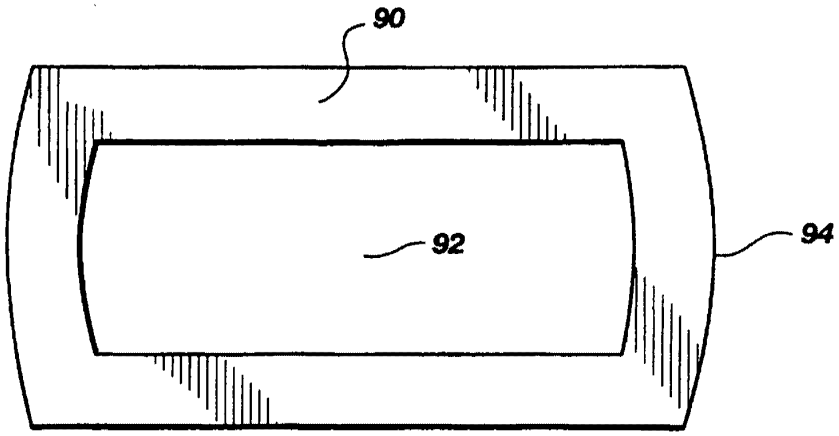


Fig. 5A

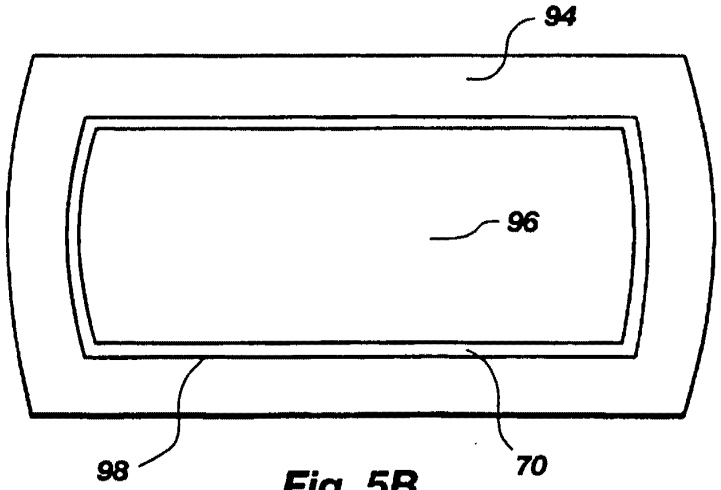


Fig. 5B

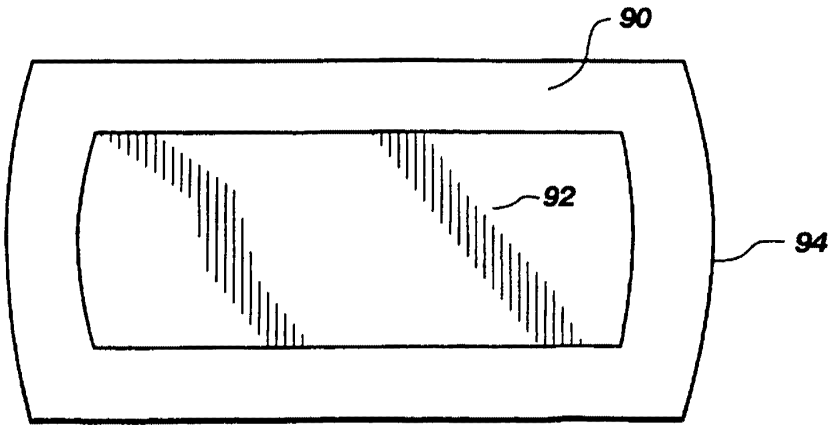


Fig. 5C

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US96/18046

A. CLASSIFICATION OF SUBJECT MATTER
IPC(6) :G09G 3/02
US CL : 345/157, 173; 463/37; 341/21
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)

U.S. : 345/157, 173, 156, 145, 163, 168, 169, 174; 463/37; 341/21; 178/18, 19; 340/825.19; 273/148B

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

NONE

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

NONE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,327,161 A (LOGAN et al) 05 JULY 1994, FIGURES 2B, 7, COLUMN 3, LINES 56-58, COLUMN 4, LINES 1-7, COLUMN 7, LINES 52-58, COLUMN 8 AND COLUMN 9, LINES 1-28.	1-16
Y	US 5,410,333 A (CONWAY) 25 APRIL 1995, COLUMN 3, LINES 37-44.	1-16
Y	US 4,891,777 A (LAPEYRE) 02 JANUARY 1990, COLUMN 4, LINES 8-14.	1-16
Y	US 5,231,380 A (LOGAN) 27 JULY 1993, COLUMN 3, LINES 21-27.	5 AND 11

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

*	Special categories of cited documents:	"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
"A"	document defining the general state of the art which is not considered to be of particular relevance	"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
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"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)	"&"	document member of the same patent family
"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		

Date of the actual completion of the international search	Date of mailing of the international search report
03 JANUARY 1997	12 FEB 1997
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer LUN-YI LAO Telephone No. (703) 305-4873

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(19) Europäisches Patentamt
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(11) EP 0 556 999 B1

127

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Application No.: 10/723,778
Filing Date: 11/26/2003
Docket Number: IMM174 (51851-279589)

(54) **Data processing apparatus with user input feedback**

Datenverarbeitungsgerät mit Rückmeldung der Benutzereingabe

Appareil de traitement de données doté d'une réaction (feedback) aux entrées de l'utilisateur

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DE FR GB

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25.08.1993 Bulletin 1993/34

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(56) References cited:
EP-A- 0 445 906
WO-A-92/00559
US-A- 4 885 565

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 0 556 999 B1

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Description

The present invention relates to data processing apparatus.

When manually inputting data into a machine or system, the benefits of feedback to the user are well known. This feedback can serve to indicate to the user that he has accomplished his objective.

Data capture surfaces may include a digitizer or a combination of a display and an overlying transparent digitizer. The digitizer responds to pressure from a finger or writing instrument by generating a signal which is filtered, processed, and measured to determine the position of the pressure source on the digitizer.

When the data capture surface comprises a rigid surface, for example when an overlying transparent display forms the data capture surface, or when the surface is generally inflexible, a user is disadvantageously faced with the unfamiliar feel of a solid writing instrument such as a ballpoint pen or stylus against a hard and rigid surface.

It is an object of the present invention to provide data processing apparatus which does not have the above disadvantage.

In accordance with the present invention there is provided data processing apparatus having a data input surface and data input means for touching said surface so as to input data into said apparatus, detection means for providing a signal when said input means comes within a predetermined distance from said surface, and feedback means connected to said detection means for providing feedback to a user in response to receiving said signal, said feedback means comprising displacement means for displacing said surface in response to said signal characterized by surface mounting means for biasing said surface in a predetermined direction.

It should be understood that the term within a predetermined distance as used in the preceding paragraph includes a value of zero distance, such as when the data input means touches the surface.

It is an advantage of the present invention that a data capture system is provided with feedback in the form of displacement of the data capture surface when a data capture instrument touches the data capture surface so that the surface moves in response to use of the instrument.

The invention is described further hereinafter, by way of example only, with reference to the accompanying drawings in which:

Fig. 1 is a block diagram of apparatus embodying the present invention;

Fig. 2 shows a first type of data capture surface for use in the present invention;

Fig. 3 shows a second type of data capture surface for use in the present invention;

Fig. 4 shows a third type of data capture surface for use in the present invention;

Fig. 5 is a diagrammatic view of apparatus according to one embodiment of the present invention;

Fig. 6 is a diagrammatic view of apparatus according to another embodiment of the present invention; and

Fig. 7 is a diagrammatic view of apparatus according to a further embodiment of the present invention.

Referring now to Figs. 1-7, data capture system 10 of the present invention includes a data capture surface 12 and a surface proximity detection system 14. Data capture surface 12 may include a liquid crystal display with a transparent digitizer or one or more touch sensitive elements across its top surface (Figs. 5-7). It could be a touch sensitive element within a video monitor (Fig. 2). Alternatively, data capture surface 12 may be a hard surface with printed captions in blocks and a transparent digitizer or touch sensitive overlay to enable the selection of a particular block (Fig. 3). Finally, data capture surface 12 may be a resistive or other type of digitizer underneath an overlay containing printed indicia thereon (Fig. 4).

Surface proximity detection system 14 includes a surface proximity detector 16, an electronic driver 18, a feedback actuator 20, and a data capture surface mount 22. Surface proximity detector 16 senses when a data input instrument touches or comes within a predetermined distance of data capture surface 12 and provides a signal 24 to electronic driver 18.

Electronic driver 18 amplifies and rectifies signal 24 to a level sufficient to activate feedback actuator 20.

Feedback actuator 20 provides feedback to the user when a data input instrument touches or comes within a predetermined distance of data capture surface 12. Feedback actuator 20 may include a tactile actuator 26, an aural actuator 28, and a visual actuator 30.

Tactile actuator 26 displaces data capture surface 12 when a touch is applied to data capture surface 12. Displacement may assist or oppose the touch force. Preferably, tactile actuator 26 includes an electromagnet, and a metal plate affixed to data capture surface 12. Tactile actuator 26 works in conjunction with data capture surface mount 22 to displace data capture surface 12. Surface mount 22 may include a hinge at one end of data capture surface 12.

Aural actuator 28 actuates aural indicator 32 when a data capture instrument touches or comes within a predetermined distance of data capture surface 12.

Visual actuator 30 actuates visual indicator 33 when a data capture instrument touches or comes within a predetermined distance of data capture surface 12.

Turning now to Fig. 2, a touch sensitive element 34 is shown on a video monitor 35.

Turning now to Fig. 3, a transparent digitizer 36 is shown over a hard surface 37 having printed captions in blocks.

Turning now to Fig. 4, a resistive digitizer 38 is

shown underneath an overlay 39 containing printed indicia thereon.

Turning now to Fig. 5, a first embodiment 40 of data capture system 10 is shown in which data capture surface 12 is a transparent digitizer 41 over a liquid crystal display 45. Data capture surface mount 22 includes a hinge 42 coupled to one end 44 of data capture surface 41, 45. Hinge 42 is normally biased by a spring 43 at the other end 48 of the surface 41,45 so that data capture surface 12 is in an upward position. Data capture surface 12 moves in a downward direction during a touch when an electromagnet 50 attracts plate 46 mounted at end 48 of data capture surface 12.

In operation, when pressure is applied by writing instrument 52, data capture surface 12 rotates about hinge 42 in opposition to spring force from spring 43. End 48 deflects downward with the aid of the magnetic force from electromagnet 50. Thus, the user is provided with a sensation of having pushed data capture surface 12. Tactile feedback may be accompanied by an audible or visual indication from aural and visual indicators 32 and 33.

Preferably, downward travel of end 48 is limited to as small as about five thousandths of an inch (0.13mm) to minimize any adverse effects, if any, on the writing process. For data capture surfaces incorporating simple push-button motions, the limit of travel may be significantly greater to achieve an appropriate sensation.

Referring now to Fig. 6, a second embodiment 60 of data capture system 10 of the present invention is shown. Embodiment 60 is similar to embodiment 40, except that activated motion is in an upward direction, opposing the direction of the touch force. Embodiment 60 provides increased sensation to the user and tends to keep writing instrument 52 in contact with data capture surface 12.

Referring now to Fig. 7, a third embodiment 70 of data capture system 10 is shown. Instead of using hinge 42, embodiment 70 supports data capture surface 12 with a supporting frame 72. Springs 74 or some other type of resilient means bias the data capture surface 12 away from supporting frame 72 in an upward direction. Tactile actuator 26 includes a T-shaped armature 76, which moves upward to impact data capture surface 12 when electromagnet 50 is energized by contact from data capture instrument 52 with data capture surface 12. Magnitude and duration of tactile, aural, or visual sensations are established by the signal input to electromagnet 50, the weight and travel of armature 76, and the type of material from which the impacting surfaces are made. While embodiment 70 illustrates upward motion of armature 76, a downward direction of motion can be easily obtained by changes in the mechanical mounting of armature 76.

Claims

1. Data processing apparatus having a data input surface (12) and data input means (52) for touching said surface (12), so as to input data into said apparatus, detection means (16) for providing a signal when said input means (52) comes within a predetermined distance from said surface (12) feedback means (20) connected to said detection means (16) for providing feedback to a user in response to receiving said signal, said feedback means (20) comprising displacement means (26) for displacing said surface (12) in response to said signal, characterized by surface mounting means (22) for biasing said surface (12) in a predetermined direction.

2. Apparatus according to claim 1, characterized in that said surface mounting means (22) comprises hinge means (42) at one end of said surface (12) and resilient means (43) at another end of said surface (12) for biasing said surface (12) in a predetermined direction.

3. Apparatus according to claim 1, characterized in that said surface mounting means (22) comprises frame member (72) for displaceably supporting said surface (12) and resilient means (74) mounted between said surface (12) and said frame member (72) for biasing said surface (12) in a predetermined direction.

4. Apparatus according to any of claims 1 to 3, characterized in that said predetermined direction is in the same direction as the touch.

5. Apparatus according to any of claims 1 to 3, characterized in that said predetermined direction is in the opposite direction to the touch.

6. Apparatus according to any of claims 1 to 3, characterized in that said displacement of said surface (12) is in the same direction as the touch or is in the opposite direction to the touch.

7. Apparatus according to claim 2 or 3, characterized in that said displacement means includes an actuator means (26) comprising plate means (46) coupled to said data output surface (12) and electromagnetic means (50) for attracting said plate means and thereby displacing said surface.

8. Apparatus according to claim 7, characterized in that said plate means (46) is affixed to said data output surface (12).

9. Apparatus according to claim 2 or 3, characterized in that said displacement means includes an actuator means (26) comprising a plunger means (76)

for displacing said surface (12) in a predetermined direction and electromagnetic means (50) for driving said plunger means (76).

10. Apparatus according to claim 9, characterized in that said plunger mean (76) impacts said surface (12) when said electromagnetic means (50) is energized.

11. Apparatus according to claim 1, characterized in that said displacement means (26) includes a driver (18) for amplifying and rectifying said signal from said detecting means (16).

12. Apparatus according to any one of the preceding claims, characterized in that said data input surface (12) comprises a digitizer layer (41) and a display layer (45).

Patentansprüche

1. Datenverarbeitungsvorrichtung aufweisend eine Dateneingabefläche (12) und ein Dateneingabemittel (52) zum Berühren der Fläche (12), um Daten in das Gerät einzugeben, eine Erfassungseinrichtung (16) zur Lieferung eines Signals, wenn das Eingabemittel (52) in einen vorbestimmten Abstand zu der Fläche (12) gelangt, eine Rückkopplungseinrichtung (20), die mit der Erfassungseinrichtung (16) verbunden ist, um unter Ansprechen auf den Empfang des Signals Rückmeldung an einen Benutzer zu erstatten, wobei die Rückkopplungseinrichtung (20) eine Versetzungseinrichtung (26) aufweist, um die Fläche (12) unter Ansprechen auf das Signal zu verlagern,
gekennzeichnet durch
eine Flächenbefestigungseinrichtung (22) zum Spannen der Fläche (12) in eine vorbestimmte Richtung.

2. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß die Flächenbefestigungseinrichtung (22) an einem Ende der Fläche (12) eine Gelenkeinrichtung (42) und am anderen Ende der Fläche (12) eine Federeinrichtung (43) aufweist, um die Fläche in eine vorbestimmte Richtung zu spannen.

3. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß die Flächenbefestigungseinrichtung (22) ein Rahmenelement (72) zur verschiebbaren Lagerung der Fläche (12) und eine Federeinrichtung (74) aufweist, die zwischen der Fläche (12) und dem Rahmenelement (72) befestigt ist, um die Fläche (12) in eine vorbestimmte Richtung zu spannen.

4. Vorrichtung nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß die vorbestimmte Richtung in derselben Richtung wie die Berührung liegt.

5. Vorrichtung nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß die vorbestimmte Richtung in Gegenrichtung zur Berührung liegt.

6. Vorrichtung nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß die Versetzung der Fläche (12) in derselben Richtung wie die Berührung oder in Gegenrichtung zur Berührung erfolgt.

7. Vorrichtung nach Anspruch 2 oder 3, dadurch gekennzeichnet, daß die Versetzungseinrichtung eine Betätigungsvorrichtung (26) mit einer Platteneinrichtung (46) aufweist, die an die Datenausgabefläche (12) und eine elektromagnetische Einrichtung (50) gekoppelt ist, um die Platteneinrichtung anzuziehen und dadurch die Fläche (12) zu verschieben.

8. Vorrichtung nach Anspruch 7, dadurch gekennzeichnet, daß die Platteneinrichtung (46) an der Datenausgabefläche (12) angebracht ist.

9. Vorrichtung nach Anspruch 2 oder 3, dadurch gekennzeichnet, daß die Versetzungseinrichtung eine Betätigungsvorrichtung (26) mit einer Kolbeneinrichtung (76) zum Verschieben der Fläche (12) in eine vorbestimmte Richtung und eine elektromagnetische Einrichtung (50) zum Antreiben der Kolbeneinrichtung (76) aufweist.

10. Vorrichtung nach Anspruch 9, dadurch gekennzeichnet, daß die Kolbeneinrichtung (76) auf der Fläche (12) aufschlägt, wenn die elektromagnetische Einrichtung (50) betätigt wird.

11. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß die Versetzungseinrichtung (26) einen Treiber (18) aufweist, um das Signal von der Erfassungseinrichtung (16) zu verstärken und gleichzurichten.

12. Vorrichtung nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Dateneingabefläche (12) eine Digitalumsetzerschicht (41) und eine Anzeigeschicht (45) aufweist.

Revendications

1. Un instrument de traitement de données ayant une surface d'entrée de données (12) et un moyen d'entrée de données (52) pour toucher ladite surface (12), afin d'entrer les données dans ledit instrument, un moyen de détection (16) pour fournir un signal lorsque ledit moyen d'entrée (52) se trouve dans une marge de distance prédéterminée de ladite sur-

face (12), un moyen de réponse (20) connecté audit moyen de détection (16) pour fournir un retour à un utilisateur en réponse à la réception dudit signal, ledit moyen de réponse (20) comprenant un moyen de déplacement (26) pour déplacer ladite surface (12) en réponse au dit signal, caractérisé par un moyen de montage de la surface (22) pour diriger la dite surface (12) dans une direction prédéterminée.

2. Un instrument selon la revendication 1, caractérisé par le fait que ledit moyen de montage de la surface (22) comporte un moyen d'articulation (42) à une extrémité de ladite surface (12) et un moyen élastique (43) à l'autre extrémité de ladite surface (12) pour diriger ladite surface (12) dans une direction prédéterminée.

3. Un instrument selon la revendication 1, caractérise par le fait que ledit moyen de montage de la surface (22) comporte un cadre (72) pour soutenir de façon mobile ladite surface (12) et un moyen élastique (74) monté entre ladite surface (12) et ledit cadre (72) pour diriger ladite surface (12) dans une direction prédéterminée.

4. Un instrument selon l'une ou l'autre des revendications 1 à 3, caractérisé par le fait que ladite direction prédéterminée est la même que celle du toucher appliqué.

5. Un instrument selon l'une ou l'autre des revendications 1 à 3, caractérisé par le fait que ladite direction prédéterminée est opposée à celle du toucher appliqué.

6. Un instrument selon l'une ou l'autre des revendications 1 à 3, caractérisé par le fait que ledit déplacement de ladite surface (12) a la même direction que celle du toucher appliqué ou la direction opposée à celle du toucher appliqué.

7. Un instrument selon les revendications 2 ou 3, caractérisé par le fait que ledit moyen de déplacement comprend un moyen de déclenchement (26) comprenant un intermédiaire sous forme de plaque (46) couplé à ladite surface de sortie de données (12) et un intermédiaire électromagnétique (50) pour attirer ledit intermédiaire sous forme de plaque et ainsi déplacer ladite surface.

8. Un instrument selon la revendication 7, caractérise par le fait que ledit intermédiaire sous forme de plaque (46) est fixé a ladite surface (12) de sortie de données.

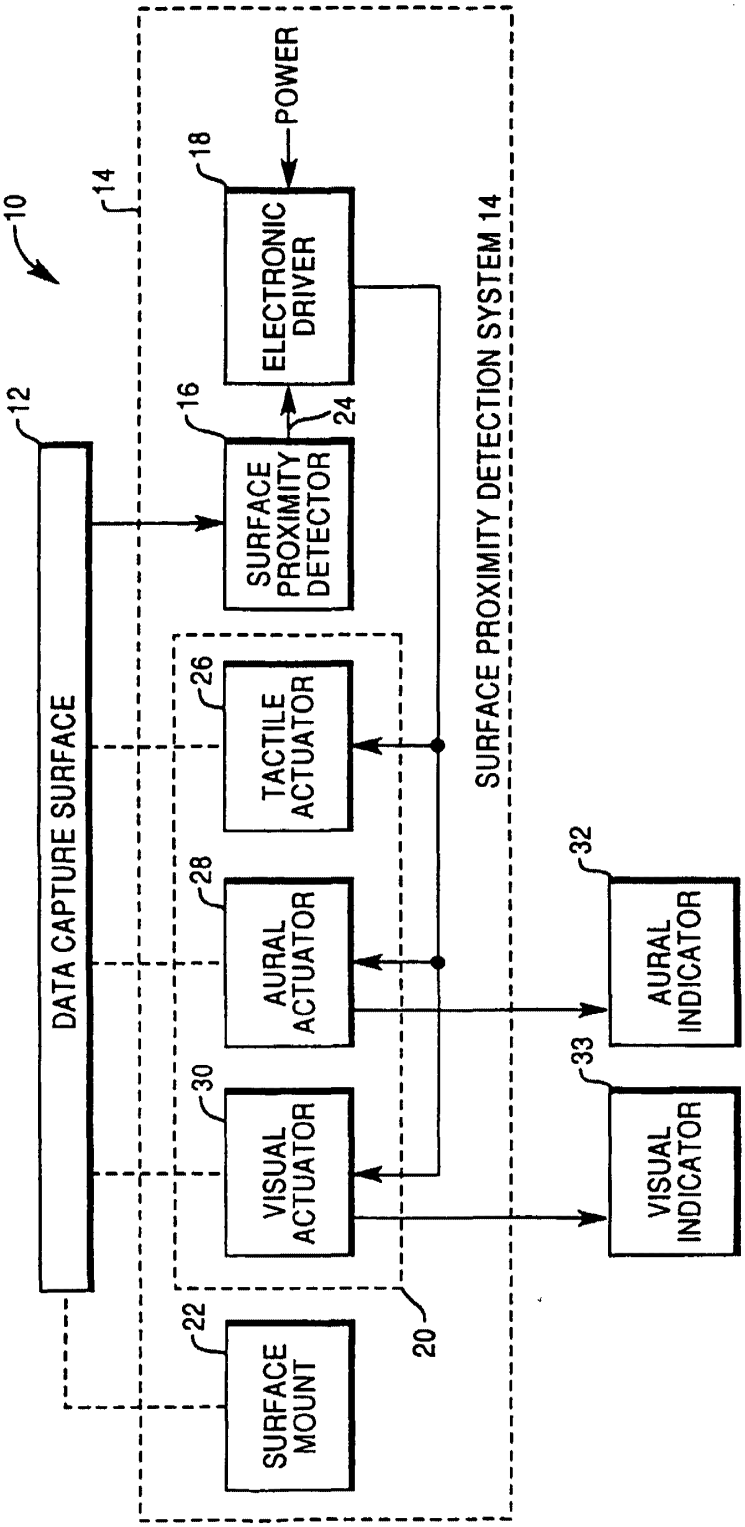
9. Un instrument selon les revendications 2 ou 3, caractérisé par le fait que ledit moyen de déplacement comprend un moyen de déclenchement (26) comportant un intermédiaire sous forme de poussoir (76) pour déplacer ladite surface (12) dans une direction prédéterminée et un intermédiaire électromagnétique (50) pour diriger ledit intermédiaire sous forme de poussoir (76).

10. Un instrument selon la revendication 9, caractérisé par le fait que ledit intermédiaire sous forme de poussoir (76) percute ladite surface (12) lorsque ledit intermédiaire électromagnétique (50) est alimenté.

11. Un instrument selon la revendication 1, caractérisé par le fait que ledit moyen de déplacement (26) comprend un driver (18) pour amplifier et rectifier ledit signal en provenance dudit moyen de détection (16).

12. Un instrument selon l'une ou l'autre des revendications précédentes, caracterisé par le fait que ladite surface (12) de saisie de données comprend une membrane avec un numériseur (41) et une membrane d'affichage (45).

FIG. 1



EX1021 - 418

FIG. 2

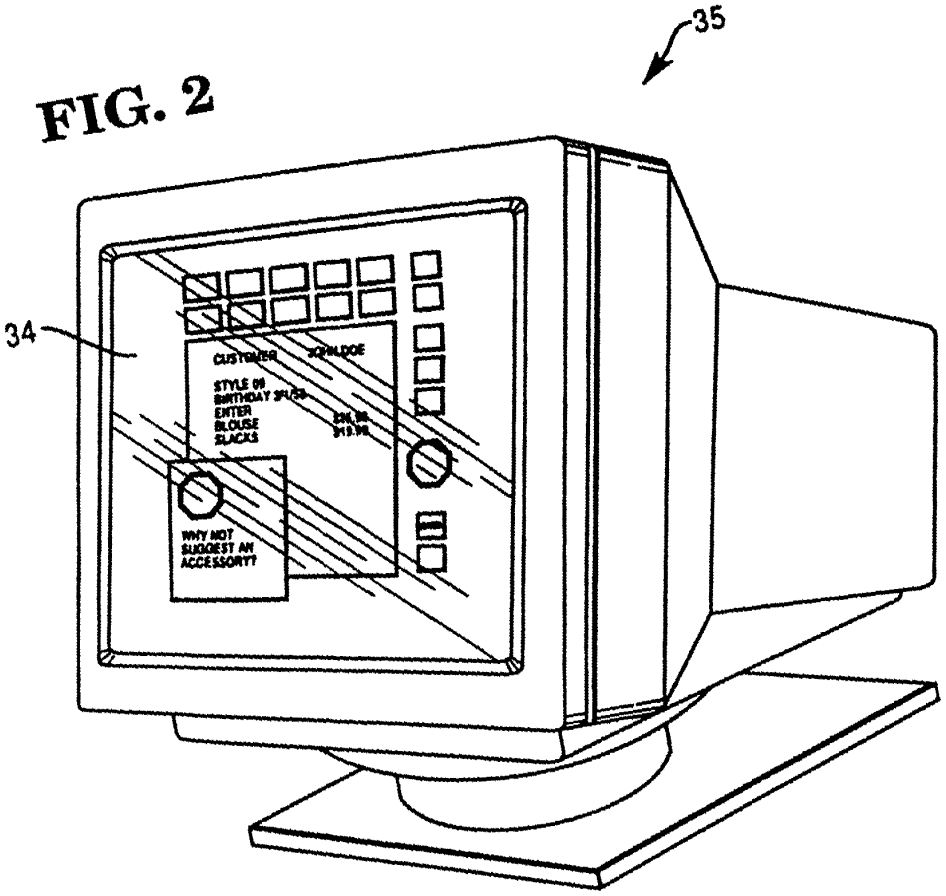

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34
CUSTOMER
STYLE 09
BIRTHDAY
ENTER
BLOUSE
SLACKS
WHY NOT SUGGEST AN ACCESSORY?

FIG. 3

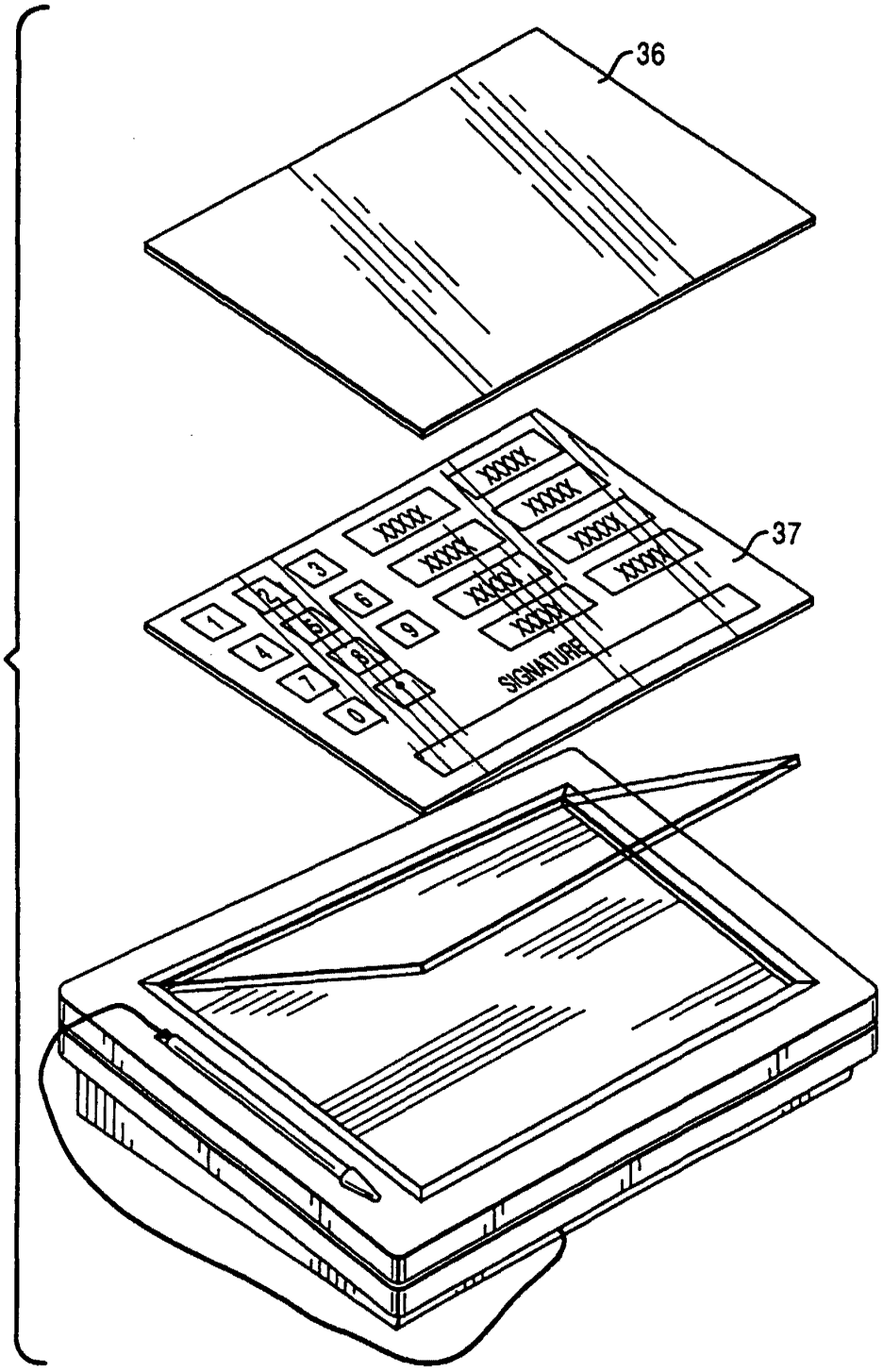
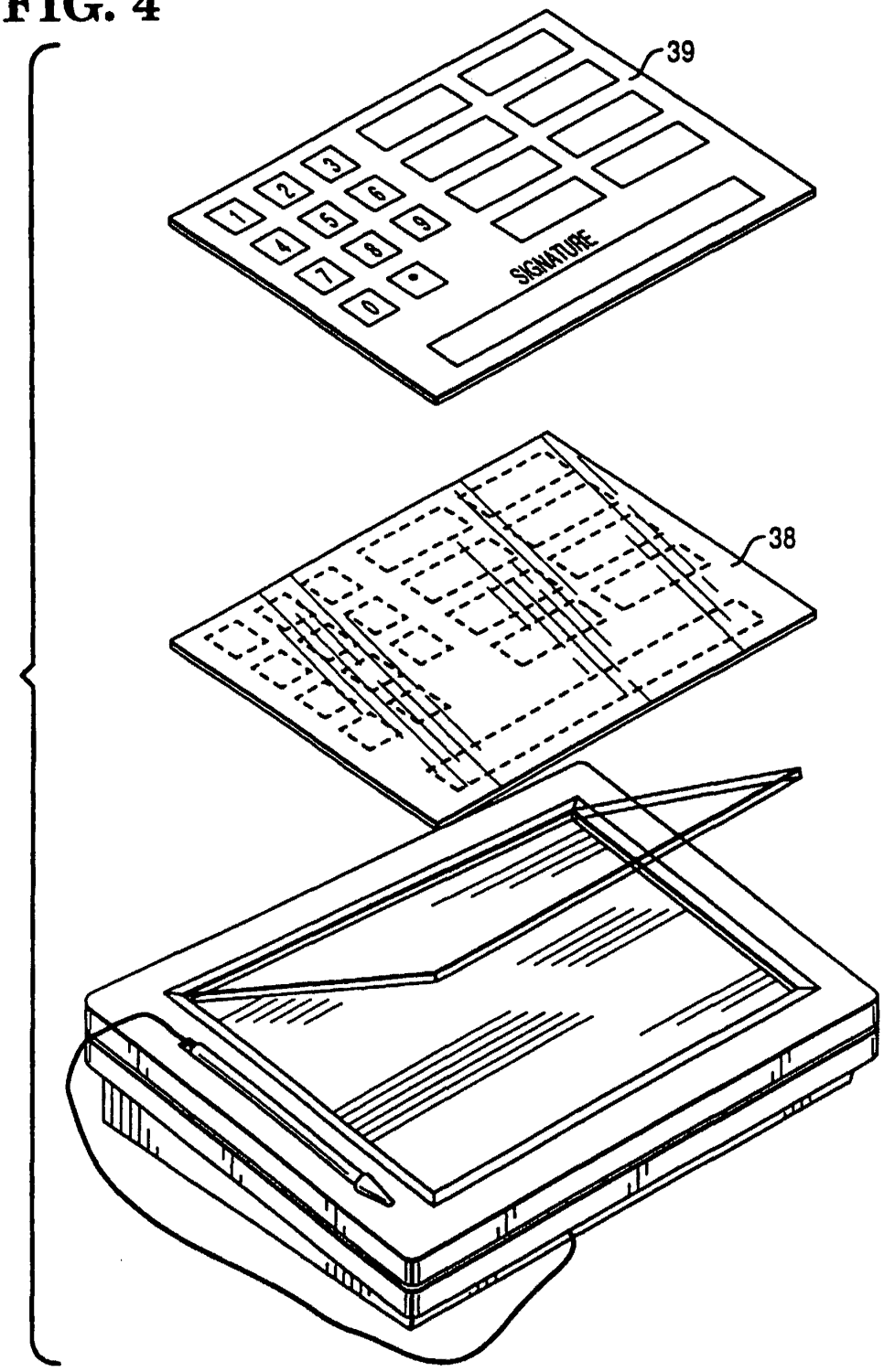

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FIG. 4



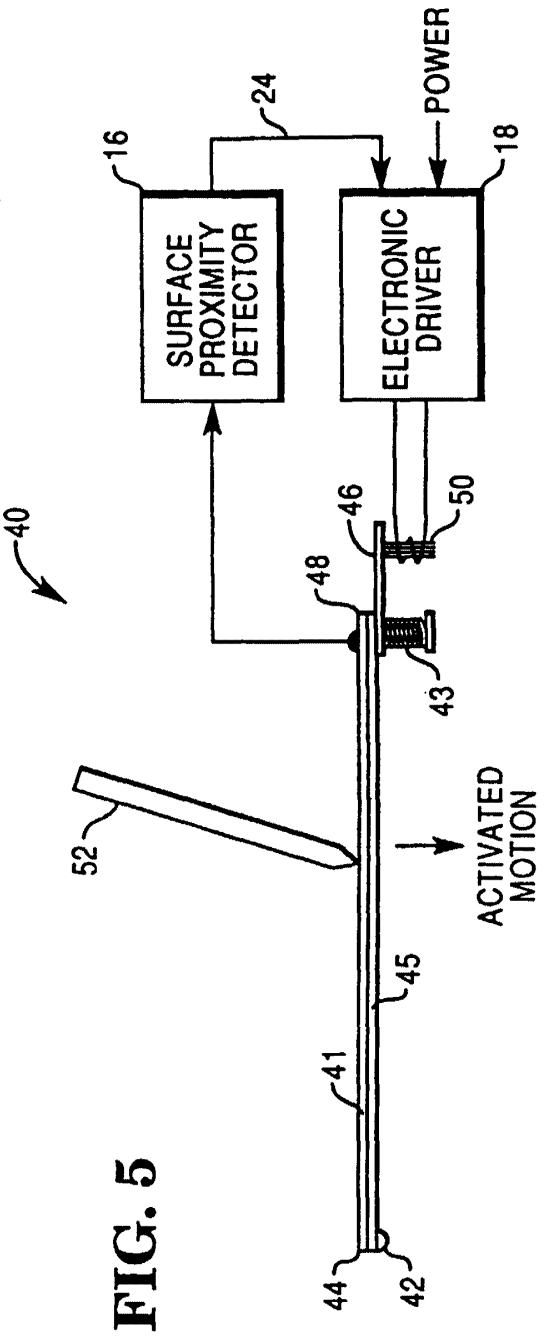


FIG. 5

EX1021 - 422

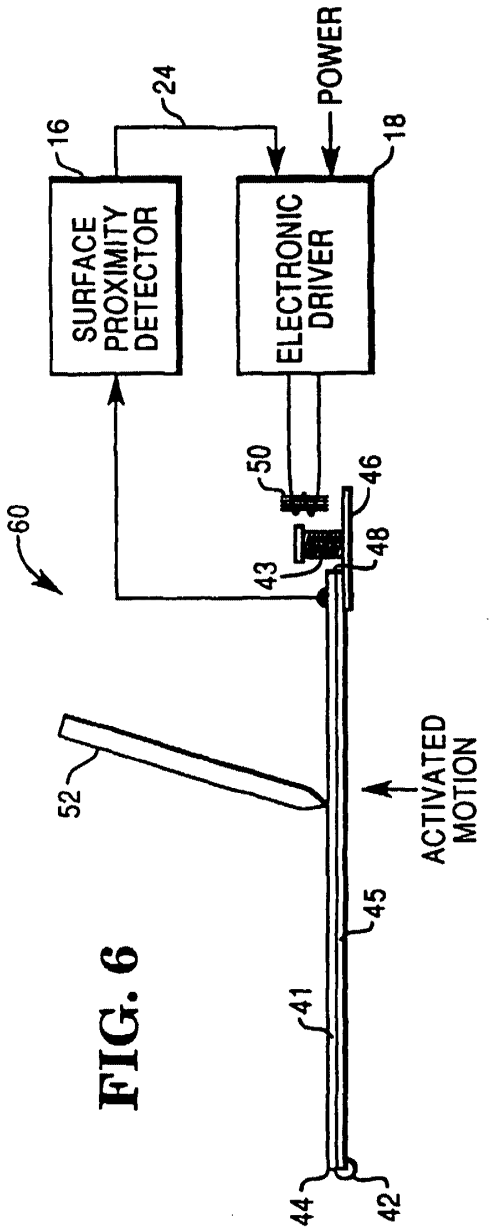


FIG. 6

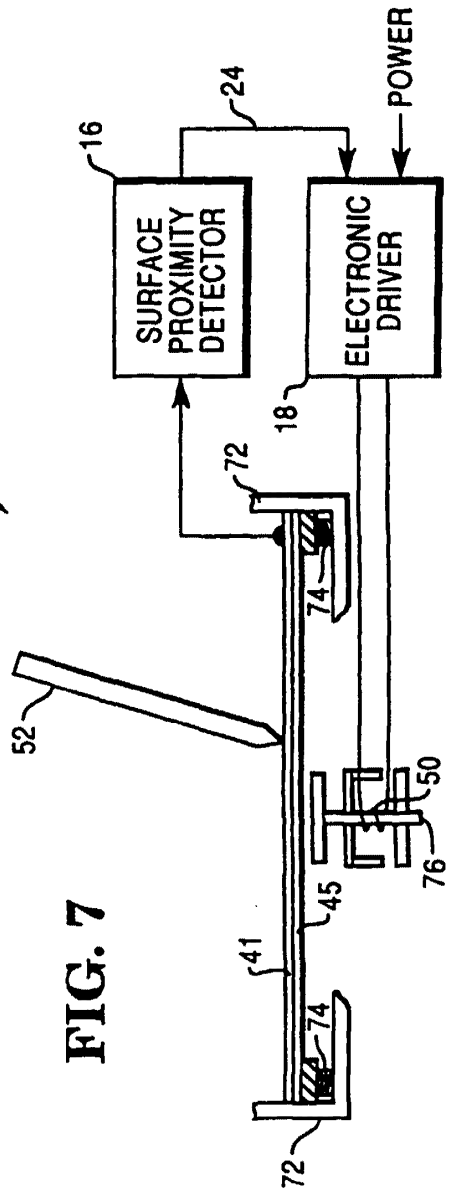


FIG. 7

EX1021 - 423

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PATENT ABSTRACTS OF JAPAN

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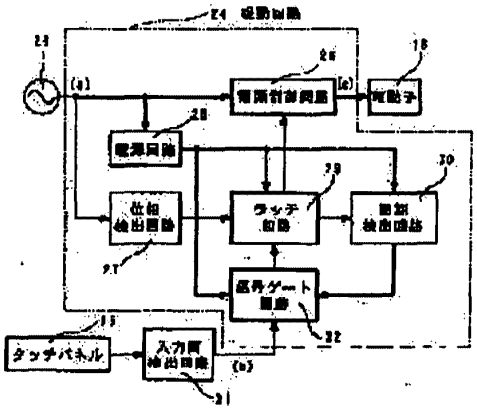
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KUMAZAWA KIYOHIKO
ISHIBASHI HIROTOSHI
MIYAZAKI MINEKAZU

(54) DEPRESSION SENSATION GENERATING DEVICE FOR TOUCH PANEL

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a depression sensation generating device for a touch panel which securely generates a depression sensation giving no shock, etc.
SOLUTION: This device is equipped with a needle 18 which is provided facing the touch panel 15, a driving waveform output circuit 25 which drives the needle 18, and a driving circuit 24 which moves the touch panel 15 by outputting a driving waveform for a 0.5 to 1.5 cycle, and the driving circuit 24 comprises a phase detecting circuit 27 for the start of operation, a latch circuit 29 which temporarily holds a detected phase, a cycle detecting circuit 30 for the driving waveform, a signal gate circuit 32 which generates a clear signal for a latch of the latch circuit 29, and a power source control circuit 26 which generates the driving waveform of a 0.5 to 1.5 cycle. The driving waveform output circuit 25 can be simplified by using the commercial AC power source.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to the feeling generator of press of the touch panel which was made to carry out the feel of having pressed to a direct fingertip in the touch panel which presses and carries out alter operation of the electrode sheet metal with a finger.
[0002]
[Description of the Prior Art] Conventionally, since the stroke when pressing electrode sheet metal with a finger in this kind of touch panel is very as small as 0.1-0.5 etc.mm etc., it is unclear whether the switch turns on or not, it will surely press too much strongly and a substrate will bend. Therefore, when a switch turned on, there was a thing of making sound or the color of a press portion changing.
[0003] Some which are sensed by visual sense from which some which make such sound and are sensed by the acoustic sense have a possibility of it being unable to sense in the one hard of hearing, or mistaking for external noise, and a color changes had an oversight, and there was a not employable problem in small equipment. Therefore, when electrode sheet metal is pressed and a switch turns on recently, some which were made to carry out multiple-times vibration have a touch panel.
[0004]
[Problem(s) to be Solved by the Invention] Among these, in some which a touch panel vibrates and sense switch-on, when the vibration when touching electrode sheet metal with a finger continued two or more times, there was a problem that a shock which is receiving an electric shock to the user was given.
[0005] this invention aims at offering the feeling generator of press of the touch panel it was made to make generate certainly, without giving a shock which is receiving an electric shock in 1 time of the feeling of press similar to the feeling of a click at the time of switch-on.
[0006]
[Means for Solving the Problem] In the touch panel with which this invention is detected by the input-screen detector 31, and displayed press of the input screen of a touch panel 15 by the display panel 11 The needle 18 which the aforementioned touch panel 15 was made to face and was prepared, and the drive wave output circuit 25 which outputs the HARASHIN number wave for driving this needle 18, The drive circuit 24 which only 0.5 to 1.5 period outputs the output wave of this drive wave output circuit 25, and carries out movable [of the aforementioned touch panel 15] is provided. this drive circuit 24 The phase detector 27 for detecting the phase of a start of a drive wave of operation, and the latch circuit 29 which holds temporarily the phase detected by this phase detector 27, It is the feeling generator of press of the touch panel characterized by the bird clapper from the periodic detector 30 which detects the period of a drive wave, the signal gate circuit 32 which creates the clear signal of a latch of the aforementioned latch circuit 29, and the power control circuit 26 for making the drive wave of 0.5 to 1.5 period. A shock which is receiving an electric shock is not given by such composition.
[0007] The simplification of a circuit can do the drive wave output circuit 25 by using a commercial alternating current power supply. moreover, the phase detector 27 By detecting the abbreviation 0V point of the alternating current signal of a sine-wave form outputted from the drive wave output circuit

25, and starting a driving signal from this detecting point An injury is not done to a needle 18. further the signal gate circuit 32 After pressing a touch panel 15, when the signal has been sent from the input-screen detector 31 during fixed re-press prohibition time By making the function for canceling this provide, it can prevent that a needle 18 carries out incorrect differential by unstable press operation during re-press prohibition time.

[0008]

[Embodiments of the Invention] One example of the feeling generator of press of the touch panel by this invention is explained based on drawing 1 or drawing 4 . In drawing 3 and drawing 4 , 10 is plate-like housing. ON of the switch of the transparent touch panel 15 of the upper part attaches the plate-like display panel 11 as which a number, a character, a figure, etc. are displayed in the center of the upper surface of this housing 10. It is located in four corners of the periphery of this display panel 11, and the pillar base-like cushion plinth 16 is formed. Although this cushion plinth 16 is a thing made of the rubber for carrying a touch panel 15, if it is too soft not much, since the movement at the time of press of a touch panel 15 will be absorbed, that whose degree of hardness is 50 - 60 degrees is used. Moreover, some bending prevention plinths 17 which suppress the bending when pressing the touch panel 15 other than this cushion plinth 16 are formed in the inferior surface of tongue of a touch panel 15 with few crevices.

[0009] The aforementioned touch panel 15 consists of many insulating salients 13 which consist of an insulating material for making a crevice between the substrate 12 which consists of a transparent glass plate, the electrode sheet metal 14 of two sheets with the transparent upper surface, and these electrode sheet metal 14 of two sheets. The needle 18 which becomes the lower part of the end marginal part of the aforementioned touch panel 15 from the piezoelectricity vibrator using the piezoelectric effect is formed. The end face section of this needle 18 is fixed by the susceptor 20, an interstitial segment is supported with the free support shaft 21, and contact 19 prepared in the upper surface of a point is further attached in contact with the inferior surface of tongue of the substrate 12 of a touch panel 15. The periphery enclosure of the upper surface of the aforementioned touch panel 15 has a crevice 23, and is protected by the periphery flange 22.

[0010] The drive circuit 24 which drives the aforementioned needle 18 is shown in drawing 1 . In this drawing 1 , 25 is the drive wave output circuit which used 50 or the 60Hz source-power-supply wave as it was. This drive wave output circuit 25 is connected to the phase detector 27 for detecting the power circuit 28 for supplying DC power supply to the power control circuit 26 for making a drive wave, and each circuit, and the phase of a start of a drive wave of operation. While the periodic detector to which the latch circuit which holds temporarily the wave which detected 29 by the phase detector 27, and 30 detect the period of a drive wave, and 32 create the clear signal of a latch of a latch circuit 29, the signal gate circuit for canceling the instant OFF by the chattering etc. and 31 are input-screen detectors which detect ON of the switch by the touch of a touch panel 15, and OFF.

[0011] Operation by the above circuitry is explained based on drawing 2 . The commercial alternating current power supply from the drive wave output circuit 25 is a power circuit 28, for example, is changed into DC5V and supplied to a latch circuit 29, the periodic detector 30, and the signal gate circuit 32. Moreover, in the phase detector 27, the phase of a 50 or the power supply wave of 60HZ(s) as shown in drawing 2 (a) from the drive wave output circuit 25 is monitored continuously, and the phase a2 when changing from + to - is detected and outputted.

[0012] Here, the upper surface of a touch panel 15 should be pressed with the finger at t 1:00, and the up-and-down electrode sheet metal 14 of two sheets should short-circuit. Then, it is detected by the input-screen detector 31, and a trigger signal is sent to the signal gate circuit 32. In the signal gate circuit 32, the first phase a2 which sent the signal as shown in drawing 2 (b) to the latch circuit 29 based on this trigger signal, and has been sent from the phase detector 27 is latched.

[0013] With the signal from a latch circuit 29, as shown in drawing 2 (c), the gate opens the power control circuit 26 at a 2:00. A signal is simultaneously sent to the periodic detector 30 from a latch circuit 29, for example, one period is detected. One period is set to 20ms when a source power supply is 50Hz. Moreover, one period is set to about 16.7ms when a source power supply is 60Hz. If the signal of

1 period progress outputs from the periodic detector 30, in the signal gate circuit 32, a clear signal will output, it will send to a latch circuit 29, and the gate of the power control circuit 26 will close by the signal from a latch circuit 29. Consequently, the voltage of the sine-wave type of one period as shown in drawing 2 (c) from the power control circuit 26 outputs, and a needle 18 carries out movable up and down only once.

[0014] Thus, although the voltage of - is first impressed to a needle 18 by the half period and the voltage of + is impressed to a needle 18 by the following half period, a needle 18 is set up so that it may be distorted below on the voltage of - and may be distorted upwards on the voltage of +. Thus, since the cushion plinth 16 will be crushed a little and a touch panel 15 will move below when a touch panel 15 is pressed with a finger if constituted, it follows in footsteps of distortion by the lower part by the voltage of - of the point of a needle 18. And a touch panel 15 is momentarily pushed up by the distortion to the upper part by the voltage of + of the following needle 18. This movement gets across to a finger and what the switch turned on is taken in.

[0015] Next, after pressing a touch panel 15, when the signal has been sent from the input-screen detector 31 during fixed re-press prohibition time at t 2:00 during 100ms, it is made for a needle 18 not to drive by unstable press operation by canceling this in the signal gate circuit 32.

[0016] If voltage like pulse shape which rises rapidly is impressed to a needle 18 or it impresses from the high voltage first also with a sine-wave form, a crack may be entered and damaged to the needle 18 which consists of a ceramic, and it is not desirable. Therefore, operation is made to perform a needle 18 by impressing the voltage of a sine-wave form started from 0V to a needle 18 by the aforementioned example smoothly. However, even if the starting potential impressed first is not necessarily from 0V, be made to let it be a certain low voltage. However, the voltage at the time of an end may be any between 0V - peak value.

[0017] In the aforementioned example, simplification of a circuit is enabled by using a source power supply as it is as a drive wave output circuit 25. However, you may be not the thing restricted to this but a separate oscillator circuit.

[0018] Although it is desirable that they are the half period or 1.5 periods which do not give feeling which received an electric shock, but begin from 0V in order to tell the flight readiness of a touch panel 15 certainly to a finger moreover, and return to 0V although used in the aforementioned example by one period which impresses 0V of the sine-wave type of source-power-supply 100V first, and returns to 0V, it can be set as which range between 0.5-1.5Hz.

[0019]

[Effect of the Invention] this invention can make a feeling of press generate certainly, without giving a shock which a touch panel 15 vibrates more than required, and is receiving an electric shock, since the drive wave output circuit 25 which outputs the HARASHIN number for driving a needle 18, and the drive circuit 24 which only 0.5 to 1.5 period outputs the output wave of this drive wave output circuit 25, and carries out movable [of the touch panel 15] were provided.

[0020] By using a commercial alternating current power supply, the drive wave output circuit 25 can simplify circuitry, and can offer cheap equipment.

[0021] The needle 18 which the touch panel 15 was made to face and was prepared, and the drive wave output circuit 25 which outputs the HARASHIN number wave for driving this needle 18, The drive circuit 24 which only 0.5 to 1.5 period outputs the output wave of this drive wave output circuit 25, and carries out movable [of the aforementioned touch panel 15] is provided. this drive circuit 24 The phase detector 27 for detecting the phase of a start of a drive wave of operation, and the latch circuit 29 which holds temporarily the phase detected by this phase detector 27, Since it consists of the periodic detector 30 which detects the period of a drive wave, a signal gate circuit 32 which creates the clear signal of a latch of a latch circuit 29, and a power control circuit 26 for making the drive wave of 0.5 to 1.5 period While being able to set up the phase corresponding to the starting potential of the optimal driving signal for the drive of a needle 18, the output period of a driving signal can be set as the most desirable length. The feeling generator of press of the touch panel characterized by things.

[0022] Since the phase detector 27 detects the abbreviation 0V point of the alternating current signal of a

sine-wave form outputted from the drive wave output circuit 25 and the driving signal was started from this detecting point, breakage of a needle 18 is prevented and operation can be smoothly performed in a needle 18.

[0023] The signal gate circuit 32 carries out operation which a needle 18 did not drive and was stabilized by unstable press operation during re-press prohibition time, such as a chattering, by providing the function for canceling this, when the signal has been sent from the input-screen detector 31 during fixed re-press prohibition time, after pressing a touch panel 15.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the block diagram showing one example of the drive circuit 24 for the feeling generator of press of the touch panel by this invention.
[Drawing 2] It is the output wave form chart of each part in drawing 1 .
[Drawing 3] It is drawing of longitudinal section showing one example of the feeling generator of press of the touch panel by this invention.
[Drawing 4] It is the plan which cut and lacked the part in drawing 3 .
[Description of Notations]
10 [-- A substrate, 13 / -- Insulating salient,] -- Housing, 11 -- A display panel, 12 14 [-- A cushion plinth, 17 / -- Bending prevention plinth,] -- Electrode sheet metal, 15 -- A touch panel, 16 18 [-- A susceptor, 21 / -- A free support shaft, 22 / -- Periphery flange,] -- A needle, 19 -- Contact, 20 23 [-- A drive wave output circuit 26 / -- A power control circuit, 27 / -- A phase detector, 28 / -- A power circuit, 29 / -- A latch circuit, 30 / -- A periodic detector, 31 / -- An input-screen detector, 32 / -- Signal gate circuit.] -- A crevice, 24 -- A drive circuit, 25

[Translation done.]

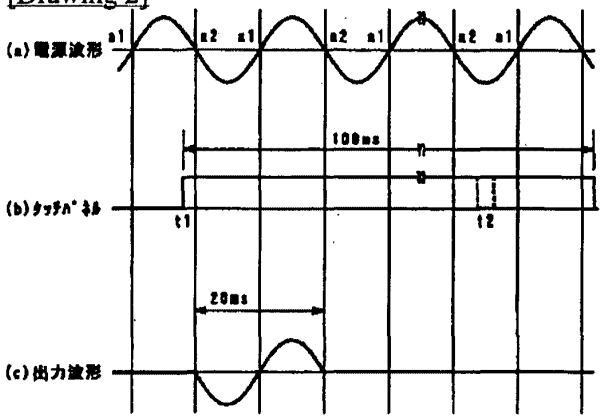
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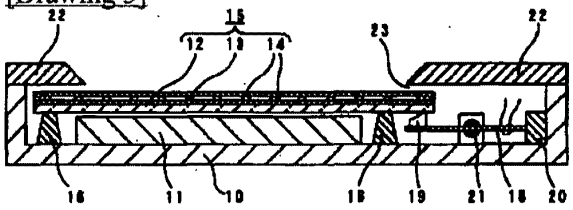
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DRAWINGS

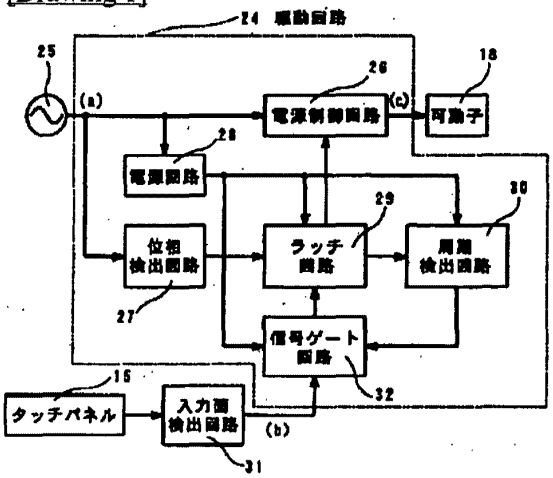
[Drawing 2]



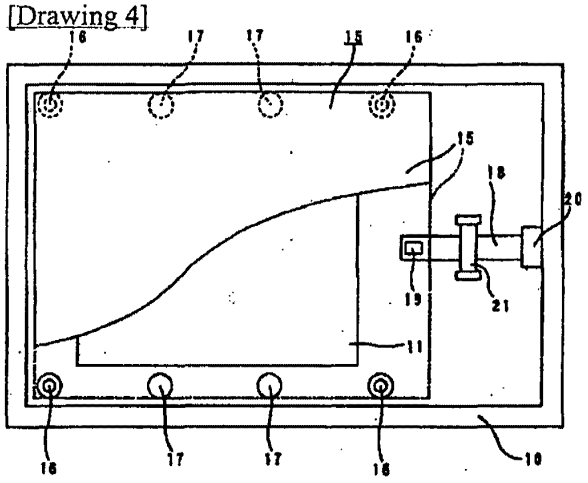
[Drawing 3]



[Drawing 1]



[Drawing 4]



[Translation done.]

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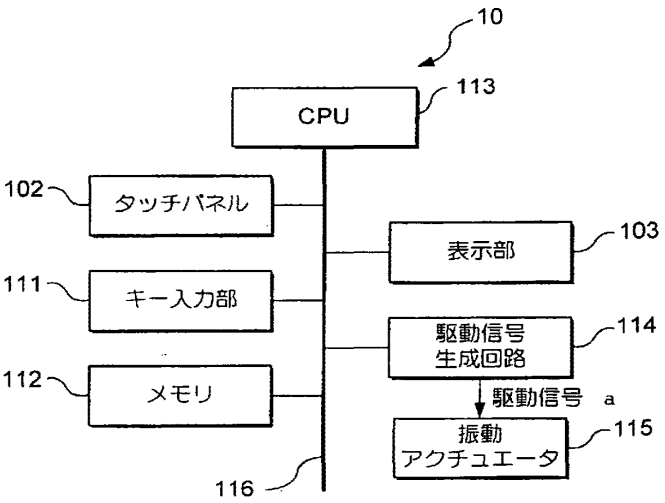
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[続葉有]

(54) Title: ELECTRONIC APPARATUS, VIBRATION GENERATOR, VIBRATORY INFORMING METHOD AND METHOD FOR CONTROLLING INFORMATION

(54) 発明の名称: 電子機器、振動発生器、振動による報知方法および報知制御方法



102...TOUCH PANEL
103...DISPLAY SECTION
111...KEY INPUT SECTION
112...MEMORY
114...DRIVE SIGNAL GENERATING CIRCUIT
115...VIBRATORY ACTUATOR
a...DRIVE SIGNAL

(57) Abstract: An electronic apparatus generates a vibration by actuating a vibratory actuator upon detecting a fact that an operational input to a touch panel or an operating key is received. The electronic apparatus vibrates the touch panel and the operating key in the direction perpendicular to the surface thereof or vibrates the housing of the electronic apparatus. The vibratory actuator comprises a weight, a member for supporting the weight reciprocating in the air and coupled with a member of the electronic apparatus to be vibrated, e.g. the touch panel or the housing, or the base member of the vibratory actuator abutting on the member to be vibrated, and a mechanism for reciprocating the weight by applying a magnetic force or an electrostatic force thereto.

[続葉有]

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規則4.17に規定する申立て:
— KRの指定のための不利にならない開示又は新規性喪失の例外に関する申立て (規則4.17(v))
— KRの指定のための不利にならない開示又は新規性喪失の例外に関する申立て (規則4.17(v))
— KRの指定のための不利にならない開示又は新規性喪失の例外に関する申立て (規則4.17(v))

添付公開書類:
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— 不利にならない開示又は新規性喪失の例外に関する申立て

2文字コード及び他の略語については、定期発行される各PCTガゼットの巻頭に掲載されている「コードと略語のガイダンスノート」を参照。

(57) 要約:

電子機器は、タッチパネルや操作キーに対する操作入力が受付けられたことを検知した場合に振動アクチュエータを駆動し、振動を発生させる。電子機器は、この振動によりタッチパネルおよび操作キーをその表面に対して垂直となる方向に振動させる。あるいは、電子機器の筐体を振動させる。また、振動アクチュエータは、錘体と、この錘体を空中で往復運動可能に支持するとともに、タッチパネルや筐体などの電子機器の被振動部材または被振部材に接する当該振動アクチュエータのベース部材につながれた支持部材と、錘体に往復運動を行わせるための磁力や静電力などを与える機構とを有する。

明 細 書

電子機器、振動発生器、振動による報知方法および報知制御方法

技 術 分 野

本発明は、電子機器のユーザインタフェースおよび振動発生機構に関する。

技 術 背 景

ＰＤＡ（Personal Digital Assistant）やパーソナルコンピュータ、ＡＴＭ（Automatic Tellers Machine：現金自動預け払い機）などの各種電子機器は、例えば、操作ボタンやキーボード、タッチパネルなどのユーザインタフェースを有している。ユーザは、これらのユーザインタフェースを介して文字の入力や、実行する処理の選択など電子機器に対する操作入力を行う。

ところで、例えば、キーボードや操作ボタンを備えた携帯型電子機器においては、携帯型電子機器の小型化、軽量化、薄型化に伴い、キーや操作ボタンも小型化、軽量化、薄型化されたため、キーや操作ボタンを押下した際の押込み感に乏しい。このため、ユーザは、キーや操作ボタンの押下操作が携帯型電子機器に受付けられたか否かを画面の表示内容を見て確認しなければならなかった。

また、例えば、タッチパネルを備えた電子機器においては、タッチパネルに対して指先や付属のペンによるタッチ操作が行われる。この際、タッチパネルに対する指先やペンの接触のさせ方が悪かったり、あるいは押圧の度合いが弱いと、タッチ操作が無効となってしまう。このため、ユーザは、タッチパネルに対するタッチ操作が電子機器に受付けられたか否かを、やはり画面の表示内容を見て確認しなければならなかった。

また、ビープ音などを用いて操作入力が受付けられたことをユーザに報知する電子機器があるが、このような音による報知は、例えば、街中などの騒音下では

効果がほとんどなかった。

発明の開示

本発明の目的は、操作入力が受付けられたことや操作入力に対する電子機器の応答を、ユーザが画面を見ずに容易に確認することのできる電子機器、振動発生器、振動による報知方法および報知制御方法を提供することである。

上記目的を達成するために、この発明は、操作入力を受付ける操作部と、当該電子機器の把持部に振動を与える振動発生器と、前記操作部に対する操作入力が受付けられたことを検知した場合に、前記振動発生器から振動を発生させる振動制御手段とを具備する電子機器を提供する。また、この発明は、電子機器における振動による報知方法であって、操作部に対する操作入力が受付けられたことを検知した場合に、この電子機器に具備された振動発生器から振動を発生させて当該電子機器の把持部を振動させる振動による報知方法を提供する。

この発明によれば、電子機器は、操作入力が受付けられたことを当該電子機器の把持部を振動させて操作者に報知する。

また、この発明は、操作入力を受付ける操作部と、前記操作部に振動を与える振動発生器と、前記操作部に対する操作入力が受付けられたことを検知した場合に、前記振動発生器から振動を発生させる振動制御手段とを具備し、前記振動発生器は、錘体と、前記錘体を空中で往復運動可能に支持するとともに、前記操作部または前記操作部に接する当該振動発生器のベース部材につながれた支持部材と、前記錘体に往復運動を行わせるための運動力を与える運動力発生手段とを具備する電子機器を提供する。また、この発明は、電子機器における振動による報知方法であって、操作部に対する操作入力が受付けられたことを検知した場合に、この電子機器に具備された振動発生器を駆動して、当該振動発生器において、前記操作部または前記操作部に接する当該振動発生器のベース部材につながれた支持部材により空中で往復運動可能に支持された錘体に往復運動を行わせることで、前記操作部を振動させる振動による報知方法を提供する。

この発明によれば、電子機器は、操作入力が受付けられたことを操作部を振動させて操作者に報知する。

また、この発明は、操作入力を受付ける操作部と、操作者に振動を与える振動発生器と、前記操作部に対する操作入力によって指示された処理の実行が終了したことを検知した場合に、前記振動発生器から振動を発生させる振動制御手段とを具備する電子機器を提供する。また、この発明は、電子機器における振動による報知方法であって、操作部に対する操作入力によって指示された処理の実行が終了したことを検知した場合に、この電子機器に具備された振動発生器から振動を発生させて操作者に振動を与える振動による報知方法を提供する。

この発明によれば、電子機器は、操作入力によって指示された処理の実行が終了したことを振動により操作者に報知する。

また、この発明は、操作入力を受付ける操作部と、前記操作部に振動を与える第１の振動発生器と、当該電子機器の把持部に振動を与える第２の振動発生器と、前記操作部に対する操作入力が受付けられたことを検知した場合に、前記第１の振動発生器および前記第２の振動発生器のうち、あらかじめ操作者により指定されたいずれか一方以上から振動を発生させる振動制御手段とを具備する電子機器を提供する。また、この発明は、電子機器における振動による報知方法であって、操作部に対する操作入力が受付けられたことを検知した場合に、この電子機器に具備された、前記操作部に振動を与える第１の振動発生器および当該電子機器の把持部に振動を与える第２の振動発生器のうち、あらかじめ操作者により指定されたいずれか一方以上から振動を発生させて操作者に振動を与える振動による報知方法を提供する。

この発明によれば、電子機器は、操作入力が受付けられたことを、あらかじめ操作者により指定された部位を振動させて操作者に報知する。

また、この発明は、操作入力を受付ける操作部と、前記操作部に振動を与える第１の振動発生器と、当該電子機器の把持部に振動を与える第２の振動発生器と、当該電子機器が操作者により把持されているか否かを検知する検知手段と、前記操作部に対する操作入力が受付けられたことを検知した場合に、前記第１の振

動発生器および前記第２の振動発生器のうち、前記検知手段による検知結果に応じていずれか一方以上を選択し、当該選択された振動発生器から振動を発生させる振動制御手段とを具備する電子機器を提供する。また、この発明は、電子機器における振動による報知方法であって、操作部に対する操作入力が受付けられたことを検知した場合に、この電子機器に具備された、前記操作部に振動を与える第１の振動発生器および当該電子機器の把持部に振動を与える第２の振動発生器のうち、当該電子機器が操作者により把持されているか否かを検知するセンサの検知結果に応じていずれか一方以上を選択し、当該選択された振動発生器から振動を発生させて操作者に振動を与える振動による報知方法を提供する。

この発明によれば、電子機器は、操作入力が受付けられたことを、当該電子機器が操作者により把持されているか否かに応じて異なる部位を振動させて操作者に報知する。

また、この発明は、タッチパネルが重ねられた表示パネルと、前記表示パネルに設置された振動発生器と、前記振動発生器から発生する振動により前記表示パネルを振動可能に支持する、弾性体を用いて構成された弾性部材と、前記タッチパネルに対するタッチ操作が受付けられたことを検知した場合に、前記振動発生器から振動を発生させる振動制御手段とを具備し、前記振動発生器は、錘体と、前記錘体を空中で往復運動可能に支持するとともに、前記表示パネルまたは前記表示パネルに接する当該振動発生器のベース部材につながれた支持部材と、前記錘体に往復運動を行わせるための運動力を与える運動力発生手段とを具備する電子機器を提供する。

この発明によれば、電子機器は、表示パネルごとタッチパネルを振動させて、タッチ操作が受付けられたことを操作者に報知する。

また、この発明は、タッチパネルが重ねられた表示パネルと、前記表示パネルを支持するとともに、前記表示パネルに振動を与える振動発生器と、前記タッチパネルに対するタッチ操作が受付けられたことを検知した場合に、前記振動発生器から振動を発生させる振動制御手段とを具備し、前記振動発生器は、錘体と、前記錘体を空中で往復運動可能に支持するとともに、前記表示パネルまたは前記

表示パネルに接する当該振動発生器のベース部材につながれた支持部材と、前記錘体に往復運動を行わせるための運動力を与える運動力発生手段とを具備する電子機器を提供する。

この発明によれば、電子機器は、表示パネルごとタッチパネルを振動させて、タッチ操作が受付けられたことを操作者に報知する。

また、この発明は、ディスプレイと、前記ディスプレイの表示画面を覆うタッチパネルと、前記ディスプレイと前記タッチパネルとの間に設けられ、前記タッチパネルを前記表示画面上に支持するとともに、前記タッチパネルに振動を与える振動発生器と、前記タッチパネルに対するタッチ操作が受付けられたことを検知した場合に、前記振動発生器から振動を発生させる振動制御手段とを具備する電子機器を提供する。

この発明によれば、電子機器は、タッチ操作が受付けられたことをタッチパネルを振動させて操作者に報知する。

また、この発明は、ディスプレイと、前記ディスプレイの表示画面を覆うタッチパネルと、前記タッチパネルに設置され、当該タッチパネルに振動を与える振動発生器と、前記ディスプレイと前記タッチパネルとの間に設けられ、前記振動発生器から発生した振動のうち、前記ディスプレイに伝わろうとする振動成分を吸収する振動吸収部材と、前記タッチパネルに対するタッチ操作が受付けられたことを検知した場合に、前記振動発生器から振動を発生させる振動制御手段とを具備する電子機器を提供する。

この発明によれば、電子機器は、タッチ操作が受付けられたことを表示画面上のタッチパネルのみを振動させて操作者に報知する。

また、この発明は、操作入力を受付ける操作部と、少なくともその一部が当該電子機器の筐体から外部に露出して設けられ、操作者に直接振動を与える振動発生器と、前記操作部に対する操作入力が受付けられたことを検知した場合に、前記振動発生器から振動を発生させる振動制御手段とを具備する電子機器を提供する。

この発明によれば、電子機器は、タッチ操作が受付けられたことを振動発生器

から直接、操作者に振動を与えて報知する。

また、この発明は、操作入力を受付ける操作部と、前記操作部とは異なる当該電子機器の筐体の一部に振動を与える振動発生器と、前記操作部に対する操作入力が受付けられたことを検知した場合に、その操作入力の種類を特定し、当該操作入力の種類に対応付けられた振動形態で前記振動発生器から振動を発生させる振動制御手段とを具備する電子機器を提供する。また、この発明は、電子機器における振動による報知方法であって、操作部に対する操作入力が受付けられたことを検知した場合に、その操作入力の種類を特定し、この電子機器に具備された振動発生器から前記操作入力の種類に対応付けられた振動形態で振動を発生させて、前記操作部とは異なる当該電子機器の筐体の一部を振動させる振動による報知方法を提供する。

この発明によれば、電子機器は、操作入力が受付けられたことを当該操作入力の種類に応じた振動形態で、操作部とは異なる筐体の一部を振動させて操作者に報知する。

また、この発明は、操作入力を受付ける操作部と、前記操作部と異なる当該電子機器の筐体の一部に振動を与える振動発生器と、前記操作部に対する操作入力に応じて当該電子機器を制御するためのパラメータ値を変更する変更手段と、前記操作部に対して前記パラメータ値を変更する操作入力が受付けられたことを検知した場合に、当該操作入力によって前記変更手段により変更されたパラメータ値に対応付けられた振動形態で前記振動発生器から振動を発生させる振動制御手段とを具備する電子機器を提供する。

この発明によれば、電子機器は、パラメータ値を変更する操作入力が受付けられたことを変更後のパラメータ値に応じた振動形態で、操作部とは異なる筐体の一部を振動させて操作者に報知する。

また、この発明は、操作入力を受付ける操作部と、前記操作部に振動を与える振動発生器と、前記操作部に対する操作入力が受付けられたことを検知した場合に、その操作入力の種類を特定し、当該操作入力の種類に対応付けられた振動形態で前記振動発生器から振動を発生させる振動制御手段とを具備し、前記振動発

生器は、錘体と、前記錘体を空中で往復運動可能に支持するとともに、前記操作部または前記操作部に接する当該振動発生器のベース部材につながれた支持部材と、前記錘体に往復運動を行わせるための運動力を与える運動力発生手段とを具備する電子機器を提供する。また、この発明は、電子機器における振動による報知方法であって、操作部に対する操作入力が受付けられたことを検知した場合に、その操作入力の種類を特定してこの電子機器に具備された振動発生器を駆動し、当該振動発生器において、前記操作部または前記操作部に接する当該振動発生器のベース部材につながれた支持部材により空中で往復運動可能に支持された錘体に往復運動を行わせることで、前記操作部を振動させる振動による報知方法を提供する。

この発明によれば、電子機器は、操作入力が受付けられたことを当該操作入力の種類に応じた振動形態で操作部を振動させて操作者に報知する。

また、この発明は、操作入力を受付ける操作部と、前記操作部に振動を与える振動発生器と、前記操作部に対する操作入力に応じて当該電子機器を制御するためのパラメータ値を変更する変更手段と、前記操作部に対して前記パラメータ値を変更する操作入力が受付けられたことを検知した場合に、当該操作入力によって前記変更手段により変更されたパラメータ値に対応付けられた振動形態で前記振動発生器から振動を発生させる振動制御手段とを具備し、前記振動発生器は、錘体と、前記錘体を空中で往復運動可能に支持するとともに、前記操作部または前記操作部に接する当該振動発生器のベース部材につながれた支持部材と、前記錘体に往復運動を行わせるための運動力を与える運動力発生手段とを具備する電子機器を提供する。

この発明によれば、電子機器は、パラメータ値を変更する操作入力が受付けられたことを、変更後のパラメータ値に応じた振動形態で操作部を振動させて操作者に報知する。

また、この発明は、当該電子機器を制御するためのパラメータ値を連続的に変化させる操作子と、操作者に振動を与える振動発生器と、前記操作子の操作量に基づいて前記パラメータ値を変更する変更手段と、前記操作子の操作が受付けら

れたことを検知した場合に、当該操作によって前記変更手段により変更されたパラメータ値に対応付けられた振動形態で前記振動発生器から振動を発生させる振動制御手段とを具備する電子機器を提供する。

この発明によれば、電子機器は、パラメータ値を連続的に変化させる操作子の操作が受付けられたことを、変更後のパラメータ値に応じた振動形態で操作者に報知する。

また、この発明は、操作入力を受付けるとともに、当該操作入力の押圧レベルを検知する操作部と、操作者に振動を与える振動発生器と、前記操作部に対する操作入力が受付けられたことを検知した場合に、前記操作部により検知された当該操作入力の押圧レベルに対応付けられた振動形態で前記振動発生器から振動を発生させる振動制御手段とを具備する電子機器を提供する。

この発明によれば、電子機器は、操作入力が受付けられたことを当該操作入力の押圧レベルに応じた振動形態で操作者に報知する。

また、この発明は、操作入力を受付ける操作部と、操作者に報知音を与える発音手段と、操作者に振動を与える振動発生器と、前記操作部に対する操作入力が受付けられたことを検知した場合に、前記発音手段および前記振動発生器のうち、あらかじめ操作者により指定されたいずれか一方以上を用いて操作入力が受付けられたことを操作者に報知する報知制御手段とを具備する電子機器を提供する。また、この発明は、電子機器における報知制御方法であって、操作部に対する操作入力が受付けられたことを検知した場合に、この電子機器に具備された、操作者に報知音を与える発音手段および操作者に振動を与える振動発生器のうち、あらかじめ操作者により指定されたいずれか一方以上を用いて操作入力が受付けられたことを操作者に報知する報知制御方法を提供する。

この発明によれば、電子機器は、操作入力が受付けられたことを、あらかじめ操作者により指定された振動または音により操作者に報知する。

また、この発明は、操作入力を受付ける操作部と、操作者に報知音を与える発音手段と、操作者に振動を与える振動発生器と、当該電子機器の周囲の音量を測定する測定手段と、前記操作部に対する操作入力が受付けられたことを検知した

場合に、前記発音手段および前記振動発生器のうち、前記測定手段による測定結果に基づいていずれか一方以上を選択し、当該選択されたものを用いて操作入力が受付けられたことを操作者に報知する報知制御手段とを具備する電子機器を提供する。また、この発明は、電子機器における報知制御方法であって、操作部に対する操作入力が受付けられたことを検知した場合に、この電子機器に具備された、操作者に報知音を与える発音手段および操作者に振動を与える振動発生器のうち、当該電子機器の周囲の音量を測定する測定手段の測定結果に基づいていずれか一方以上を選択し、当該選択されたものを用いて操作入力が受付けられたことを操作者に報知する報知制御方法を提供する。

この発明によれば、電子機器は、操作入力が受付けられたことを当該電子機器の周囲の音量に応じて振動または音により操作者に報知する。

また、この発明は、操作入力を受付ける操作部と、操作者に報知音を与える発音手段と、操作者に振動を与える振動発生器と、当該電子機器が在圏しているエリアをカバーする基地局から、前記発音手段または前記振動発生器のいずれか一方以上を指定する信号を受信する受信手段と、前記操作部に対する操作入力が受付けられたことを検知した場合に、前記受信手段により受信された信号が指定する前記発音手段または前記振動発生器のいずれか一方以上を用いて操作入力が受付けられたことを操作者に報知する報知制御手段とを具備する電子機器を提供する。また、この発明は、電子機器における報知制御方法であって、操作部に対する操作入力が受付けられたことを検知した場合に、この電子機器に具備された、操作者に報知音を与える発音手段および操作者に振動を与える振動発生器のうち、当該電子機器が在圏しているエリアをカバーする基地局から受信した信号が指定するいずれか一方以上の手段を用いて操作入力が受付けられたことを操作者に報知する報知制御方法を提供する。

この発明によれば、電子機器は、操作入力が受付けられたことを、当該電子機器が在圏しているエリアをカバーする基地局からの指示に応じて振動または音により操作者に報知する。

また、この発明は、操作入力を受付ける操作部と、操作者に振動を与えると同

時に音を発生させることが可能な振動発生器と、前記操作部に対する操作入力が受付けられたことを検知した場合に、前記振動発生器から振動とともに音を発生させる場合は、前記振動発生器を駆動して振動を発生させるための駆動信号と、前記振動発生器を駆動して音を発生させるための音声信号とを合成し、当該合成した信号を前記振動発生器に印加する駆動制御手段とを具備する電子機器を提供する。また、この発明は、電子機器における振動による報知方法であって、操作部に対する操作入力が受付けられたことを検知した場合に、この電子機器に具備された振動発生器から振動とともに音を発生させる場合は、前記振動発生器を駆動して振動を発生させるための駆動信号と、前記振動発生器を駆動して音を発生させるための音声信号とを合成し、当該合成した信号を用いて前記振動発生器を駆動して操作者に振動を与えると同時に音を発生させる振動による報知方法を提供する。

この発明によれば、電子機器は、操作入力が受付けられたことを振動発生器を用いて振動により操作者に報知するとともに、音声信号に基づく音を振動発生器から発生させる。

また、この発明は、操作入力を受付ける操作部と、操作者に報知音を与える発音手段と、操作者に振動を与える振動発生器と、当該電子機器の位置情報を取得する取得手段と、前記操作部に対する操作入力が受付けられたことを検知した場合に、前記発音手段および前記振動発生器のうち、前記取得手段により取得された位置情報に基づいていずれか一方以上を選択し、当該選択されたものを用いて操作入力が受付けられたことを操作者に報知する報知制御手段とを具備する電子機器を提供する。また、この発明は、電子機器における報知制御方法であって、操作部に対する操作入力が受付けられたことを検知した場合に、この電子機器に具備された、操作者に報知音を与える発音手段および操作者に振動を与える振動発生器のうち、当該電子機器の位置情報に基づいていずれか一方以上を選択し、当該選択されたものを用いて操作入力が受付けられたことを操作者に報知する報知制御方法を提供する。

この発明によれば、電子機器は、操作入力が受付けられたことを、当該電子機

器の現在位置に応じて振動または音により操作者に報知する。

また、この発明は、タッチ操作を受付ける操作パネルと、前記操作パネルに振動を与える複数の振動発生器と、前記操作パネルにおけるタッチ位置を検出する検出手段と、前記操作パネルに対するタッチ操作が受付けられたことを検知した場合に、前記検出手段により検出された前記タッチ操作のタッチ位置に基づいて前記複数の振動発生器のいずれか１以上を選択し、当該選択された振動発生器から振動を発生させる振動制御手段とを具備する電子機器を提供する。また、この発明は、電子機器における振動による報知方法であって、操作パネルに対するタッチ操作が受付けられたことを検知した場合に、そのタッチ位置を検出し、当該タッチ位置に基づいてこの電子機器が具備する複数の振動発生器のいずれか１以上を選択し、当該選択された振動発生器から振動を発生させて操作者に振動を与える振動による報知方法を提供する。

この発明によれば、電子機器は、タッチ操作が受付けられたことを振動により操作者に報知する場合に、タッチ位置に応じて駆動する振動発生器を切り替える。

また、この発明は、タッチ操作を受付ける操作パネルと、前記操作パネルに振動を与える複数の振動発生器と、前記操作パネルにおけるタッチ位置を検出する検出手段と、前記操作パネルに対するタッチ操作が受付けられたことを検知した場合に、前記複数の振動発生器の各々から発生させる振動波の相互干渉によって、前記検出手段により検出された前記タッチ操作のタッチ位置に生じる振動の振幅が増幅されるように、前記複数の振動発生器の各々を駆動する駆動信号を生成する生成手段と、前記生成手段により生成された各駆動信号を対応する前記振動発生器に印加し、当該各振動発生器から振動を発生させる振動制御手段とを具備する電子機器を提供する。また、この発明は、電子機器における振動による報知方法であって、操作パネルに対するタッチ操作が受付けられたことを検知した場合に、そのタッチ位置を検出し、この電子機器が具備する複数の振動発生器の各々から発生させる振動波の相互干渉によって前記操作パネルのタッチ位置に生じる振動の振幅が増幅されるように、前記複数の振動発生器の各々に印加する駆動

信号を生成して当該各振動発生器を駆動し、操作者に振動を与える振動による報知方法を提供する。

この発明によれば、電子機器は、タッチ操作が受付けられたことを複数の振動発生器から振動を発生させて操作者に報知する場合に、各振動発生器から発生させる振動波の相互干渉により、操作パネル上のタッチ位置に生じる振動の振幅を増幅させる。

また、この発明は、振動により変形可能な変形層が積層された操作パネルと、前記操作パネルに振動を与える複数の振動発生器と、前記操作パネルにおけるタッチ位置を検出する検出手段と、前記操作パネルに対するタッチ操作が受付けられたことを検知した場合に、前記複数の振動発生器の各々から発生させる振動波の相互干渉によって、前記検出手段により検出された前記タッチ操作のタッチ位置の前記変形層の層厚が非タッチ時と比較して薄くまたは厚くなるように、前記複数の振動発生器の各々を駆動する駆動信号を生成する生成手段と、前記生成手段により生成された各駆動信号を対応する前記振動発生器に印加し、当該各振動発生器から振動を発生させる振動制御手段とを具備する電子機器を提供する。

この発明によれば、電子機器は、タッチ操作が受付けられたことを複数の振動発生器から振動を発生させて操作者に報知する場合に、各振動発生器から発生させる振動波の相互干渉により、操作パネル上のタッチ位置の変形層の層厚を非タッチ時と比較して薄くまたは厚くする。

また、この発明は、錘体と、前記錘体を空中で直線的な往復運動を可能に支持するとともに、当該振動発生器が振動を与える被振動体または前記被振動体に接する当該振動発生器のベース部材につながれた支持部材と、前記錘体に往復運動を行わせるための運動力を与える運動力発生手段と、前記運動力発生手段から発生させた運動力により直線的な往復運動を行う前記錘体の、往復運動の方向と平行な側面に常時接触し、前記錘体に接触抵抗を与える抵抗付与部材とを具備する振動発生器を提供する。

この発明によれば、運動力発生手段からの運動力の発生が停止したときに、錘体の往復運動が接触抵抗により速やかに停止する。

また、この発明は、錘体と、前記錘体を空中で往復運動可能に支持するとともに、当該振動発生器が振動を与える被振動体または前記被振動体に接する当該振動発生器のベース部材につながれた支持部材と、前記錘体に往復運動を行わせるための運動力を与える運動力発生手段と、前記運動力発生手段からの運動力の発生が停止したときに、前記錘体に接触して当該錘体の往復運動を停止させるブレーキ手段とを具備する振動発生器を提供する。

この発明によれば、運動力発生手段からの運動力の発生が停止したときに、ブレーキ手段が錘体の往復運動を直ちに停止させる。

図面の簡単な説明

図１は、本発明の第１実施形態に係るＰＤＡの外観を例示する斜視図である。

図２は、同実施形態に係るＰＤＡのハードウェア構成を例示するブロック図である。

図３は、同実施形態に係るＰＤＡの本体ケース内において、振動アクチュエータの設置状態を模式的に例示する断面図である。

図４は、同実施形態に係る振動アクチュエータに印加される駆動信号の波形を例示する図である。

図５は、同実施形態に係るＰＤＡにおいて、ＣＰＵにより実行される振動制御処理１の動作を説明するフローチャートである。

図６は、本発明の第２実施形態に係るＰＤＡのハードウェア構成を例示するブロック図である。

図７は、同実施形態に係るＰＤＡの本体ケース内において、バイブレータの設置状態を模式的に例示する断面図である。

図８は、同実施形態に係るＤＣモータの外観を例示する斜視図である。

図９は、同実施形態に係るバイブレータに印加される駆動電圧の波形について例示する図である。

図１０は、同実施形態に係るタッチパネルの表面に生じる振動について例示す

る図である。

図１１は、同実施形態に係るＰＤＡにおいて、ＣＰＵにより実行される振動制御処理２の動作を説明するフローチャートである。

図１２は、本発明の第３実施形態に係るＰＤＡの外観を例示する斜視図である。

図１３は、同実施形態に係るＰＤＡのハードウェア構成を例示するブロック図である。

図１４は、同実施形態に係るＰＤＡにおいて、ＣＰＵにより実行される振動制御処理３の動作を説明するフローチャートである。

図１５は、同実施形態に係るＰＤＡにおいて、ＣＰＵにより実行される振動制御処理４の動作を説明するフローチャートである。

図１６は、本発明の第４実施形態に係るＰＤＡの内部構造を例示する図である。

図１７は、同実施形態に係るＰＤＡのハードウェア構成を例示するブロック図である。

図１８は、同実施形態に係るＰＤＡにおいて、ＣＰＵにより実行される振動制御処理５の動作を説明するフローチャートである。

図１９は、同実施形態の第１の変形例に係るＰＤＡの内部構造を例示する断面図である。

図２０は、同変形例に係る弾性部材の他の設置例を示す図である。

図２１は、同変形例に係る弾性部材のその他の設置例を示す図である。

図２２は、同変形例に係る弾性部材のその他の設置例を示す図である。

図２３は、同実施形態の第２の変形例に係るＰＤＡの内部構造を例示する図である。

図２４は、同実施形態の第３の変形例に係るＰＤＡの内部構造を例示する図である。

図２５は、本発明の第５実施形態に係るＡＴＭの内部構造を説明するための断面図である。

図２６は、同実施形態に係る振動アクチュエータの設置位置の変形例を示す断面図である。

図２７は、同実施形態の第１の変形例に係るＡＴＭの内部構造を例示する断面図である。

図２８は、同実施形態の第２の変形例に係るＡＴＭの内部構造を例示する図である。

図２９は、同実施形態の第３の変形例に係るＡＴＭの内部構造を例示する図である。

図３０は、同実施形態の第４の変形例に係るＡＴＭの内部構造を例示する図である。

図３１は、同実施形態の第５の変形例に係るＡＴＭの内部構造を例示する図である。

図３２は、本発明の第６実施形態の第１例に係るＰＤＡの画面表示例を示す図である。

図３３は、同実施形態の第１例に係るＰＤＡにおいて、メモリに格納されている波形データテーブルを例示する図である。

図３４は、同実施形態の第１例に係るＰＤＡにおいて、振動アクチュエータに印加される駆動信号の波形を例示する図である。

図３５は、同実施形態の第１例に係るＰＤＡにおいて、振動アクチュエータに印加される駆動信号の波形を例示する図である。

図３６は、同実施形態の第１例に係るＰＤＡにおいて、振動アクチュエータに印加される駆動信号の波形を例示する図である。

図３７は、同実施形態の第１例に係るＰＤＡにおいて、振動アクチュエータに印加される駆動信号の波形を例示する図である。

図３８は、同実施形態の第２例に係るＰＤＡの画面表示例を示す図である。

図３９は、同実施形態の第２例に係るＰＤＡの画面表示例を示す図である。

図４０は、同実施形態の第２例に係るＰＤＡにおいて、メモリに格納されている波形データテーブルを例示する図である。

図４１は、同実施形態の第３例に係るＰＤＡの画面表示例を示す図である。

図４２は、同実施形態の第３例に係るＰＤＡにおいて、メモリに格納されている波形データテーブルを例示する図である。

図４３は、同実施形態の第３例に係るＰＤＡにおいて、振動アクチュエータに印加される駆動信号の波形を例示する図である。

図４４は、同実施形態の第３例に係るＰＤＡにおいて、振動アクチュエータに印加される駆動信号の波形を例示する図である。

図４５は、同実施形態の第３例に係るＰＤＡにおいて、振動アクチュエータに印加される駆動信号の波形を例示する図である。

図４６は、本発明の第７実施形態に係るＰＤＡにおいて、メモリに格納されている波形データテーブルを例示する図である。

図４７は、本発明の第８実施形態に係るＰＤＡのハードウェア構成を例示するブロック図である。

図４８は、同実施形態に係るＰＤＡにおいて、ＣＰＵにより実行される報知制御処理１の動作を説明するフローチャートである。

図４９は、同実施形態に係るＰＤＡにおいて、振動アクチュエータに印加される振動用の駆動信号の波形を例示する図である。

図５０は、同実施形態に係るＰＤＡにおいて、振動アクチュエータに印加されるビープ音用の駆動信号の波形を例示する図である。

図５１は、同実施形態に係るＰＤＡにおいて、振動とビープ音とによる報知を同時に行う場合に振動アクチュエータに印加される駆動信号の波形を例示する図である。

図５２は、本発明の第９実施形態に係るＰＤＡのハードウェア構成を例示するブロック図である。

図５３は、同実施形態に係るＰＤＡにおいて、ＣＰＵにより実行されるビーコン受信処理の動作を説明するフローチャートである。

図５４は、本発明の第１０実施形態に係るＰＤＡにおいて、メモリに格納されている報知モード判定テーブルを例示する図である。

図５５は、本発明の第１１実施形態に係るＡＴＭについて説明するための図である。

図５６は、同実施形態に係るＡＴＭのハードウェア構成を例示するブロック図である。

図５７は、同実施形態に係るＡＴＭにおいて、ＣＰＵにより実行される振動制御処理６の動作を説明するフローチャートの一部である。

図５８は、同実施形態に係るＡＴＭにおいて、ＣＰＵにより実行される振動制御処理６の動作を説明するフローチャートの一部である。

図５９は、同実施形態の変形例に係るＡＴＭのタッチパネルについて説明するための断面図である。

図６０は、同実施形態の変形例に係るＡＴＭのタッチパネルについて説明するための断面図である。

図６１は、本発明の第１２実施形態に係るＡＴＭについて説明するための図である。

図６２は、同実施形態に係るＡＴＭにおいて、メモリに格納されている駆動先判定テーブルを例示する図である。

図６３は、同実施形態に係るＡＴＭにおいて、ＣＰＵにより実行される振動制御処理７の動作を説明するフローチャートである。

図６４は、本発明の第１３実施形態の第１例に係る振動アクチュエータの内部構造を例示する断面図である。

図６５は、同実施形態の第１例に係る振動アクチュエータにおいて、ブレーキ部材の配置例を示す平面図である。

図６６は、同実施形態の第１例に係る振動アクチュエータにおいて、ブレーキ部材の他の配置例を示す平面図である。

図６７は、同実施形態の第１例に係る振動アクチュエータにおいて、ブレーキ部材のその他の配置例を示す平面図である。

図６８は、同実施形態の第１例に係る振動アクチュエータのコイルに印加される駆動信号の波形を例示する図である。

図６９は、ブレーキ機構のない振動アクチュエータの可動錘の往復運動を説明するための図である。

図７０は、同実施形態の第１例に係る振動アクチュエータの可動錘の往復運動を説明するための図である。

図７１は、同実施形態の第２例に係る振動アクチュエータの内部構造を例示する断面図である。

図７２は、同実施形態の第２例に係る振動アクチュエータのコイルおよびブレーキ用コイルに駆動信号を印加するための回路構成を例示する図である。

図７３は、同実施形態の第２例に係る振動アクチュエータのコイルに印加される駆動信号の波形を例示する図である。

図７４は、同実施形態の第２例に係る振動アクチュエータのブレーキ用コイルに印加される駆動信号の波形を例示する図である。

図７５は、同実施形態の第３例に係る振動アクチュエータの内部構造を例示する断面図である。

図７６は、同実施形態の第３例に係る振動アクチュエータのコイルに駆動信号を印加するための回路構成を例示する図である。

図７７は、同実施形態の第３例に係るスイッチ回路に供給されるＣＴＲＬ信号の波形を例示する図である。

図７８は、本発明の変形例３に係る操作パネルについて例示する図である。

図７９は、同変形例に係るダイアル式スイッチを例示する図である。

図８０は、同変形例に係る「＋」キーおよび「－」キーを例示する図である。

図８１は、同変形例に係る電子機器のリモートコントローラの外観を例示する斜視図である。

図８２は、本発明の変形例５に係る静電型の振動アクチュエータについて説明するための図である。

図８３は、本発明の変形例５に係る他の静電型の振動アクチュエータについて説明するための図である。

図８４は、本発明の変形例６に係る振動アクチュエータの内部構造を例示する

断面図である。

図８５は、本発明の変形例８に係るＡＴＭの外観を例示する斜視図である。

発明を実施するための最良の形態

以下、本発明の実施の形態について説明する。かかる実施の形態は本発明の一態様を示すものであり、この発明を限定するものではなく、本発明の範囲で任意に変更可能である。

［Ａ：第１実施形態］

［Ａ－１：第１実施形態の構成］

図１は、本発明の第１実施形態に係るＰＤＡ１０の外観を例示する斜視図である。同図において、本体ケース１０１の開口部に臨む液晶表示パネル１０３ａの表示画面上には、透明のタッチパネル１０２が重ねられている。ユーザは、このタッチパネル１０２に指先でタッチすることにより、ＰＤＡ１０に対する操作指令を入力する。なお、タッチパネル１０２に対するタッチ操作は、ペンなどの操作具を用いる形態であってもよい。また、本体ケース１０１の上面には、主電源のＯＮ／ＯＦＦ操作など、ＰＤＡ１０に操作指令を入力するための押下式の操作キー１０４ａ，１０４ｂ，１０４ｃが設けられている。

次に、図２は、図１に示したＰＤＡ１０のハードウェア構成を例示するブロック図である。同図に示すように、ＰＤＡ１０は、タッチパネル１０２、表示部１０３、キー入力部１１１、メモリ１１２、ＣＰＵ（Central Processing Unit）１１３、駆動信号生成回路１１４および振動アクチュエータ１１５を有する。

タッチパネル１０２は、タッチ操作に応じてタッチパネル１０２上のタッチ位置を示す信号（以下、タッチ信号と述べる）をＣＰＵ１１３に出力する。また、表示部１０３は、液晶表示パネル１０３ａと、この液晶表示パネル１０３ａの表示制御を行う駆動回路とを有する。キー入力部１１１は、ユーザによる操作キー１０４ａ～１０４ｃの押下操作に応じたキー操作信号をＣＰＵ１１３に出力する。メモリ１１２には、ＰＤＡ１０を制御するためのプログラムやデータなどが格

納されている。また、このメモリ１１２には、振動アクチュエータ１１５を駆動するための駆動信号の波形データが格納されている。

ＣＰＵ１１３は、メモリ１１２に格納されているプログラムを実行することによりバス１１６を介して接続されている装置各部を制御する。このＣＰＵ１１３は、振動制御処理１（図５参照）を実行し、タッチパネル１０２や操作キー１０４ａ～１０４ｃからの操作入力を検知した場合に、駆動信号生成回路１１４を介して振動アクチュエータ１１５を駆動してタッチパネル１０２や操作キー１０４ａ～１０４ｃを振動させる。

駆動信号生成回路１１４は、ＣＰＵ１１３から供給される波形データに従って振動アクチュエータ１１５を駆動するための駆動信号を生成する。また、この駆動信号生成回路１１４は、ＣＰＵ１１３からの指示に従って振動アクチュエータ１１５に駆動信号を印加する。

振動アクチュエータ１１５は、永久磁石を可動錘（錘体）として用いており、電磁力により可動錘に直線的な往復運動を行わせて振動を発生させる、いわゆる永久磁石可動型のリニア振動アクチュエータ（Linear Oscillatory Actuator）である。この振動アクチュエータ１１５は、駆動信号生成回路１１４から印加される駆動信号によって駆動され、振動を発生する。

図３は、ＰＤＡ１０の本体ケース１０１内における振動アクチュエータ１１５の設置状態を模式的に例示する断面図である。同図に示すように、振動アクチュエータ１１５のケース１１５ａ上面は、液晶表示パネル１０３ａと操作キー１０４ａ～１０４ｃとに接している。また、振動アクチュエータ１１５のケース１１５ａ内部には、ケース１１５ａ上面に固定された円筒状のコイル１２１と、永久磁石により形成された、コイル１２１が収まる円環状の隙間を有する円柱状の可動錘１２２と、可動錘１２２を支持するスプリング１２３と、が設けられている。

なお、振動アクチュエータ１１５のケース１１５ａは、密閉されており、磁気シールドとして機能する。このような磁気シールドとしての機能をケース１１５ａに持たせるためには、例えば、ケース１１５ａを導電性物質で形成して接地ま

たは同電位とすること、あるいは、ケース１１５ａを透磁率の大きい磁性体で形成すればよい。

可動錘１２２は、振動アクチュエータ１１５のケース１１５ａ内部に形成された空間に、図中、上下方向に直線的な往復運動が可能な状態で、スプリング１２３により支持されている。このスプリング１２３は、図３に示すように、一方の端が、液晶表示パネル１０３ａと操作キー１０４ａ～１０４ｃに接するケース１１５ａ（ベース部材）につなげられており、他方の端が可動錘１２２につなげられている。なお、スプリング１２３は、複数設けられている構成であってもよい。また、スプリング１２３の代わりに、例えば、ひも状のゴムなど、弾性体を用いて構成された支持部材を使用してもよい。

可動錘１２２は、コイル１２１に対して交流電流（駆動信号）が印加されると、このコイル１２１から発生する磁力により、図中、上下方向に直線的な往復運動を行う。この可動錘１２２の往復運動の反力として、スプリング１２３がつなげられたケース１１５ａ部分に振動加速度が生じる。なお、スプリング１２３がつなげられたケース１１５ａ部分には、可動錘１２２の往復運動に伴い、この往復運動の反力の他に、可動錘１２２からスプリング１２３を介して伝わる振動成分が加わるが、この振動アクチュエータ１１５における振動発生原理の基本は、可動錘１２２の往復運動の反力として生じた振動加速度を用いることにある。

この振動加速度により液晶表示パネル１０３ａと操作キー１０４ａ～１０４ｃに振動が伝わる。この振動の方向は、タッチパネル１０２の表面に対して垂直となる方向であり、ユーザがタッチパネル１０２や操作キー１０４ａ～１０４ｃを押す方向およびその反対方向と一致する。これにより、タッチパネル１０２および操作キー１０４ａ～１０４ｃがタッチパネル１０２の表面に対して垂直となる方向に振動し、操作入力を行っているユーザの指先に振動が伝わる。

なお、図３に示した振動アクチュエータ１１５は、防磁効果を有するケース１１５ａで密閉されているが、このようなケース１１５ａで密閉されていなくてもよい。また、可動錘１１２を支持するスプリング１２３は、ケース１１５ａではなく、直接、液晶表示パネル１０３の裏面などにつながれていてもよい。

ところで、このように１パッケージ化された振動アクチュエータ１１５を用いることには、以下の利点がある。すなわち、１パッケージ化されていない振動アクチュエータを用いる場合、例えば、タッチパネルが重ねられた液晶表示パネルの裏面と、この液晶表示パネルを支持する電子機器の本体装置との双方に、振動アクチュエータの部材を分離設置しなければならない。例えば、液晶表示パネルの裏面に永久磁石を設置するとともに、電子機器の本体装置側において永久磁石と対向する位置にコイルを設置する必要がある。

このような場合、分離設置した部材の取り付け精度が悪いと、あるいは経年変化により部材の取り付け精度が悪化すると、これが即座にタッチパネルの振動の不具合として表面化してしまい、安定した精度でタッチパネルを振動させることが困難である。また、部品点数が多いことや永久磁石とコイルの位置合わせなど、電子機器の組み立て作業の工程が煩雑化してその分だけ製品コストが高くついてしまう。

さらに、このような離設置を行う場合、タッチパネルを効率良く振動させるためには、液晶表示パネルを支持する電子機器の本体装置や筐体などの支持体が確実に固定されているか、あるいは支持体の質量が液晶表示パネルに対して十分に大きくなければならない。したがって、振動アクチュエータの分離設置は、軽量の電子機器や携帯型電子機器には適さない。

これに対して１パッケージ化された振動アクチュエータ１１５を用いた場合、あらかじめケース１１５ａ内に可動錘１２２（永久磁石）とコイル１２１が収容されているので、永久磁石とコイルの取り付け精度の良し悪しがほとんど生じない。また、分離設置を行った場合と比較して経年変化による永久磁石とコイルの設置精度の悪化も生じにくい。したがって、安定した精度でタッチパネル１０２を振動させることができる。また、液晶表示パネル１０３ａの裏面など、振動させたい部材に対して１パッケージ化された振動アクチュエータ１１５を取り付けるだけで良く、電子機器の組み立て作業の工程を簡素化できる。

さらに、振動アクチュエータ１１５は、空中に支持された可動錘１２２に往復運動を行わせることにより当該往復運動の反力として生じる振動を、可動錘１２

２がつながれている液晶表示パネル１０３ａなどに与える。したがって、ＰＤＡ１０の本体装置や本体ケース１０１などの支持体が確実に固定されていない場合や、支持体の質量が液晶表示パネル１０３ａに対して十分に大きくない場合であっても、振動アクチュエータ１１５は、十分な大きさの振動を液晶表示パネル１０３ａなどに与えることができる。これは、特に、軽量の電子機器や携帯型の電子機器に用いた場合に好適である。

なお、この振動アクチュエータ１１５のコイル１２１に可聴帯域の音声信号を印加すると、例えば、振動アクチュエータ１１５のケース１１５ａや、当該振動アクチュエータ１１５が設置されたＰＤＡ１０の本体ケース１０１などを振動させて、音声信号に応じた音を発生させることができる。つまり、振動アクチュエータ１１５を発音源としても利用することができる。この場合、音声信号の印加に応じて振動アクチュエータ１１５から発生する振動が伝わる、例えば、液晶表示パネル１０３ａや本体ケース１０１などを音響拡声機構として用い、振動アクチュエータ１１５から発生させた音の大きさを増幅させる構成とすることが好適である。このように振動発生器と発音源を兼用することができると、例えば、携帯電話機やページャなどの小型電子機器において、構成部品の設置スペースを大幅に節約できる。なお、振動アクチュエータ１１５に発音源としての機能を持たせる場合、振動アクチュエータ１１５の内部または外部に、例えば、コーン紙やホーンなどの音響拡声機構を具備する構成としてもよい。

次に、図４は、振動アクチュエータ１１５に印加される駆動信号の波形を例示する図である。同図において、振動アクチュエータ１１５のコイル１２１に印加される駆動信号の周波数f_0は、ＰＤＡ１０の本体ケース１０１の固有振動数f_1、あるいは振動アクチュエータ１１５自身の固有振動数f_2と一致させている。このような周波数f_0の駆動信号をコイル１２１に印加すると、ＰＤＡ１０の本体ケース１０１あるいは振動アクチュエータ１１５が共振するので、少ない駆動電力でより大きな振動をユーザに与えることができる。つまり、ＰＤＡ１０の電力消費を節約することができる。このような周波数データや、振幅データなどが駆動信号の波形データとしてメモリ１１２に格納されている。

なお、駆動信号の周波数f_0は、この周波数f_0を整数倍した値が固有振動数f_1あるいは固有振動数f_2と一致するように定められていてもよい。このような周波数f_0であっても、ＰＤＡ１０の本体ケース１０１あるいは振動アクチュエータ１１５を共振させることができる。また、駆動信号の波形は、図４に例示したＳＩＮ波に限定されるものではなく、方形波、台形波、三角波などであってもよいことは勿論である。

［Ａ－２：第１実施形態の動作］

図５は、本実施形態に係るＰＤＡ１０において、ＣＰＵ１１３により実行される振動制御処理１の動作を説明するフローチャートである。この振動制御処理１は、タッチパネル１０２や操作キー１０４ａ～１０４ｃに対する操作入力が許可されている期間において、ＣＰＵ１１３により所定周期毎に実行される。

同図に示すように、まず、ＣＰＵ１１３は、タッチパネル１０２からタッチ信号が入力されたか否か、およびキー入力部１１１からキー操作信号が入力されたか否かを判別する（ステップＳ１０１）。ＣＰＵ１１３は、タッチ信号およびキー操作信号がともに入力されていないと判別した場合は、振動制御処理１を終了する。一方、ＣＰＵ１１３は、タッチ信号あるいはキー操作信号のいずれか一方以上が入力されたと判別した場合は、まず、振動アクチュエータ１１５に印加する駆動信号の波形データをメモリ１１２から読み出す（ステップＳ１０２）。

なお、ＣＰＵ１１３は、上記ステップＳ１０１において、タッチパネル１０２からタッチ信号が入力されたと判別した場合であっても、この信号に基づくタッチパネル１０２上のタッチ位置が、例えば、表示画面に表示されているタッチボタンの表示領域から外れていると検知した場合には、ステップＳ１０２の処理に移行せず、振動制御処理１を終了する。

次いで、ＣＰＵ１１３は、メモリ１１２から読み出した波形データを駆動信号生成回路１１４に出力する。また、これと同時にＣＰＵ１１３は、駆動信号生成回路１１４に対して駆動信号の生成を指示する（ステップＳ１０３）。このステップＳ１０３の処理により、駆動信号生成回路１１４は、ＣＰＵ１１３から供給

された波形データを用いて駆動信号を生成する。

次いで、ＣＰＵ１１３は、駆動信号の印加時間を計時するためのカウント値をリセットする（ステップＳ１０４）。そして、ＣＰＵ１１３は、駆動信号の印加開始を駆動信号生成回路１１４へ指示する（ステップＳ１０５）。また、これと同時にＣＰＵ１１３は、印加時間の計時を開始する（ステップＳ１０６）。駆動信号生成回路１１４は、ＣＰＵ１１３から印加開始が指示されると、この後、ＣＰＵ１１３から印加停止が指示されるまでの期間、駆動信号を振動アクチュエータ１１５に印加する。これにより、振動アクチュエータ１１５が駆動し、タッチパネル１０２および操作キー１０４ａ～１０４ｃがタッチパネル１０２の表面に対して垂直となる方向に振動する。

また、ＣＰＵ１１３は、印加時間の計時開始に応じて、印加時間計時用のカウント値をカウントアップする（ステップＳ１０７）。そして、ＣＰＵ１１３は、カウント値があらかじめ設定された規定時間に相当するカウント値に達したか否かを判別する（ステップＳ１０８）。例えば、本実施形態においては、規定時間が０．５秒に定められている。

ＣＰＵ１１３は、印加時間が規定時間以下である場合は、上記ステップＳ１０７に戻って印加時間のカウントアップを行う。また、ＣＰＵ１１３は、印加時間が規定時間を超えたと判別した場合、すなわち、印加時間が０．５秒に達した場合は、駆動信号生成回路１１４に対して駆動信号の印加停止を指示する（ステップＳ１０９）。この後、ＣＰＵ１１３は、振動制御処理１を終了する。駆動信号生成回路１１４は、ＣＰＵ１１３から印加停止が指示されると、振動アクチュエータ１１５への駆動信号の印加を停止する。

以上説明したように本実施形態によれば、ＣＰＵ１１３は、タッチパネル１０２や操作キー１０４ａ～１０４ｃに対する操作入力を検知した場合に、振動アクチュエータ１１５を駆動し、タッチパネル１０２や操作キー１０４ａ～１０４ｃを振動させる。したがって、ＰＤＡ１０は、操作入力が受付けられたことを振動によりユーザへ報知することができる。その結果、ユーザは、画面表示を見なくても、タッチパネル１０２や操作キー１０４ａ～１０４ｃに対する操作入力がＰ

ＤＡ１０に受付けられたか否かを確認することができる。

また、振動アクチュエータ１１５としてリニア振動アクチュエータを用いているので、この振動アクチュエータ１１５から発生させる振動の方向精度が高い。したがって、振動方向をタッチパネル１０２の表面や操作キー１０４ａ～１０４ｃの押下方向に対して垂直となるように振動アクチュエータ１１５をＰＤＡ１０に組み込むことで、タッチパネル１０２に対してタッチ操作が行われた場合や、薄型の操作キー１０４ａ～１０４ｃの押下操作が行われた場合に、例えば、タッチボタンや操作キーの押し込み感を振動刺激によりユーザに与えることができる。

また、振動アクチュエータ１１５のコイル１２１に可聴帯域の音声信号を印加することで、この振動アクチュエータ１１５を発音源としても利用することができる。

さらに、振動時間を０．５秒など短時間にすることにより、例えば、タッチパネル１０２や操作キー１０４ａ～１０４ｃが操作された時に、いわゆるクリック感と同様の操作感覚を振動刺激によりユーザに与えることができる。ここで、クリック感とは、例えば、ディスプレイに画面表示されているアイコンやボタンをマウスを操作して選択する際に、マウスのボタンを押し込んで離す動作を行ったときに生じる操作感覚である。このようなクリック感を与えるためには、振動時間が最大でも１秒以下であることが好ましい。また、このように振動時間を短時間とすることで、振動アクチュエータ１１５の駆動電力を低減し、ＰＤＡ１０の消費電力を節約することができる。

また、振動アクチュエータ１１５は、磁気シールドとして密閉されたケース１１５ａ内にコイル１２１と可動錘１２２とを収容している。したがって、振動アクチュエータ１１５は、その周囲に設置されたＰＤＡ１０の構成部品から磁力の影響を受けない。また、振動アクチュエータ１１５は、周囲の構成部品に対してコイル１２１から発生する磁力の影響を与えない。

振動アクチュエータ１１５が、周囲の構成部品から磁力の影響を受けないようにすることは、可動錘１２２の往復運動の方向精度、すなわち、振動アクチュエ

ータ１１５から発生させる振動の方向精度を一定に保つ点において重要である。なぜならば、周囲の構成部品からの磁力の影響により振動アクチュエータ１１５から発生する振動の方向がズレてしまうと、上述したタッチボタンや操作キーの押し込み感を振動刺激によりユーザに与えることができなくなってしまう。

また、振動アクチュエータ１１５が、その周囲の構成部品に対して磁力の影響を与えないようにすることは、周囲の構成部品の誤動作を防ぐ点において重要である。本実施形態では、液晶表示パネル１０３ａを用いた場合について説明した。しかしながら、液晶表示パネル１０３ａの代わりにＣＲＴ（Cathode-Ray Tube）を用いるような場合に、タッチパネル１０２を振動させるため、ＣＲＴの近傍に防磁効果を持たない振動アクチュエータを設置すると、この振動アクチュエータから発生する磁力の影響で、ＣＲＴの表示内容に変色やゆがみなどが生じてしまう可能性がある。

なお、本実施形態においては、タッチパネル１０２や操作キー１０４ａ～１０４ｃなどの操作部を振動させる構成、すなわち、操作入力を行ったユーザの指先に振動を与える場合について説明した。しかしながら、ＰＤＡ１０の本体ケース１０１を振動させる構成、すなわち、操作入力を行った指先ではなく、ＰＤＡ１０を把持するユーザの手に振動を与えるようにしてもよい。

［Ｂ：第２実施形態］

本実施形態では、ＤＣモータを使用したバイブレータを振動発生器として用いた場合について説明する。なお、本実施形態において、上記第１実施形態と共通する部分については同一の符号を使用するものとする。また、第１実施形態と共通する部分についてはその説明を省略するものとする。

［Ｂ－１：第２実施形態の構成］

図６は、本実施形態に係るＰＤＡ２０のハードウェア構成を例示するブロック図である。同図に示すように、ＰＤＡ２０は、タッチパネル１０２、表示部１０３、キー入力部１１１、メモリ１１２、ＣＰＵ１１３、駆動信号生成回路２１１、バイブレータ２１２およびエンコーダ２１３を有する。

メモリ１１２には、バイブレータ２１２を駆動するための駆動電圧の波形データが格納されている。ＣＰＵ１１３は、振動制御処理２（図１１参照）を実行し、タッチパネル１０２や操作キー１０４ａ～１０４ｃからの操作入力を検知した場合に、駆動信号生成回路２１１を介してバイブレータ２１２を駆動してタッチパネル１０２や操作キー１０４ａ～１０４ｃを振動させる。また、ＣＰＵ１１３は、エンコーダ２１３から供給される回転角情報に基づいて、バイブレータ２１２に対する駆動信号の印加停止タイミングを決定する。

駆動信号生成回路２１１は、ＣＰＵ１１３から供給される波形データに従ってバイブレータ２１２を駆動するための駆動信号を生成する。また、この駆動信号生成回路２１１は、ＣＰＵ１１３からの指示に従ってバイブレータ２１２に駆動信号を印加する。また、バイブレータ２１２は、回転軸に偏心錘を取り付けたＤＣモータである。このバイブレータ２１２は、駆動信号生成回路２１１から印加される駆動信号によって駆動され、振動を発生する。

図７は、ＰＤＡ２０の本体ケース１０１内におけるバイブレータ２１２の設置状態を模式的に例示する断面図である。また、図８は、バイブレータ２１２の外観を例示する斜視図である。図７に示すように、液晶表示パネル１０３ａの下面には、ケース２１２ａに収容されたバイブレータ２１２が設置されている。このバイブレータ２１２は、図示を省略した支持部材によりケース２１２ａ内に固定されている。また、図７および図８に示すように、バイブレータ２１２は、回転軸２２１の先端に偏心錘２２２を取り付けたＤＣモータ２２３により構成されている。

このＤＣモータ２２３に対して駆動電圧（駆動信号）が印加されると、回転軸２２１に取り付けられた偏心錘２２２が回転し、この偏心錘２２２の回転運動によりケース２１２ａに振動が発生する。なお、バイブレータ２１２を使用した場合、上記第１実施形態において説明した振動アクチュエータ１１５の場合とは異なり、バイブレータ２１２から発生する振動の方向やその振動形態が、偏心錘２２２の初期位置やＤＣモータ２２３の回転方向などで異なってしまう。バイブレータ２１２から毎回、同じ振動を発生させるためには、偏心錘２２２の位置を検

知し、偏心錘２２２をいつも同じ位置から同方向に回転させる必要がある。

このため、図６に示したように本実施形態に係るＰＤＡ２０には、エンコーダ２１３が具備されている。このエンコーダ２１３は、ＤＣモータ２２３の回転角情報を検知してＣＰＵ１１３に出力する。ＣＰＵ１１３は、エンコーダ２１３から供給される回転角情報に基づいて、ＤＣモータ２２３に対する駆動電圧の印加停止タイミングを決定する。例えば、本実施形態では、図７に示すように、回転軸２２１を中心とした時、ちょうど１２時の位置で偏心錘２２２が停止するように、ＤＣモータ２２３に対する駆動電圧の印加停止タイミングが決定される。なお、ＤＣモータ２２３の代わりにステッピングモータを使用した場合は、エンコーダ２１３を用いることなく回転軸に取り付けた偏心錘の位置を検知することが可能である。

以上説明したように偏心錘２２２の停止位置を制御することで、バイブレータ２１２から発生する振動の方向を、タッチパネル１０２の表面に対して垂直となる方向と一致させることができる。バイブレータ２１２から発生した振動は、液晶表示パネル１０３ａを介してタッチパネル１０２に伝わる。これにより、タッチパネル１０２がその表面に対して垂直となる方向に振動し、この振動がタッチパネル１０２を操作しているユーザの指先に伝わる。

次に、図９は、バイブレータ２１２に印加される駆動電圧の波形について例示する図である。また、図１０は、タッチパネル１０２の表面に生じる振動について例示する図である。バイブレータ２１２の場合、印加される駆動電圧に応じてＤＣモータ２２３の回転数が変化する。ここで、ＤＣモータ２２３の回転数が、ＰＤＡ２０の本体ケース１０１の固有振動数f_1、あるいはバイブレータ２１２の固有振動数f_3と一致すると、ＰＤＡ２０の本体ケース１０１あるいはバイブレータ２１２が共振する。

そこで、本実施形態では、ＤＣモータ２２３の回転数を、固有振動数f_1あるいは固有振動数f_3と一致させる駆動電圧をバイブレータ２１２に印加する。したがって、図１０に示すように、タッチパネル１０２は、固有振動数f_1あるいは固有振動数f_3の周期でその表面に対して垂直となる方向に振動する。これに

より、少ない駆動電力でより大きな振動を与えることが可能となり、ＰＤＡ２０の電力消費を節約することができる。なお、駆動電圧の波形は、図９に例示した方形波に限定されるものではない。

［Ｂ－２：第２実施形態の動作］

図１１は、本実施形態に係るＰＤＡ２０において、ＣＰＵ１１３により実行される振動制御処理２の動作を説明するフローチャートである。この振動制御処理２は、タッチパネル１０２や操作キー１０４ａ～１０４ｃに対する操作入力が許可されている期間において、ＣＰＵ１１３により所定周期毎に実行される。なお、この振動制御処理２のステップＳ２０１～Ｓ２０８に示す処理は、上記第１実施形態で説明した振動制御処理１（図５参照）のステップＳ１０１～Ｓ１０８の処理と同様であるので説明を省略する。

但し、本実施形態においては、バイブレータ２１２を振動発生器として用いているため、駆動信号生成回路２１１において生成される駆動信号が、図９に示した駆動電圧となる。バイブレータ２１２は、この駆動電圧が印加されると、本体ケース１０１の固有振動数f_1あるいはバイブレータ２１２の固有振動数f_3と一致する回転数でＤＣモータ２２３を回転させる。これにより偏心錘２２２が回転し、振動を発生させる。このバイブレータ２１２から発生した振動により、タッチパネル１０２および操作キー１０４ａ～１０４ｃがタッチパネル１０２の表面に対して垂直となる方向に振動する。

そして、ステップＳ２０８においてＣＰＵ１１３は、印加時間が規定時間を超えたと判別した場合、すなわち、印加時間が０．５秒に達した場合にステップＳ２０９に移行する。次いで、ＣＰＵ１１３は、エンコーダ２１３から供給される回転角情報に基づいて、偏心錘２２２を毎回同じ位置で停止させるための駆動電圧の印加停止タイミングを決定する（ステップＳ２０９）。本実施形態では、図７に示したように、回転軸２２１を中心とした時、ちょうど１２時の位置で偏心錘２２２が停止するように駆動電圧の印加停止タイミングが決定される。

次いで、ＣＰＵ１１３は、決定した印加停止タイミングに従って駆動信号生成

回路２１１へ駆動信号の印加停止を指示する（ステップＳ２１０）。この後、ＣＰＵ１１３は、振動制御処理２を終了する。駆動信号生成回路２１１は、ＣＰＵ１１３から印加停止が指示されると、バイブレータ２１２への駆動信号の印加を停止する。これによりバイブレータ２１２のＤＣモータ２２３に取り付けられた偏心錘２２２は、毎回、同じ位置で停止する。このように偏心錘２２２をいつも同じ位置で停止させ、かつ、この偏心錘２２２を同じ停止位置から同方向に回転させることで、バイブレータ２１２から発生させる振動の方向を固定することができる。また、バイブレータ２１２から発生させる振動を、より木目細やかに制御することが可能となる。

以上説明したように本実施形態によれば、ＣＰＵ１１３は、タッチパネル１０２や操作キー１０４ａ～１０４ｃに対する操作入力を検知した場合に、バイブレータ２１２を駆動し、タッチパネル１０２や操作キー１０４ａ～１０４ｃを振動させる。したがって、ＰＤＡ２０は、操作入力が受付けられたことを振動によりユーザへ報知することができる。

また、本実施形態では、偏心錘２２２をいつも同じ位置で停止させ、当該停止位置から同方向に回転を開始させるようにした。これにより、バイブレータ２１２から発生する振動の方向を固定することができるとともに、バイブレータ２１２から発生させる振動を、より木目細やかに制御することができる。以上のようなことから、タッチパネル１０２に対してタッチ操作が行われた場合や、薄型の操作キー１０４ａ～１０４ｃの押下操作が行われた場合に、タッチボタンや操作キーの押し込み感、クリック感を振動刺激によりユーザに与えることができる。このような押し込み感やクリック感の付与は、上述した偏心錘２２２の停止位置の制御を行わなければ達成し得ないことであり、従来の偏心錘付きモータでは実現できなかったことである。

［Ｃ：第３実施形態］

本実施形態では、操作入力によって指示された処理の実行が終了した場合に、この処理の実行終了を振動により報知する携帯型電子機器について説明する。な

お、本実施形態において、上記第１実施形態と共通する部分については同一の符号を使用するものとする。また、第１実施形態と共通する部分についてはその説明を省略するものとする。

［Ｃ－１：第３実施形態の構成］

図１２は、本実施形態に係るＰＤＡ３０の外観を例示する斜視図である。同図において、ＰＤＡ３０には、本体ケース３０１の開口部に臨んで液晶表示パネル３０２ａの表示画面が設けられている。また、本体ケース３０１の上面には、押下式の操作キーを複数有するキー入力部３０３が設けられている。

図１３は、図１２に示したＰＤＡ３０のハードウェア構成を例示するブロック図である。同図に示すように、ＰＤＡ３０は、表示部３０２、キー入力部３０３、無線通信部３０４、メモリ１１２、ＣＰＵ１１３、駆動信号生成回路１１４および振動アクチュエータ１１５を有する。

このＰＤＡ３０は、ＷＡＮ（Wide Area Network）やＬＡＮ（Local Area Network）などのネットワークを介して他の通信装置とデータ通信を行う機能を有している。無線通信部３０４は、ＷＡＮやＬＡＮの無線基地局との間で行われる無線通信を制御する。また、ＣＰＵ１１３は、振動制御処理３（図１４参照）を実行し、操作入力によって指示された処理の実行が終了したことを検知した場合に、駆動信号生成回路１１４を介して振動アクチュエータ１１５を駆動して本体ケース３０１を振動させる。

なお、振動アクチュエータ１１５は、上記第１実施形態で説明した振動アクチュエータ１１５と同じものである。但し、本実施形態において、振動アクチュエータ１１５は、ＰＤＡ３０の背面側、すなわち、表示画面が設けられた面とは反対側の本体ケース３０１内側に取り付けられ、本体ケース３０１を振動させる。そして、この振動がＰＤＡ３０を把持しているユーザの手に伝わる。

［Ｃ－２：第３実施形態の動作］

図１４は、本実施形態に係るＰＤＡ３０において、ＣＰＵ１１３により実行される振動制御処理３の動作を説明するフローチャートである。この振動制御処理

３は、待ち時間を要する処理の実行が操作入力により指示された場合に実行される。ここで、待ち時間を要する処理とは、例えば、ｗｅｂページの読み込み処理などのファイルデータのダウンロードやアップロード、自己当ての電子メールの有無を確認するメールチェック処理、アプリケーションソフトの起動処理、ファイルデータのコピーや一括削除、メモリ１１２内のデータ格納領域の初期化処理などである。

同図に示すように、まず、ＣＰＵ１１３は、操作入力によって指示された処理を実行する（ステップＳ３０１）。次いで、ＣＰＵ１１３は、実行中の処理が終了したか否かを判別する（ステップＳ３０２）。処理が終了していない場合、ＣＰＵ１１３は、上記ステップＳ３０１に戻り、処理の実行を継続する。また、ＣＰＵ１１３は、上記ステップＳ３０２において実行中の処理が終了したと判別した場合は、ステップＳ３０３に移行する。このステップＳ３０３以降の処理は、上記第１実施形態で説明した振動制御処理１（図５参照）のステップＳ１０２以降の処理と同様であるので説明を省略する。

このような制御構成とすることで、ＣＰＵ１１３は、操作入力によって指示された処理の実行が終了したことを検知すると、駆動信号生成回路１１４を介して振動アクチュエータ１１５を駆動し、ＰＤＡ３０の本体ケース３０１を振動させる。これにより、ＰＤＡ３０を把持するユーザの手に振動が伝わる。

ところで、例えば、メールチェック処理の実行終了を振動により報知する場合、自己当ての電子メールがあった場合と、なかった場合とに応じて振動の形態を異ならせることが有効である。このように、実行された処理の結果に応じて振動の形態を異ならせる制御方法について以下に説明する。

図１５は、本実施形態に係るＰＤＡ３０において、ＣＰＵ１１３により実行される振動制御処理４の動作を説明するフローチャートである。同図に示すように、まず、ＣＰＵ１１３は、操作入力によって指示された処理を実行する（ステップＳ４０１）。そして、ＣＰＵ１１３は、実行中の処理が終了したと判別した場合に（ステップＳ４０２）、ステップＳ４０３に移行する。

次いで、ＣＰＵ１１３は、上記ステップＳ４０１において実行された処理の実

行結果を取得する（ステップＳ４０３）。ＣＰＵ１１３は、この実行結果に応じて、駆動信号の印加時間、すなわち、印加時間を定める規定時間のカウント値を変更する（ステップＳ４０４）。例えば、メールチェック処理が実行された場合、ＣＰＵ１１３は、チェック結果に応じて、自己当ての電子メールがなかった場合は規定時間を０．５秒のままとする。また、自己当ての電子メールがあった場合は規定時間を１．５秒に変更する。

なお、ステップＳ４０５以降の処理は、上述した振動制御処理３（図１４参照）のステップＳ３０３以降の処理と同様であるので詳細な説明を省略するが、ＣＰＵ１１３は、処理の実行結果に応じて本体ケース３０１の振動時間を異ならせる。

以上説明したように本実施形態によれば、ＣＰＵ１１３は、操作入力によって指示された処理が終了したことを検知した場合に、振動アクチュエータ１１５を駆動し、ＰＤＡ３０の本体ケース３０１を振動させる。したがって、ＰＤＡ３０は、操作入力によって指示された処理の実行終了を、振動によりユーザへ報知することができる。また、本実施形態によれば、ＣＰＵ１１３は、処理の実行結果に応じて振動アクチュエータ１１５の振動時間を異ならせる。したがって、ユーザは、画面情報を見なくても、指示した処理の実行結果を振動時間により認識することができる。

なお、本実施形態では、処理の実行結果に応じて振動時間を変更する場合について説明したが、振動の大きさや振動の回数などを変更してもよい。要は、処理の実行結果に応じて振動アクチュエータ１１５から発生させる振動の形態を異ならせればよい。また、本実施形態では、ＰＤＡ３０の本体ケース３０１全体を振動させる構成とした。しかしながら、本体ケース３０１のうち、ユーザがＰＤＡ３０を把持する際に握る部分のみを振動させる構成としてもよい。

また、本実施形態においては、ＰＤＡ３０の本体ケース３０１を振動させる構成、すなわち、ＰＤＡ３０を把持する手に振動を与える場合について説明した。しかしながら、ＰＤＡ３０に備わる複数の操作キーを振動させる構成、すなわち、操作入力を行った指先に振動を与えるようにしてもよい。

［Ｄ：第４実施形態］

本実施形態では、携帯型電子機器がユーザに把持されているか否かに応じて、振動させる部位をタッチパネルまたは筐体の把持部に切り替える携帯型電子機器について説明する。なお、本実施形態において、上記第１実施形態と共通する部分については同一の符号を使用するものとする。また、第１実施形態と共通する部分についてはその説明を省略するものとする。

［Ｄ－１：第４実施形態の構成］

図１６は、本実施形態に係るＰＤＡ４０の内部構造を例示する図である。同図において、ＰＤＡ４０は、タッチパネル１０２が重ねられた液晶表示パネル１０３ａを有し、この液晶表示パネル１０３ａの表示画面が本体ケース４０１の開口部に臨んでいる。また、この液晶表示パネル１０３ａの裏面には、振動アクチュエータ１１５ａが設けられている。この振動アクチュエータ１１５ａは、タッチパネル１０２を振動させ、タッチ操作を行ったユーザの指先に振動を与える。

一方、ＰＤＡ４０の背面側、すなわち、表示画面が設けられた面とは反対側の本体ケース４０１内側には、振動アクチュエータ１１５ｂが設けられている。この振動アクチュエータ１１５ｂは、ＰＤＡ４０を把持しているユーザの手のひらに本体ケース４０１を介して振動を与える。なお、各振動アクチュエータ１１５ａ，１１５ｂは、上記第１実施形態で説明した振動アクチュエータ１１５と同じものである。また、本体ケース４０１の側面には、主電源のＯＮ／ＯＦＦ操作などを入力する押下式の操作キー１０４ａが設けられている。

このようにＰＤＡ４０は、２つの振動アクチュエータ１１５ａ，１１５ｂを有する。また、図１６においては図示を省略しているが、ＰＤＡ４０はタッチセンサを有し、ＰＤＡ４０がユーザに把持されているか否かに応じて、いずれか一方の振動アクチュエータを駆動して振動を発生させる。このような制御を行う理由は、例えば、卓上に置かれたＰＤＡ４０の本体ケース４０１を振動させると、その振動でＰＤＡ４０が移動してしまう、あるいは振動時に卓と当たることで不快な振動音が生じてしまうなどといったことを防ぐためである。

なお、本実施形態では、制御の一例として、ＰＤＡ４０がユーザに把持されている場合には、振動アクチュエータ１１５ｂのみを駆動してＰＤＡ４０を把持しているユーザの手のひらに振動を与える一方、ＰＤＡ４０がユーザに把持されていない場合には、振動アクチュエータ１１５ａのみを駆動してタッチ操作を行った指先に振動を与える場合について説明する。但し、例えば、ＰＤＡ４０がユーザに把持されている場合に、両方の振動アクチュエータ１１５ａ，１１５ｂを駆動して振動報知を行う構成としてもよい。

図１７は、図１６に示したＰＤＡ４０のハードウェア構成を例示するブロック図である。同図に示すように、ＰＤＡ４０は、ＰＤＡ４０は、タッチパネル１０２、表示部１０３、キー入力部１１１、メモリ１１２、ＣＰＵ１１３、駆動信号生成回路１１４、振動アクチュエータ１１５ａ，１１５ｂおよびタッチセンサ４１１を有する。

タッチセンサ４１１は、ＰＤＡ４０がユーザに把持されているか否かを検知するセンサであり、検知結果をＣＰＵ１１３に供給する。

メモリ１１２には、振動アクチュエータ１１５ａ，１１５ｂに印加する駆動信号の波形データが格納されている。ここで、振動アクチュエータ１１５ａに印加する駆動信号の周波数は、タッチパネル１０２を具備した液晶表示パネル１０３ａを共振させる周波数、あるいは振動アクチュエータ１１５ａ自身を共振させる周波数と一致させている。また、振動アクチュエータ１１５ｂに印加する駆動信号の周波数は、ＰＤＡ４０の本体ケース４０１を共振させる周波数、あるいは振動アクチュエータ１１５ｂ自身を共振させる周波数と一致させている。

ＣＰＵ１１３は、振動制御処理５（図１８参照）を実行し、タッチパネル１０２に対するタッチ操作が受付けられたことを振動によりユーザへ報知する。但し、本実施形態においてＣＰＵ１１３は、タッチセンサ４１１の検出結果に応じて、２つの振動アクチュエータ１１５ａ，１１５ｂのうちいずれか一方のみを駆動して振動を発生させる。

駆動信号生成回路１１４は、ＣＰＵ１１３から供給される波形データに従って振動アクチュエータ１１５ａ，１１５ｂを駆動するための駆動信号を生成する。

また、この駆動信号生成回路１１４は、ＣＰＵ１１３からの指示に従って振動アクチュエータ１１５ａ，１１５ｂに駆動信号を印加する。

［Ｄ－２：第４実施形態の動作］

図１８は、本実施形態に係るＰＤＡ４０において、ＣＰＵ１１３により実行される振動制御処理５の動作を説明するフローチャートである。この振動制御処理５は、タッチパネル１０２に対するタッチ操作が許可されている期間において、ＣＰＵ１１３により所定周期毎に実行される。

同図に示すように、まず、ＣＰＵ１１３は、タッチパネル１０２からタッチ信号が入力されたか否かを判別する（ステップＳ５０１）。ＣＰＵ１１３は、タッチ信号が入力されていないと判別した場合は、振動制御処理５を終了する。なお、ＣＰＵ１１３は、タッチパネル１０２からタッチ信号が入力されたと判別した場合であっても、この信号に基づいて検出されるタッチパネル１０２上のタッチ位置が、例えば、表示画面に表示されているタッチボタンの表示領域から外れていると検知した場合には、ステップＳ５０２の処理に移行せず、振動制御処理５を終了する。

一方、ＣＰＵ１１３は、上記ステップＳ５０１においてタッチ信号が入力されたと判別した場合は、次いで、ＰＤＡ４０がユーザに把持されているか否かをタッチセンサ４１１の検知結果に基づいて判別する（ステップＳ５０２）。そして、ＣＰＵ１１３は、ＰＤＡ４０がユーザに把持されていると判別した場合は、駆動する振動アクチュエータを振動アクチュエータ１１５ｂに決定する（ステップＳ５０３）。すなわち、ＰＤＡ４０がユーザに把持されている場合は、本体ケース４０１の把持部を振動させ、ＰＤＡ４０を把持しているユーザの手のひらに振動を与える。

一方、ＣＰＵ１１３は、上記ステップＳ５０２においてＰＤＡ４０がユーザに把持されていないと判別した場合は、駆動する振動アクチュエータを振動アクチュエータ１１５ａに決定する（ステップＳ５０４）。すなわち、ＰＤＡ４０がユーザに把持されいない場合は、タッチパネル１０２を振動させ、タッチ操作を行

ったユーザの指先に振動を与える。

なお、ステップＳ５０５以降の処理は、上記第１実施形態で説明した振動制御処理１（図５参照）のステップＳ１０２以降の処理と同様であるので詳細な説明を省略するが、ＣＰＵ１１３は、上記ステップＳ５０３またはＳ５０４の処理により決定した振動アクチュエータを駆動して、タッチパネル１０２または本体ケース４０１の把持部に振動を与える。

以上説明したように本実施形態によれば、ＣＰＵ１１３は、タッチセンサ４１１の検知結果に応じていずれか一方の振動アクチュエータを駆動し、振動を発生させる。したがって、ＰＤＡ４０は、当該ＰＤＡ４０がユーザに把持されているか否かに応じて、振動させる部位をタッチパネル１０２または本体ケース４０１の把持部に変更することができる。

なお、本実施形態において、振動報知時に使用する振動アクチュエータをユーザが指定可能な構成としてもよい。この場合、ＣＰＵ１１３は、振動報知時に使用する１以上の振動アクチュエータをユーザに指定させるための画面表示を行う。ＣＰＵ１１３は、ユーザからの操作入力により、使用する振動アクチュエータが指定されると、その指定情報をメモリ１１２に記憶する。そして、ＣＰＵ１１３は、上記ステップＳ５０１においてタッチパネル１０２からタッチ信号が入力されたと判別した後、メモリ１１２に記憶された指定情報に従って、駆動する振動アクチュエータを決定する。

また、図１９は、本実施形態の変形例に係るＰＤＡ４１の内部構造を例示する断面図である。同図において、その表示面にタッチパネル１０２が重ねられ、かつ、裏面に振動アクチュエータ１１５ａが設置された液晶表示パネル１０３ａは、弾性部材４５１を介してＰＤＡ４１の本体ケース４０１に取り付けられている。この弾性部材４５１は、例えば、ゴムやウレタン、スポンジなどであって、図２０に示すように、液晶表示パネル１０３ａの周縁部に取り付けられている。この弾性部材４５１は、タッチパネル１０２および液晶表示パネル１０３ａを効率的に振動させるための部材である。

なお、この弾性部材４５１は、図２１や図２２に示すように、液晶表示パネル

１０３ａの周縁部に複数個に分けて設置されるものであってもよい。また、この弾性部材４５１は、スプリングなどを用いて構成されるものであってもよい。これらの図２０～図２２に示した弾性部材４５１，４５１ａ～４５１ｆを介してタッチパネル１０２および液晶表示パネル１０３ａを本体ケース４０１に取り付ける構成とすることで、振動アクチュエータ１１５ａ，１１５ｂから発生させた振動を効率的にタッチパネル１０２および液晶表示パネル１０３ａに与えることができる。したがって、振動アクチュエータ１１５ａの駆動電力を抑えつつ、より大きな振動をユーザへ与えることができる。

また、図２３に示すように、タッチパネル１０２が重ねられた液晶表示パネル１０３ａの裏面と、ＰＤＡ４２の背面側の本体ケース４０１内側と、の両方に接するように振動アクチュエータ１１５ｃを設置する構成としてもよい。このような構成とした場合、タッチパネル１０２に対してタッチ操作を行った指先と、ＰＤＡ４２を把持する手に同一の振動を与えることができる。

さらに、図２４に示すように、振動アクチュエータ１１５ｂは、本体ケース４０１ａに設けられた開口部からその一部を外部に露出するように設置され、ＰＤＡ４３を把持するユーザの手のひらに直接、振動を与える構成であってもよい。このような構成とした場合も、振動アクチュエータ１１５ｂから発生させた振動を効率的にユーザへ与えることができる。また、このような場合、振動アクチュエータ１１５ｂは、直接、ユーザに振動を与えることができるので、より細やかな振動の制御を行うことができる。

[Ｅ：第５実施形態]

本実施形態では、タッチパネルを振動させる振動発生器の設置場所について説明する。

図２５は、本実施形態に係るＡＴＭ５０の内部構造を説明するための断面図である。同図において、ＡＴＭ５０の本体装置５０ａの前面には、液晶表示パネル５０１が傾斜させて設置されている。この液晶表示パネル５０１の表示面上には、ダンパ５０３を介してタッチパネル５０２が取り付けられている。このタッチ

パネル５０２には、タッチ面の上方および下方に２つの振動アクチュエータ１１５ａ，１１５ｂが設置されている。そして、このタッチパネル５０２のさらに外側に、開口部を有する本体カバー５０４が設けられている。

ここで、タッチパネル５０２は、例えば、ガラス基板などの透明かつ硬質の部材で構成されている。また、ダンパ５０３は、ゴムやウレタン、スポンジなどの振動吸収部材であり、タッチパネル５０２の周縁部に取り付けられている。このダンパ５０３は、タッチパネル５０２に設置された振動アクチュエータ１１５ａ，１１５ｂから発生する振動のうち、液晶表示パネル５０１に伝わる振動成分を吸収し、振動が液晶表示パネル５０１に伝わらないようにするための部材である。また、このダンパ５０３は、液晶表示パネル５０１に設置されたタッチパネル５０２を効率的に振動させるための役割も担っている。このため、ダンパ５０３は、ゴムなどの弾性体により構成されていることが望ましい。

振動アクチュエータ１１５ａ，１１５ｂは、上記第１実施形態で説明した振動アクチュエータ１１５と同じものである。また、ダンパ５０３および振動アクチュエータ１１５ａ，１１５ｂは、液晶表示パネル５０１の表示画面領域の外側に設けられている。

同図に示すように、液晶表示パネル５０１は、ＡＴＭ５０の本体装置５０ａに固定されている。これに対してタッチパネル５０２は、ダンパ５０３のみを介して液晶表示パネル５０１に取り付けられており、かつ、タッチパネル５０２と本体カバー５０４との間には隙間が設けられている。このため、タッチパネル５０２は、振動アクチュエータ１１５ａ，１１５ｂから発生する振動により、タッチパネル５０２の表面に対して垂直となる方向に振動する。

なお、タッチパネル５０２に対するタッチ操作に応じて振動アクチュエータ１１５ａ，１１５ｂから振動を発生させる制御については、振動アクチュエータ１１５ａ，１１５ｂが複数である点を除いて、上記第１実施形態で説明した振動制御処理１（図５参照）と同様の制御を行えばよいので説明を省略する。また、本実施形態において振動アクチュエータ１１５ａ，１１５ｂに印加する駆動信号の周波数は、タッチパネル５０２を共振させる周波数、あるいは振動アクチュエー

タ１１５ａ，１１５ｂ自身を共振させる周波数としている。

以上説明したように本実施形態によれば、ＡＴＭ５０は、振動アクチュエータ１１５ａ，１１５ｂから発生した振動によりタッチパネル５０２のみを振動させることができる。液晶表示パネル５０１への振動は、ダンパ５０３により吸収される。したがって、液晶表示パネル５０１の画面表示内容がぶれないので、例えば、上記第１実施形態のように液晶表示パネルごとタッチパネルを振動させる場合と比較して、表示内容が見易い。

なお、図２６に示すように、振動アクチュエータ１１５ａ，１１５ｂをタッチパネル５０２の液晶表示パネル５０１側に設置する構成としてもよい。また、図２７は、本実施形態の変形例に係るＡＴＭ５１の内部構造を例示する断面図である。同図において、ＡＴＭ５１の本体装置５０ａの前面側に傾斜させて設置された液晶表示パネル５０１の表示面上には、２つの振動アクチュエータ１１５ａ，１１５ｂを介してタッチパネル５０２が取り付けられている。

ここで、液晶表示パネル５０１はＡＴＭ５１の本体装置５０ａに固定されている。これに対してタッチパネル５０２は、振動アクチュエータ１１５ａ，１１５ｂのみを介して液晶表示パネル５０１に取り付けられており、かつ、タッチパネル５０２と本体カバー５０４との間には隙間が設けられている。このため、タッチパネル５０２は、振動アクチュエータ１１５ａ，１１５ｂから発生する振動により、タッチパネル５０２の表面に対して垂直となる方向に振動する。また、液晶表示パネル５０１は本体装置５０ａに固定されているため、振動アクチュエータ１１５ａ，１１５ｂと接しているものの、ほとんど振動しない。したがって、図２７に示す構造としても、図２５に示した構造の場合と同様の効果を得ることができる。

また、図２８～図３１は、本実施形態のその他の変形例に係るＡＴＭ５２，５３，５４，５５の内部構造を例示する断面図である。まず、図２８に示すように、その表示面にタッチパネル５０２が重ねられ、かつ、裏面に振動アクチュエータ１１５ａ，１１５ｂが設置された液晶表示パネル５０１を、ダンパ５０３を介して本体カバー５０４に取り付ける構成としてもよい。この場合、液晶表示パネ

ル５０１とＡＴＭ５２の本体装置５０ａとの間には隙間が設けられる。このような構成とすれば、振動アクチュエータ１１５ａ，１１５ｂから発生する振動により、タッチパネル５０２をその表面に対して垂直となる方向に振動させることができる。なお、この変形例におけるダンパ５０３は、タッチパネル５０２および液晶表示パネル５０１を効率的に振動させるための役割を担う。

また、図２９に示すように、その表示面にタッチパネル５０２が重ねられた液晶表示パネル５０１を、振動アクチュエータ１１５ａ，１１５ｂを介して本体カバー５０４に取り付ける構成としてもよい。この場合も、液晶表示パネル５０１とＡＴＭ５３の本体装置５０ａとの間に隙間が設けられる。このような構成であっても、図２８に示した場合と同様に、振動アクチュエータ１１５ａ，１１５ｂから発生する振動によりタッチパネル５０２を振動させることができる。

あるいは、図３０に示すように、その表示面にタッチパネル５０２が重ねられ、かつ、裏面に振動アクチュエータ１１５ａ，１１５ｂが設置された液晶表示パネル５０１を、ダンパ５０３を介してＡＴＭ５４の本体装置５０ａに取り付ける構成としてもよい。この場合は、液晶表示パネル５０１と本体カバー５０４との間に隙間が設けられる。このような構成としても、振動アクチュエータ１１５ａ，１１５ｂから発生する振動により、タッチパネル５０２をその表面に対して垂直となる方向に振動させることができる。

また、図３１に示すように、その表示面にタッチパネル５０２が重ねられた液晶表示パネル５０１を、振動アクチュエータ１１５ａ，１１５ｂを介してＡＴＭ５５の本体装置５０ａに取り付ける構成としてもよい。この場合も、液晶表示パネル５０１と本体カバー５０４との間に隙間が設けられる。このような構成であっても、図３０に示した場合と同様に、振動アクチュエータ１１５ａ，１１５ｂから発生する振動によりタッチパネル５０２を振動させることができる。

これらの図２８～図３１に示した各変形例は、いずれも液晶表示パネル５０１ごとタッチパネル５０２を振動させるものであるが、ＡＴＭ５２～５５は、タッチパネル５０２に対するタッチ操作を受付けたことを、タッチ操作を行ったユーザの指先に振動で報知することができる。

なお、本実施形態では、ディスプレイとして液晶ディスプレイを用いた場合について説明した。しかしながらディスプレイは、ＣＲＴやプラズマディスプレイ、ＥＬ（Electronic Luminescence）ディスプレイなどであってもよい。また、振動アクチュエータ１１５ａ，１１５ｂの設置数は任意である。さらに、ダンパ５０３は、例えば、スプリングなどを用いて構成されるものであってもよい。

［Ｆ：第６実施形態］

本実施形態では、操作入力が受付けられたことを、その操作入力の種類に応じて異なる形態の振動でユーザへ報知する電子機器について説明する。なお、本実施形態においては、上記第１実施形態で説明したＰＤＡ１０を基礎として説明を行う。したがって、第１実施形態と共通する部分については同一の符号を使用するものとする。また、第１実施形態と共通する部分についてはその説明を省略するものとする。

［Ｆ－１：第１例］

図３２は、本実施形態の第１例に係るＰＤＡ１０の画面表示例を示す図である。同図に示すように、ＰＤＡ１０の表示画面には、複数のタッチボタン「Ａ」～「Ｇ」が表示されている。画面表示されたこれらのタッチボタンにユーザが指先で触れることにより、表示画面上に重ねられたタッチパネル１０２がタッチ操作を検出する。なお、各タッチボタンに割り当てたアルファベットは、タッチボタンを識別するために付与したものにすぎない。

次に、図３３は、ＰＤＡ１０のメモリ１１２に格納されている波形データテーブル１１２ａを例示する図である。同図に示すように、波形データテーブル１１２ａには、画面表示される各タッチボタン毎に、このタッチボタンがタッチパネル１０２上において占有する領域をＸＹ座標値を用いて示したエリアデータと、このタッチボタンが押された場合に振動アクチュエータ１１５に印加する駆動信号の波形データとが格納されている。

ここで、各タッチボタンと対応付けられている駆動信号の波形は、例えば、図３４～図３７に例示するように振幅や形状がそれぞれ異なる。但し、これらの各

図において駆動信号の周波数f_0は、ＰＤＡ１０の本体ケース１０１、タッチパネル１０２を具備した液晶表示パネル１０３ａ、振動アクチュエータ１１５のいずれかを共振させる周波数である。上述した波形データテーブル１１２ａには、これらの駆動信号を生成するために必要となる周波数データや振幅データなどが波形データとして格納されている。

このような構成を有するＰＤＡ１０のタッチパネル１０２にユーザが指先でタッチすると、タッチパネル１０２は、タッチ操作を検出し、タッチ信号をＣＰＵ１１３に出力する。ＣＰＵ１１３は、タッチ信号に基づいてタッチ位置のＸＹ座標データを求め、波形データテーブル１１２ａを参照して押されたタッチボタンを特定する。次いで、ＣＰＵ１１３は、特定したタッチボタンに対応付けられた駆動信号の波形データを波形データテーブル１１２ａから読み出す。

そして、ＣＰＵ１１３は、読み出した波形データを駆動信号生成回路１１４に出力する。また、これと同時にＣＰＵ１１３は、駆動信号生成回路１１４に対して駆動信号の生成を指示する。この後の処理は、上記第１実施形態で説明した振動制御処理１（図５参照）のステップＳ１０４以降の処理と同様であるので説明を省略する。

以上説明したように本実施形態の第１例によれば、ＣＰＵ１１３は、タッチパネル１０２に対するタッチ操作を検知した場合に、まず、タッチ位置を検出し、操作されたタッチボタンを特定する。そして、ＣＰＵ１１３は、タッチボタンの種類に対応付けられた振動形態で振動アクチュエータ１１５から振動を発生させる。したがって、ＰＤＡ１０は、タッチ操作を受付けたことを報知する振動の形態を、操作されたタッチボタンに応じて異ならせることができる。

なお、タッチパネル１０２上において、いずれのタッチボタンにも該当しない場所がユーザにより押された場合に、このタッチ操作が無効であることを示す振動を振動アクチュエータ１１５から発生させる構成としてもよい。また、振動時間や振動の回数などを変更して振動形態を異ならせる構成としてもよい。

また、本実施形態の第１例に係る発明は、タッチパネル１０２の代わりに複数の操作キーを有する電子機器に対しても適用可能である。この場合、電子機器の

メモリには、操作キー毎に波形データを記憶しておく。そして、電子機器の制御部は、操作キーが操作されたことを検知した場合に、操作されたキーに応じた波形データをメモリから読み出して振動発生器を駆動する。このような構成とすれば、キー操作が電子機器に受付けられたことを報知する振動の形態を、操作されたキーに応じて異ならせることができる。

［Ｆ－２：第２例］

図３８および図３９は、ＰＤＡ１０の表示画面に表示されたアイコンをタッチパネル１０２に対するタッチ操作によりドラッグし、ゴミ箱に移す作業を行っている状態を例示する図である。なお、ここで言うゴミ箱とは、データの削除を指令するアイコンのことである。

まず、ユーザがタッチパネル１０２に対するタッチ操作によりドラックしたいアイコンを選択すると、ＰＤＡ１０のＣＰＵ１１３は、タッチ位置を検出し、そのタッチ操作がアイコンの選択を指令したものであると特定する。ＰＤＡ１０のメモリ１１２には、図４０に示すように、操作入力が指示する指令の種類毎に振動アクチュエータ１１５に印加する駆動信号の波形データが格納された波形データテーブル１１２ｂが記憶されている。

ＣＰＵ１１３は、この波形データテーブル１１２ｂから「アイコンの選択」に対応付けられた波形データを読み出して振動アクチュエータ１１５を駆動する。したがって、タッチ操作を行ったユーザの指先やＰＤＡ１０を把持するユーザの手には、アイコンの選択が行われたことを示す振動が与えられる。

また、図３８に示すように、ユーザが指先をタッチパネル１０２に接触させたまま移動させ、選択したアイコンをドラッグしている場合、ＣＰＵ１１３は、そのタッチ操作がアイコンのドラッグを指令したものであると特定する。したがって、ＣＰＵ１１３は、波形データテーブル１１２ｂから「ドラッグ」に対応付けられた波形データを読み出して振動アクチュエータ１１５を駆動する。これにより、ユーザにはドラック中であることを示す振動が与えられる。例えば、ドラッグ中の場合には、弱めの振動を継続して与えることなどが好ましい。

そして、図３９に示すように、ドラッグされているアイコンがゴミ箱の上に重ねられると、ＣＰＵ１１３は、タッチ操作がアイコンをゴミ箱に収容することを指令したものであると特定する。したがって、ＣＰＵ１１３は、アイコンをゴミ箱に収容するとともに、波形データテーブル１１２ｂから「データの削除」に対応付けられた波形データを読み出して振動アクチュエータ１１５を駆動する。これにより、タッチ操作を行ったユーザには、アイコンを削除したことを示す振動が与えられる。

以上説明したように本実施形態の第２例によれば、ＣＰＵ１１３は、タッチパネル１０２に対するタッチ操作を検知した場合に、まず、タッチ操作が指示する指令の種類を特定する。そして、ＣＰＵ１１３は、特定した指令の種類に対応付けられた振動形態で振動アクチュエータ１１５から振動を発生させる。したがって、ＰＤＡ１０は、タッチ操作を受付けたことを報知する振動の形態を、タッチ操作が指示する指令の種類に応じて異ならせることができる。

［Ｆ－３：第３例］

図４１は、本実施形態の第３例に係るＰＤＡ１０の画面表示例を示す図である。同図に示すように、ＰＤＡ１０の表示画面には、例えば、ＰＤＡ１０の音量レベルや画面の明暗度などのパラメータ値を調整するための「目盛」と「つまみ」が表示されている。ユーザは、画面表示された「つまみ」の位置を、タッチパネル１０２に対するタッチ操作によりドラッグし、変更することができる。

まず、ユーザがタッチパネル１０２に対するタッチ操作により「つまみ」をクリックすると、ＰＤＡ１０のＣＰＵ１１３は、「つまみ」がクリックされたことを特定する。そして、ＣＰＵ１１３は、「つまみ」がクリックされたことを示す振動をユーザへ与える。

次いで、ユーザが指先をタッチパネル１０２に接触させたまま移動させ、「つまみ」を「目盛」に沿ってドラッグしている場合、ＣＰＵ１１３は、「つまみ」がドラッグされていることを特定する。ここで、本実施形態の第３例に係るＰＤＡ１０のメモリ１１２には、図４２に示す波形データテーブル１１２ｃが記憶さ

れている。この波形データテーブル１１２ｃは、このパラメータが取り得る範囲の値を複数に区分し、各区分毎に振動アクチュエータ１１５に印加する駆動信号の波形データを格納している。

ＣＰＵ１１３は、ドラッグされた「つまみ」の位置に従ってパラメータ値を特定し、波形データテーブル１１２ｃから現在のパラメータ値に対応付けられた波形データを読み出して振動アクチュエータ１１５を駆動する。したがって、「つまみ」をドラッグしている間、タッチ操作を行っているユーザの指先やＰＤＡ１０を把持するユーザの手には、パラメータ値に応じた振動が与えられる。

なお、以下に説明するように、駆動信号の波形合成処理を行う構成であってもよい。例えば、パラメータ値が“０”～“１００”の範囲の数値を取り得る場合に、図４３～図４５に示すように、パラメータ値が“０”の場合と（図４３）、パラメータ値が“５０”の場合と（図４４）、パラメータ値が“１００”の場合（図４５）の各駆動信号の波形データをメモリ１１２に記憶しておく。ＣＰＵ１１３は、現在のパラメータ値が“４０”の場合は、パラメータ値“０”の波形の割合を“１”、パラメータ値“５０”の波形の割合を“４”として両方の波形を合成する。そして、ＣＰＵ１１３は、この合成波形を駆動信号として振動アクチュエータ１１５に印加する。

また、パラメータ値の大きさに比例して駆動信号の振幅のみを変化させ、振動の大きさを変えるようにしてもよい。

以上説明したように本実施形態の第３例によれば、ＣＰＵ１１３は、タッチパネル１０２に対してパラメータ値を変更するタッチ操作を検知した場合に、タッチ操作により変更されたパラメータ値に対応付けられた振動形態で振動アクチュエータ１１５から振動を発生させる。したがって、ＰＤＡ１０は、タッチ操作を受付けたことを報知する振動の形態を、このタッチ操作により変更されたパラメータ値に応じて異ならせることができる。

なお、本実施形態の第３例に係る発明は、パラメータ値を連続的に可変させる操作子（例えば、図７８に例示するスライダスイッチ９９３や、図７９に例示するダイアル型スイッチ９９４など）を有する電子機器に対しても適用可能である

。この場合、電子機器の制御部は、操作子が操作されたことを検知した場合に、この操作子の操作により変更されたパラメータ値に対応付けられた振動形態で振動発生器から振動を発生させる。これにより、操作子の操作が電子機器に受付けられたことを報知する振動の形態を、この操作子の操作により変更されたパラメータ値に応じて異ならせることができる。

［Ｇ：第７実施形態］

本実施形態では、タッチパネルに対するタッチ操作の押圧レベルに応じて、タッチ操作が受付けられたことを異なる形態の振動でユーザへ報知する電子機器について説明する。なお、本実施形態においては、上記第１実施形態で説明したＰＤＡ１０を基礎として説明を行う。したがって、第１実施形態と共通する部分については同一の符号を使用するものとする。また、第１実施形態と共通する部分についてはその説明を省略するものとする。

本実施形態においてＰＤＡ１０が有するタッチパネルは、ユーザの指先がタッチパネルに触れている状態（以下、本実施形態では、この操作をタッチ操作と述べる）と、指先が所定の押圧レベル以上の力でタッチパネルを押圧している状態（以下、本実施形態では、押圧操作と述べる）との２つの操作状態を検出することができる。タッチパネルは、タッチ操作の場合と押圧操作の場合とでＣＰＵ１１３に出力するタッチ信号の種類を異ならせる。

また、本実施形態に係るＰＤＡ１０のメモリ１１２には、図４６に示す波形データテーブル１１２ｄが格納されている。この波形データテーブル１１２ｄは、図３２に示したタッチボタンの画面表示例に対応するものである。波形データテーブル１１２ｄには、各タッチボタン毎に、このタッチボタンのエリアデータと、このタッチボタンがタッチ操作された場合および押圧操作された場合に振動アクチュエータ１１５に印加するそれぞれの波形データが格納されている。

このような構成を有するＰＤＡ１０において、タッチパネルに対するタッチ操作が行われると、タッチパネルは、タッチ操作が行われたことを示すタッチ信号をＣＰＵ１１３に出力する。ＣＰＵ１１３は、タッチ信号に基づいてタッチ位置

の座標データを求め、波形データテーブル１１２ｄを参照して操作されたタッチボタンを特定する。次いで、ＣＰＵ１１３は、特定したタッチボタンに対応付けられたタッチ操作用の波形データを波形データテーブル１１２ｄから読み出す。そして、ＣＰＵ１１３は、読み出した波形データにより生成される駆動信号を用いて振動アクチュエータ１１５を駆動する。また、タッチパネルに対する押圧操作が行われた場合も同様である。ＣＰＵ１１３は、操作されたタッチボタンに対応付けられた押圧操作用の波形データを波形データテーブル１１２ｄから読み出して振動アクチュエータ１１５を駆動する。

このような構成とすることにより、例えば、ユーザが指先でタッチパネルを押圧せずに触れた状態のまま移動させ、タッチボタンの位置を探っている場合には、ＰＤＡ１０は、指先が触れているタッチボタンの種類に対応付けられたタッチ操作用の振動をユーザに与える。すなわち、タッチボタンの位置をユーザが探している状態においては、例えば、タッチボタンの種類毎に異なる微弱な振動がユーザに与えられる。一方、ユーザが所望のタッチボタンを探り当て、このタッチボタンを押圧操作した場合には、ＰＤＡ１０は、このタッチボタンの種類に対応付けられた押圧操作用の振動をユーザに与える。すなわち、ユーザがタッチボタンを押すと、この操作が受付けられたことを示す振動がユーザに与えられる。

このような振動報知制御は、視覚による操作入力の確認が困難な状況下において特に効果を発揮する。例えば、カーナビゲーション装置などに適用することが有効である。また、一般の電子機器であっても、例えば、深夜に照明を付けない状態で、手探りで操作入力を行うような状況下において効果を奏する。

以上説明したように本実施形態によれば、ＣＰＵ１１３は、タッチパネルに対する操作入力を検知した場合に、タッチ操作の場合と押圧操作の場合とで異なる振動形態で振動アクチュエータ１１５から振動を発生させる。したがって、ＰＤＡ１０は、タッチパネルに対する操作入力のし方に応じて、この操作入力を受付けたことを報知する振動の形態を異ならせることができる。

なお、ユーザの指先がタッチパネルに触れた状態を操作入力として受付けるタッチパネルと、ユーザの指先による所定の押圧レベル以上での押圧を操作入力と

して受付けるタッチパネルとを重ね合わせて用いてもよい。また、このように重ね合わせるタッチパネルの枚数は、２枚に限定されるものではない。

［Ｈ：第８実施形態］

本実施形態では、操作入力が受付けられたことを音で報知する音報知モードと、操作入力が受付けられたことを振動で報知する振動報知モードとを有し、周囲の音量レベルに応じて報知モードを切り替える電子機器について説明する。なお、本実施形態において、上記第１実施形態と共通する部分については同一の符号を使用するものとする。また、第１実施形態と共通する部分についてはその説明を省略するものとする。

［Ｈ－１：第８実施形態の構成］

図４７は、ＰＤＡ６０のハードウェア構成を例示するブロック図である。同図に示すように、ＰＤＡ６０は、タッチパネル１０２、表示部１０３、キー入力部１１１、メモリ１１２、ＣＰＵ１１３、駆動信号生成回路１１４、振動アクチュエータ１１５、マイクロフォン６０１、音量測定回路６０２、ビープ音生成回路６０３およびスピーカ６０４を有する。

音量測定回路６０２は、マイクロフォン６０１から得たＰＤＡ６０の周囲の音のアナログ信号波形に基づいてその音量レベルを測定し、測定結果をＣＰＵ１１３に出力する。ビープ音生成回路６０３は、ＣＰＵ１１３からの指示に従ってスピーカ６０４に印加するための駆動信号を生成する。この駆動信号がスピーカ６０４に印加されてビープ音が発音される。

このＰＤＡ６０は、操作入力が受付けられたことをビープ音で報知する音報知モードと、操作入力が受付けられたことを振動で報知する振動報知モードとを有する。ＣＰＵ１１３は、報知制御処理１（図４８参照）を実行し、タッチパネル１０２に対するタッチ操作が受付けられたことをビープ音や振動でユーザへ報知する。この際、ＣＰＵ１１３は、音量測定回路６０２の測定結果に応じて、報知モードを音報知モードまたは振動報知モードに切り替える。このような報知モードの切り替え制御を行う理由は、例えば、街中などの一定レベル以上の騒音下で

は、ビープ音による報知の効果がほとんどないためである。ＣＰＵ１１３は、ＰＤＡ６０の周囲の音量があらかじめ設定された音量レベル以上であると判別した場合に、少なくとも振動報知モードを選択する。

［Ｈ－２：第８実施形態の動作］

図４８は、本実施形態に係るＰＤＡ６０において、ＣＰＵ１１３により実行される報知制御処理１の動作を説明するフローチャートである。この報知制御処理１は、タッチパネル１０２に対するタッチ操作が許可されている期間において、ＣＰＵ１１３により所定周期毎に実行される。

同図に示すように、まず、ＣＰＵ１１３は、タッチパネル１０２からタッチ信号が入力されたか否かを判別する（ステップＳ６０１）。ＣＰＵ１１３は、タッチ信号が入力されていないと判別した場合は、報知制御処理１を終了する。一方、ＣＰＵ１１３は、タッチ信号が入力されたと判別した場合は、次いで、ＰＤＡ６０の周囲の音量があらかじめ設定された音量レベル以上であるか否かを音量測定回路６０２の測定結果に基づいて判別する（ステップＳ６０２）。ＣＰＵ１１３は、ＰＤＡ６０の周囲の音量があらかじめ設定された音量レベル以上でないと判別した場合は、報知モードを音報知モードに決定する（ステップＳ６０３）。そして、ＣＰＵ１１３は、ビープ音生成回路６０３を駆動してスピーカ６０４からビープ音を発音させ（ステップＳ６０４）、タッチ操作が受付けられたことをビープ音でユーザへ報知する。

一方、ＣＰＵ１１３は、上記ステップＳ６０２においてＰＤＡ６０の周囲の音量があらかじめ設定された音量レベル以上であると判別した場合は、報知モードを振動報知モードに決定する（ステップＳ６０５）。そして、ＣＰＵ１１３は、駆動信号生成回路１１４を介して振動アクチュエータ１１５を駆動し、タッチ操作が受付けられたことを振動でユーザへ報知する。なお、ステップＳ６０６以降の処理は、上記第１実施形態で説明した振動制御処理１（図５参照）のステップＳ１０２以降の処理と同様であるので説明を省略するものとする。

以上説明したように本実施形態によれば、ＣＰＵ１１３は、タッチ操作が受付

けられたことを報知する報知モードを、音量測定回路６０２の測定結果に基づいて音報知モードまたは振動報知モードに切り替える。したがって、ＰＤＡ６０は、周囲の音量（騒音レベル）に応じて振動で報知を行うのか、ビープ音で報知を行うのかを自動的に変更することができる。

なお、本実施形態において、報知モードをユーザが指定可能な構成としてもよい。この場合、ＣＰＵ１１３は、使用する報知モードをユーザに指定させるための画面表示を行う。ＣＰＵ１１３は、ユーザからの操作入力により、音報知モードまたは振動報知モードのいずれか一方以上が使用する報知モードとして指定されると、その指定情報をメモリ１１２に記憶する。そして、ＣＰＵ１１３は、上記ステップＳ６０１においてタッチパネル１０２からタッチ信号が入力されたと判別した後、メモリ１１２に記憶された指定情報に従って、報知モードを音報知モードまたは振動報知モードのいずれか一方以上に決定する。

また、上記第１実施形態で説明したように、振動アクチュエータ１１５のコイル１２１に可聴帯域の音声信号を印加することで、この振動アクチュエータ１１５をスピーカ６０４（発音源）としても用いることができる。ここで、振動アクチュエータ１１５から振動を発生させるための駆動信号の波形は、例えば、図４９に示す通りである。なお、同図において駆動信号の周波数f_0は、ＰＤＡ１０の本体ケース１０１、タッチパネル１０２を具備した液晶表示パネル１０３ａ、振動アクチュエータ１１５自身のいずれかを共振させる周波数である。また、この振動アクチュエータ１１５から音を発生させるための駆動信号の波形は、例えば、図５０に示す通りである。

そして、振動アクチュエータ１１５から振動の発生と音の発生を同時に行う場合の駆動信号の波形は、例えば、図５１に示す通りである。同図に示す波形は、図４９に示した振動発生用の波形と図５０に示した音発生用の波形とを合成したものである。この振動発生用の波形と音発生用の波形との合成処理は、駆動信号生成回路１１４において実行される。これらの図４９～図５１に示した駆動信号を用いて振動アクチュエータ１１５を駆動することにより、振動アクチュエータ１１５のみを用いて振動の発生と発音を実現することができる。

なお、このように振動アクチュエータ１１５に発音源としての機能を持たせる場合、音声信号の印加に応じて振動アクチュエータ１１５から発生する振動が伝わる、例えば、液晶表示パネル１０３ａや本体ケース１０１などを音響拡声機構として用い、振動アクチュエータ１１５から発生させた音の大きさを増幅させる構成とすることが好適である。また、振動アクチュエータ１１５の内部または外部に、例えば、コーン紙やホーンなどの音響拡声機構を具備する構成であってもよい。また、振動アクチュエータ１１５から発生させる音は、ブザー音などの報知音に限定されるものではなく、当然、楽音や人間の声などの再生音が含まれる。

［Ｉ：第９実施形態］

本実施形態では、上記第８実施形態で説明した音報知モードと振動報知モードを、無線基地局から受信したビーコンに従って切り替える電子機器について説明する。なお、本実施形態において、上記第８実施形態と共通する部分については同一の符号を使用するものとする。また、第８実施形態と共通する部分についてはその説明を省略するものとする。

［Ｉ－１：第９実施形態の構成］

図５２は、ＰＤＡ７０のハードウェア構成を例示するブロック図である。同図に示すように、ＰＤＡ７０は、タッチパネル１０２、表示部１０３、キー入力部１１１、メモリ１１２、ＣＰＵ１１３、駆動信号生成回路１１４、振動アクチュエータ１１５、ビープ音生成回路６０３、スピーカ６０４および無線通信部７０１を有する。

このＰＤＡ７０は、複数の基地局を有する無線ＬＡＮに収容される移動機である。ＰＤＡ７０は、自機７０が在圏する無線エリアをカバーする基地局と無線通信を行い、無線ＬＡＮが提供するパケット通信サービスを受ける。また、このＰＤＡ７０は、操作入力が受付けられたことを音で報知する音報知モードと、操作入力が受付けられたことを振動で報知する振動報知モードとを有する。

無線通信部７０１は、基地局との間で行われる無線通信を制御する。この無線

通信部７０１は、ＣＰＵ１１３の制御の下、例えば、パケット通信用のデータなどを搬送波に重畳して無線信号を生成し、この無線信号を基地局へ送信する。また、無線通信部７０１は、基地局から送られてくる無線信号を受信し、これを復調して自機７０宛のデータを得る。また、無線通信部７０１は、基地局から周期的に送信されるビーコンを受信する。

ここで、ビーコンは、基地局が自局の無線エリア内へ周期的に送信する無線信号であって、例えば、１秒間に数回程度の割合で送信される。このビーコンには、ＰＤＡ７０の報知モードを音報知モードまたは振動報知モードのいずれか一方以上に指定する制御ｂｉｔデータが含まれている。この制御ｂｉｔデータは、例えば、ＰＤＡ７０の報知モードを音報知モードのみに指定する場合に“０”、報知モードを振動報知モードのみに指定する場合に“１”、報知モードを音報知モードと振動報知モードの併用に指定する場合に“２”、いずれの報知モードも使用しないこと指定する場合に“３”などと設定される。

例えば、駅や映画館などの公共施設に設置された基地局は、自局の無線エリア内に、制御ｂｉｔデータ“１”を含んだビーコンを送信する。これにより、このビーコンを受信したＰＤＡ７０の報知モードは、振動報知モードに決定される。なお、例えば、映画館に設置された基地局において、映画の上映時間中のみＰＤＡ７０の報知モードを振動報知モードに指定し、上映時間外には音報知モードと振動報知モードの併用を指定するようにしてもよい。

ＣＰＵ１１３は、自機７０が在圏している無線エリアをカバーする基地局からビーコンを受信すると、ビーコンに含まれている制御ｂｉｔデータをメモリ１１２に格納する。そして、ＣＰＵ１１３は、タッチパネル１０２に対するタッチ操作を検知した場合に、メモリ１１２に格納された制御ｂｉｔデータに従って報知モードを決定し、決定した報知モードによりタッチ操作が受付けられたことをユーザへ報知する。このように本実施形態のＰＤＡ７０は、基地局から受信したビーコンにより強制的に報知モードが指定される。

［Ｉ－２：第９実施形態の動作］

図５３は、本実施形態に係るＰＤＡ７０において、ＣＰＵ１１３により実行されるビーコン受信処理の動作を説明するフローチャートである。このビーコン受信処理は、基地局から送信されたビーコンをＰＤＡ７０が受信した場合にＣＰＵ１１３により実行される。なお、例えば、基地局の無線エリアが他の基地局の無線エリアと一部重複するような場合に、重複する地域に位置するＰＤＡ７０が両方の基地局からビーコンを受信した場合、ＣＰＵ１１３は、受信したビーコンのうち電波強度の強いビーコンを選択し、このビーコンに対してビーコン受信処理を実行する。

同図に示されるように、まず、ＣＰＵ１１３は、無線通信部７０１により受信されたビーコンを復調する（ステップＴ１０１）。次いで、ＣＰＵ１１３は、復調されたビーコンに含まれている制御ｂｉｔデータを抽出する（ステップＴ１０２）。そして、ＣＰＵ１１３は、抽出した制御ｂｉｔデータをメモリ１１２に格納し（ステップＴ１０３）、ビーコン受信処理を終了する。なお、ステップＴ１０３においてＣＰＵ１１３は、今回抽出した制御ｂｉｔデータと、既にメモリ１１２に格納されている制御ｂｉｔデータとを比較し、両方の制御ｂｉｔデータが不一致の場合に、今回抽出した制御ｂｉｔデータをメモリ１１２に上書きする構成としてもよい。

また、ＣＰＵ１１３は、タッチパネル１０２に対するタッチ操作が受付けられたことを振動やビープ音でユーザに報知する報知制御処理を実行する。本実施形態における報知制御処理は、上記第８実施形態で説明した報知制御処理１（図４８参照）と略同様であるので図示並びに詳細な説明を省略するが、要点は以下の通りである。

すなわち、ＣＰＵ１１３は、タッチパネル１０２からタッチ信号が入力されると、メモリ１１２に格納された制御ｂｉｔデータに従って報知モードを決定する。例えば、メモリ１１２に格納されている制御ｂｉｔデータが“０”の場合は、報知モードを音報知モードに決定する。そして、ＣＰＵ１１３は、ビープ音生成回路６０３を駆動してスピーカ６０４からビープ音を発音させ、タッチ操作が受付けられたことを報知音によりユーザへ報知する。

一方、メモリ１１２に格納されている制御ｂｉｔデータが“１”の場合、ＣＰＵ１１３は、報知モードを振動報知モードに決定する。そして、ＣＰＵ１１３は、駆動信号生成回路１１４介して振動アクチュエータ１１５を駆動し、タッチ操作が受付けられたことを振動でユーザへ報知する。

以上説明したように本実施形態によれば、ＣＰＵ１１３は、基地局から受信したビーコンに従って、タッチ操作が受付けられたことを報知する報知モードを決定する。したがって、基地局側で自局の無線エリア内に在圏するＰＤＡ７０の報知モードを指定することができる。よって、例えば、映画館や駅などの公共施設に位置するＰＤＡ７０の報知モードを、ユーザが設定変更しなくても自動的に音報知モードから振動報知モードへ切り替えることなどが可能となる。

なお、上記第８実施形態で説明したように、スピーカ６０４としての機能を兼ね備えた振動アクチュエータを用いる構成としてもよい。また、本実施形態に係る発明は、例えば、ＰＤＣ（Personal Digital Cellular）方式の移動パケット通信網に収容される携帯電話機や、ＰＨＳ（Personal Handyphone System：登録商標）端末に適用可能であることは勿論である。

［Ｊ：第１０実施形態］

本実施形態では、電子機器が自機の現在位置を取得する機能を有し、自機の現在位置に基づいて音報知モードと振動報知モードを切り替える電子機器について説明する。なお、本実施形態に係るＰＤＡは、上記第９実施形態で説明したＰＤＡ７０と同一のハードウェア構成（図５２参照）を有するため、同一の符号を使用するものとする。また、第９実施形態と共通する部分についてはその説明を省略するものとする。

本実施形態に係るＰＤＡ７０において、無線通信部７０１は、基地局から周期的に送信されるビーコンを受信する。このビーコンには、ビーコンを送信した基地局を識別するため基地局ＩＤが含まれている。ＰＤＡ７０は、このビーコンに含まれている基地局ＩＤを自機７０の現在位置を示す位置情報として利用する。

メモリ１１２には、図５４に示す報知モード判定テーブル１１２ｅが格納され

ている。この報知モード判定テーブル１１２ｅには、ＰＤＡ７０の報知モードを振動報知モードとするエリアを示す基地局ＩＤが格納されている。この報知モード判定テーブル１１２ｅに格納されている基地局ＩＤは、音報知モードを使用すると周囲の人々に迷惑がかかる、例えば、公共施設に設置された基地局のＩＤである。この報知モード判定テーブル１１２ｅは、無線ＬＡＮのサービス制御局から基地局を介してＰＤＡ７０に送信される。

以上説明した構成を有するＰＤＡ７０において、ＣＰＵ１１３は、自機７０が在圏している無線エリアをカバーする基地局からビーコンを受信すると、ビーコン受信処理を実行する。このビーコン受信処理においてＣＰＵ１１３は、無線通信部７０１により復調されたビーコンに含まれている基地局ＩＤを抽出し、この基地局ＩＤを自機７０の位置情報としてメモリ１１２に格納する。

また、ＣＰＵ１１３は、タッチパネル１０２に対するタッチ操作が受付けられたことを振動やビープ音でユーザに報知する報知制御処理を実行する。この報知制御処理においてＣＰＵ１１３は、タッチパネル１０２に対するタッチ操作を検知した場合に、メモリ１１２に格納されている自機７０の現在位置を示す基地局ＩＤと、報知モード判定テーブル１１２ｅに格納されている各基地局ＩＤとを比較する。

そして、ＣＰＵ１１３は、自機７０の現在位置を示す基地局ＩＤが報知モード判定テーブル１１２ｅに格納されていない場合は、あらかじめユーザによって設定されている報知モード（例えば、音報知モード）に従って、タッチ操作が受付けられたことをユーザへ報知する。また、ＣＰＵ１１３は、自機７０の現在位置を示す基地局ＩＤが報知モード判定テーブル１１２ｅに格納されている場合は、報知モードを振動報知モードに決定し、タッチ操作が受付けられたことを振動でユーザへ報知する。なお、音報知モード時におけるビープ音生成回路６０３およびスピーカ６０４の制御や、振動報知モード時における駆動信号生成回路１１４および振動アクチュエータ１１５の制御は、上記第８実施形態で既に述べているため説明を省略する。

以上説明したように本実施形態によれば、ＣＰＵ１１３は、ＰＤＡ７０の現在

位置を示す位置情報に従って、タッチ操作が受付けられたことを報知する報知モードを決定する。したがって、例えば、映画館や駅などの公共施設に位置するＰＤＡ７０の報知モードを、ユーザが設定変更しなくても自動的に音報知モードから振動報知モードへ切り替えることなどができる。

なお、本実施形態では、基地局から受信したビーコンに含まれる基地局ＩＤを位置情報として利用する場合について説明した。しかしながら、このＰＤＡ７０にＧＰＳ（Global Positioning System）機能をさらに加え、ＧＰＳ機能により取得した自機７０の現在位置の緯度経度を示す位置情報を用いて報知モードを決定する構成としてもよい。また、無線ＬＡＮが移動機の測位サービスを提供している場合、ＰＤＡ７０は、基地局から自機７０の現在位置を示す位置情報（緯度経度情報）を受信し、この位置情報を用いて報知モードを決定する構成としてもよい。但し、これらの場合、報知モード判定テーブル１１２ｅに格納されるエリアデータは、基地局ＩＤではなく、緯度経度情報に基づくエリアデータとする必要がある。

また、報知モード判定テーブル１１２ｅは、ユーザによるカスタマイズが可能である。例えば、ユーザが振動報知モードとしたい場所で登録処理を実行することにより、メモリ１１２に格納されている自機７０の現在位置を示す基地局ＩＤを報知モード判定テーブル１１２ｅに追加登録することができる。

また、上記第８実施形態で説明したように、スピーカ６０４としての機能を兼ね備えた振動アクチュエータを用いる構成としてもよい。また、本実施形態に係る発明は、ＰＤＣ方式の移動パケット通信網に収容される携帯電話機や、ＰＨＳ端末に適用可能であることは勿論である。

［Ｋ：第１１実施形態］

本実施形態では、複数の振動発生器を有し、タッチパネル上におけるタッチ位置に基づいて各振動発生器に印加する駆動信号の信号波形を制御する電子機器について説明する。なお、本実施形態において、上記第５実施形態と共通する部分については同一の符号を使用するものとする。また、第５実施形態と共通する部

分についてはその説明を省略するものとする。

［Ｋ－１：第１１実施形態の構成］

図５５は、本実施形態に係るＡＴＭについて説明するための図である。同図に示すように、タッチパネル５０２が重ねられた液晶表示パネル５０１の裏面には、その四隅に計４個の振動アクチュエータ１１５ａ、１１５ｂ、１１５ｃ、１１５ｄが設置されている。このように複数の振動アクチュエータ１１５ａ～１１５ｄを設置する理由は、ＡＴＭやパーソナルコンピュータなど、大型の表示画面を有する電子機器では、タッチ操作を行ったユーザの指先に１つの振動発生器で充分な振動を与えることが難しいためである。

本実施形態では、これらの複数の振動アクチュエータ１１５ａ～１１５ｄを用いて振動報知を行う場合に、各振動アクチュエータ１１５ａ～１１５ｄを効率的に駆動して、振動報知に要する電力消費を抑えつつ、より大きな振動をユーザの指先に与えるための制御について説明する。

図５６は、本実施形態に係るＡＴＭ９０のハードウェア構成を例示するブロック図である。同図に示すように、ＡＴＭ９０は、タッチパネル５０２、表示部９０１、メモリ９０２、駆動信号生成回路９０３、振動アクチュエータ１１５ａ～１１５ｄおよびＣＰＵ９０４を有する。

タッチパネル５０２は、タッチ操作に応じてタッチパネル５０２上のタッチ位置を示すタッチ信号をＣＰＵ９０４に出力する。また、表示部９０１は、液晶表示パネル５０１と、この液晶表示パネル５０１の表示制御を行う駆動回路とを有する。メモリ９０２には、ＡＴＭ９０を制御するためのプログラムやデータなどが格納されている。また、このメモリ９０２には、各振動アクチュエータ１１５ａ～１１５ｄに印加する駆動信号の波形データが格納されている。なお、本実施形態において各振動アクチュエータ１１５ａ～１１５ｄに印加する駆動信号の波形形状は同一である。また、この駆動信号の周波数は、タッチパネル５０２を具備する液晶表示パネル５０１を共振させる周波数、あるいは振動アクチュエータ１１５ａ～１１５ｄ自身を共振させる周波数と一致させている。

駆動信号生成回路９０３は、ＣＰＵ９０４から供給される波形データおよび位

相データに従って各振動アクチュエータ１１５ａ～１１５ｄを駆動するための駆動信号を生成する。また、この駆動信号生成回路９０３は、ＣＰＵ９０４からの指示に従って各振動アクチュエータ１１５ａ～１１５ｄに駆動信号を印加する。各振動アクチュエータ１１５ａ～１１５ｄは、上記第１実施形態で説明した振動アクチュエータ１１５と同じものである。

ＣＰＵ９０４は、メモリ９０２に格納されているプログラムを実行することによりバス９０５を介して接続されている装置各部を制御する。このＣＰＵ９０４は、振動制御処理６（図５７，図５８参照）を実行し、タッチパネル５０２に対するタッチ操作を検知した場合に、駆動信号生成回路９０３を介して各振動アクチュエータ１１５ａ～１１５ｄを駆動してタッチパネル５０２および液晶表示パネル５０１を振動させる。

［Ｋ－２：第１１実施形態の動作］

図５７および図５８は、本実施形態に係るＡＴＭ９０において、ＣＰＵ９０４により実行される振動制御処理６の動作を説明するフローチャートである。この振動制御処理６は、タッチパネル５０２に対するタッチ操作が許可されている期間において、ＣＰＵ９０４により所定周期毎に実行される。

図５７に示すように、まず、ＣＰＵ９０４は、タッチパネル５０２からタッチ信号が入力されたか否かを判別する（ステップＳ７０１）。ＣＰＵ９０４は、タッチ信号が入力されていないと判別した場合は、振動制御処理６を終了する。また、ＣＰＵ９０４は、タッチ信号が入力されたと判別した場合は、このタッチ信号に基づいてタッチパネル５０２上におけるタッチ位置（ＸＹ座標値）を特定する（ステップＳ７０２）。なお、ＣＰＵ９０４は、タッチパネル５０２上のタッチ位置が、例えば、表示画面に表示されているタッチボタンの表示領域から外れていると判別した場合などに、ステップＳ７０３の処理に移行せず、振動制御処理６を終了することもできる。

次いで、ＣＰＵ９０４は、図５５に示したように、例えば、タッチ位置と各振動アクチュエータ１１５ａ～１１５ｄとの直線距離を算出するなど、タッチ位置

と各振動アクチュエータ１１５ａ～１１５ｄとの位置関係を求める（ステップＳ７０３）。また、ＣＰＵ９０４は、タッチ位置と各振動アクチュエータ１１５ａ～１１５ｄとの位置関係や、振動アクチュエータ１１５ａ～１１５ｄが設置された液晶表示パネル５０１の材質、ダンパ５０３の弾性力などをパラメータとして用い、振動解析を行う。なお、タッチパネル５０２上の各タッチ位置に応じた振動解析の結果データをあらかじめメモリ９０２に格納しておき、この振動解析の結果データを利用する構成としてもよい。このような構成とすれば、タッチ位置に応じた振動解析をリアルタイムで演算処理する必要がない。そして、ＣＰＵ９０４は、各振動アクチュエータ１１５ａ～１１５ｄから発生させる振動波の相互干渉により、タッチ位置における振動の振幅が最も大きくなるように、各振動アクチュエータ１１５ａ～１１５ｄに印加する駆動信号の位相を算出する（ステップＳ７０４）。

この後、ＣＰＵ９０４は、各振動アクチュエータ１１５に印加する同一の駆動信号の波形データをメモリ９０２から読み出す（ステップＳ７０５）。次いで、ＣＰＵ９０４は、メモリ９０２から読み出した波形データと、上記ステップＳ７０４において算出した各振動アクチュエータ１１５ａ～１１５ｄ用の位相データを駆動信号生成回路９０３に出力する。また、これと同時にＣＰＵ９０４は、駆動信号生成回路９０３に対して駆動信号の生成を指示する（ステップＳ７０６）。駆動信号生成回路９０３は、ＣＰＵ９０４から供給された波形データおよび位相データを用いて各振動アクチュエータ１１５ａ～１１５ｄに印加する駆動信号を生成する。ステップＳ７０７以降の処理は、駆動する振動アクチュエータ１１５ａ～１１５ｄが複数である点を除いて、上記第１実施形態で説明した振動制御処理１（図５参照）のステップＳ１０４以降の処理と同様であるので説明を省略するが、この振動制御処理６により、各振動アクチュエータ１１５ａ～１１５ｄから上記ステップＳ７０４において算出された位相を有する振動波がタッチパネル５０２に与えられる。

以上説明したように本実施形態によれば、ＣＰＵ９０４は、各振動アクチュエータ１１５ａ～１１５ｄから発生させる振動波の相互干渉により、タッチパネル

５０２上のタッチ位置に生じる振動の振幅が最も大きくなるように、各振動アクチュエータ１１５ａ～１１５ｄに印加する駆動信号の位相を調整する。したがって、ＡＴＭ９０は、各振動アクチュエータ１１５ａ～１１５ｄを効率的に駆動し、振動報知に要する電力消費を抑えつつ、より大きな振動をユーザの指先へ与えることができる。

なお、本実施形態では、各振動アクチュエータ１１５ａ～１１５ｄに印加する駆動信号の位相を調整する場合について説明した。しかしながら、位相以外に、例えば、駆動信号の振幅などを調整する構成としてもよい。また、振動アクチュエータの設置数は、４個に限定されるものではない。また、各振動アクチュエータは、例えば、タッチパネル５０２に設置されてもよいし、あるいは図２７に示したように液晶表示パネル５０１とタッチパネル５０２の間に挟み込まれるように設置されていてもよい。

また、例えば、タッチパネル５０２に指先が触れるときのタッチ面積程度の単位で、タッチパネル５０２の表面を区分し、各区分毎に、当該区分された領域がタッチ操作された場合に各振動アクチュエータ１１５ａ～１１５ｄに印加する駆動信号の位相データをあらかじめ算出しておき、この算出結果を記憶したデータテーブルをメモリ９０２に格納しておく構成としてもよい。このような構成とした場合、タッチ位置に基づいて各振動アクチュエータ１１５ａ～１１５ｄに印加する駆動信号の位相をリアルタイムで演算処理する必要がない。したがって、タッチ操作に対する振動報知の応答速度を向上させることができる。

また、図５９および図６０は、本実施形態の変形例に係るＡＴＭについて説明するための断面図である。この変形例に係るＡＴＭのタッチパネル５０２の表面には、高粘度の液体物質やゲル、あるいは細かい粒子状の物質を、変形可能な保護膜で覆った変形層５５０が積層されている。なお、この変形層５５０を構成する液体物質、ゲル、粒子状の物質および保護膜の色は、透明である。

このようなＡＴＭにおいて、振動アクチュエータ１１５ａ～１１５ｄを駆動すると、各振動アクチュエータ１１５ａ～１１５ｄから発生する振動により変形層５５０の表面に波が生じる。ＡＴＭのＣＰＵは、各振動アクチュエータ１１５ａ

～１１５ｄ毎に生じる波の相互干渉により、タッチ位置における変形層５５０の表面の高さが、非タッチ時よりも高くなるように各振動アクチュエータ１１５ａ～１１５ｄに印加する駆動信号の位相などを調整する。これにより、図５９に示すように、変形層５５０の表面においてタッチ位置の部分を隆起させることができる。

あるいは、逆に、ＡＴＭのＣＰＵは、各振動アクチュエータ１１５ａ～１１５ｄ毎に生じる波の相互干渉により、タッチ位置における変形層５５０の表面の高さが、非タッチ時よりも低くなるように各振動アクチュエータ１１５ａ～１１５ｄに印加する駆動信号の位相などを調整する。これにより、図６０に示すように、変形層５５０の表面においてタッチ位置の部分を沈降させることができる。

このように本変形例によれば、タッチ操作が受付けられたことを変形層５５０の層厚を変化させることで、ユーザに報知することができる。また、変形層５５０においてタッチ位置の表面部分を沈降させるように各振動アクチュエータ１１５ａ～１１５ｄの駆動制御を行うことで、タッチ操作を行っているユーザに対し、例えば、画面表示されているタッチボタンの押し込み感を与えることができる。

なお、この変形例においては、各振動アクチュエータ１１５ａ～１１５ｄから発生させる振動の振幅や波形形状、振動の方向なども位相とともに振動アクチュエータ１１５ａ～１１５ｄの駆動制御を行う上で重要な要素となる。このようなことから、例えば、タッチパネル５０２に指先で触れたときのタッチ面積程度の単位で、タッチパネル５０２の表面を区分し、各区分毎に、当該区分された領域がタッチ操作された場合に各振動アクチュエータ１１５ａ～１１５ｄに印加する駆動信号の波形データをあらかじめ算出しておき、この算出結果を記憶したデータテーブルをメモリに格納しておく構成とすることが望ましい。

［Ｌ：第１２実施形態］

本実施形態では、上記第１１実施形態と同様に複数の振動発生器を有し、タッチパネル上におけるタッチ位置に基づいて駆動する振動発生器を切り替える電子

機器について説明する。なお、本実施形態において、上記第１１実施形態と共通する部分については同一の符号を使用するものとする。また、第１１実施形態と共通する部分についてはその説明を省略するものとする。

［Ｌ－１：第１２実施形態の構成］

図６１は、本実施形態に係るＡＴＭについて説明するための図である。同図に示すように、タッチパネル５０２が重ねられた液晶表示パネル５０１の裏面には、その四隅に計４個の振動アクチュエータ１１５ａ～１１５ｄが設置されている。また、同図に示すように、タッチパネル５０２上のタッチ操作可能な領域は、複数の領域Ａ１～Ａ５に区分されている。本実施形態では、振動報知を行う場合に、タッチパネル５０２上におけるタッチ位置が領域Ａ１～Ａ５のうち、どの領域に含まれるのかに応じて、駆動する振動アクチュエータを振動アクチュエータ１１５ａ～１１５ｄの中から切り替える。

本実施形態に係るＡＴＭのハードウェア構成は、上記第１１実施形態において図５６に示したものと同様である。但し、メモリ９０２には、図６２に示す駆動先判定テーブル９０２ａが格納されている。同図に示すように、この駆動先判定テーブル９０２ａには、タッチパネル５０２上の各区分領域Ａ１～Ａ５毎に、当該区分領域をＸＹ座標値を用いて示したエリアデータと、この区分領域がタッチ操作された場合に駆動する振動アクチュエータの識別情報とが格納されている。なお、同図においては、振動アクチュエータの識別情報として、各振動アクチュエータ１１５ａ～１１５ｄに付した符号を用いている。

この駆動先判定テーブル９０２ａによれば、例えば、図６１に示したタッチパネル５０２上において領域Ａ１がタッチ操作された場合には、振動アクチュエータ１１５ａのみが駆動される。また、タッチパネル５０２上において領域Ａ５がタッチ操作された場合には、全ての振動アクチュエータ１１５ａ～１１５ｄが駆動される。

ＣＰＵ９０４は、タッチパネル５０２に対するタッチ操作を検知した場合に、そのタッチ位置を検出し、駆動先判定テーブル９０２ａを参照して駆動する振動アクチュエータを決定する。そして、ＣＰＵ９０４は、駆動信号生成回路９０３

を介して上記決定した振動アクチュエータを駆動してタッチパネル５０２および液晶表示パネル５０１を振動させる。

［Ｌ－２：第１２実施形態の動作］

図６３は、本実施形態に係るＡＴＭにおいて、ＣＰＵ９０４により実行される振動制御処理７の動作を説明するフローチャートである。この振動制御処理７は、タッチパネル５０２に対するタッチ操作が許可されている期間において、ＣＰＵ９０４により所定周期毎に実行される。

同図に示すように、まず、ＣＰＵ９０４は、タッチパネル５０２からタッチ信号が入力されたか否かを判別する（ステップＳ８０１）。ＣＰＵ９０４は、タッチ信号が入力されていないと判別した場合は、振動制御処理７を終了する。また、ＣＰＵ９０４は、タッチ信号が入力されたと判別した場合は、このタッチ信号に基づいてタッチパネル５０２上におけるタッチ位置（ＸＹ座標値）を特定する（ステップＳ８０２）。

次いで、ＣＰＵ９０４は、図６２に示した駆動先判定テーブル９０２ａを参照してタッチ位置が含まれる区分領域を特定し、駆動する振動アクチュエータを決定する（ステップＳ８０３）。この後、ＣＰＵ９０４は、決定した振動アクチュエータを駆動するための駆動信号の波形データをメモリ９０２から読み出す（ステップＳ８０４）。そして、ＣＰＵ９０４は、メモリ９０２から読み出した波形データと、上記ステップＳ８０３において決定した振動アクチュエータの識別情報を駆動信号生成回路９０３に出力する。また、これと同時にＣＰＵ９０４は、駆動信号生成回路９０３に対して駆動信号の生成を指示する（ステップＳ８０５）。なお、ステップＳ８０６以降の処理は、複数の振動アクチュエータ１１５ａ～１１５ｄのうち指定された振動アクチュエータのみを駆動する点を除いて、上記第１実施形態で説明した振動制御処理１（図５参照）のステップＳ１０４以降の処理と同様であるので説明を省略する。

以上説明したように本実施形態によれば、ＣＰＵ９０４は、タッチパネル５０２上におけるタッチ位置に応じて、駆動する振動アクチュエータを切り替える。

したがって、ＡＴＭは、タッチパネル５０２に対するタッチ位置に応じて各振動アクチュエータ１１５ａ～１１５ｄを効率的に駆動させることができる。

なお、本実施形態では、タッチパネル５０２上の領域をあらかじめ複数の領域に区分して、各区分領域毎に、当該区分領域がタッチ操作された場合に駆動する振動アクチュエータの識別情報をメモリ９０２に記憶しておく構成とした。しかしながら、例えば、タッチパネル５０２に対するタッチ操作を検知した場合に、そのタッチ位置を検出し、当該タッチ位置と各振動アクチュエータ１１５ａ～１１５ｄとの距離を算出して、一番近い振動アクチュエータを駆動する構成としてもよい。

［Ｍ：第１３実施形態］

本実施形態では、上記第１～第１２実施形態に用いて好適な振動発生器について説明する。なお、本実施形態における振動アクチュエータは、永久磁石を可動錘として用いており、電磁力により可動錘に直線的な往復運動を行わせて振動を発生させる、永久磁石可動型のリニア振動アクチュエータである。

［Ｍ－１：第１例］

図６４は、本実施形態の第１例に係る振動アクチュエータ９５０の内部構造を例示する断面図である。同図において、振動アクチュエータ９５０は、ケース９６１内部に、コイル９６２と、可動錘９６３（錘体）と、ブレーキ部材９６４と、スプリング９６６とを有する。なお、同図において、振動アクチュエータ９５０が振動を与える被振動体は、コイル９６２に対してケース９６１を挟んで対向する位置に設けられているものとする。また、ケース９６１は密閉されており、磁気シールドとして機能する。このような磁気シールドとしての機能をケース９６１に持たせるためには、例えば、ケース９６１を導電性物質で形成して接地または同電位とすること、あるいは、ケース９６１を透磁率の大きい磁性体で形成すればよい。

コイル９６２は、同図に示すように略円筒状の形状を有するコイルであって、ケース９６１に固定されている。振動アクチュエータ９５０を駆動する場合には

、このコイル９６２に対して交流電流（駆動信号）が印加される。

可動錘９６３は、コイル９６２の上部に位置しており、永久磁石によって形成された略円柱状の錘である。この可動錘９６３の下面には、コイル９６２の上端部が収まる円環状の凹部が形成されている。可動錘９６３は、ケース９６１内部に形成された空間に、図中、上下方向に直線的な往復運動が可能な状態で、スプリング９６６により支持されている。このスプリング９６６は、同図に示すように、一方の端が、被振動体に接するケース９６１（ベース部材）につなげられており、他方の端が可動錘９６３につなげられている。なお、スプリング９６６の代わりに、例えば、ひも状のゴムなど、弾性体を用いて構成された支持部材を使用してもよい。

この可動錘９６３は、コイル９６２に駆動信号が印加されると、このコイル９６２から発生する磁力により、図中、上下方向に直線的な往復運動を行う。この可動錘９６３の往復運動の反力として、スプリング９６６がつなげられたケース９６１部分に振動加速度が生じる。なお、スプリング９６６がつなげられたケース９６１部分には、可動錘９６３の往復運動に伴い、この往復運動の反力の他に、可動錘９６３からスプリング９６６を介して伝わる振動成分が加わるが、この振動アクチュエータ９５０における振動発生原理の基本は、可動錘９６３の往復運動の反力として生じた振動加速度を用いることにある。

ブレーキ部材９６４は、可動錘９６３の側面に常時接触しているブラシ９６５を有する。このブラシ９６５は、可動錘９６３の側面に対して適度な接触抵抗を与えるように設計されている。ここで、ブラシ９６５が可動錘９６３に与える接触抵抗は、コイル９６２に駆動信号が印加され、可動錘９６３が往復運動を行っている場合には、その往復運動の妨げにほとんどならない。一方、コイル９６２への駆動信号の印加が停止された場合には、上述した接触抵抗により可動錘９６３の往復運動が速やかに停止する。

すなわち、このブレーキ部材９６４は、コイル９６２への駆動信号の印加が停止されたときに、可動錘９６３の往復運動を速やかに停止させるためのブレーキとして作用する。なお、ブラシ９６５の代わりに、スポンジやウレタン、フェル

ト、ゴムなどで形成された部材を用いてもよい。

図６５～図６７は、ブレーキ部材９６４の配置例を示す平面図であり、図６４に示した断面図の図中上方から振動アクチュエータ９５０の内部を見た場合について示すものである。図６５は、３個のブレーキ部材９６４ａを可動錘９６３の周囲に１２０度間隔で配置した例を示すものである。また、図６６は、２個のブレーキ部材９６４ｂを可動錘９６３を挟んで対向配置した例を示すものである。また、図６７は、可動錘９６３の周囲を囲うように円筒状の１個のブレーキ部材９６４ｃを配置した例を示すものである。

ここで、例えば、ブレーキ部材９６４ａを可動錘９６３の周囲に１箇所だけ設けた場合、可動錘９６３には、このブレーキ部材９６４ａのブラシ９６５ａと接する１方向のみから接触抵抗が加わる。このため、往復運動時においては可動錘９６３の姿勢が崩れてしまい、振動アクチュエータ９５０から発生する振動の方向にブレが生じてしまう。また、駆動信号の印加停止時にも、可動錘９６３には一方向からブラシ９６５ａによる接触抵抗が加わるため、可動錘９６３の姿勢が崩れ、往復運動を速やかに停止することができない。また、駆動信号の印加停止時にも振動方向に大きなブレが生じてしまう。

以上のようなことから、図６５～図６７に示したように、ブラシ９６５ａ～９６５ｃの接触抵抗が可動錘９６３に対して周囲から均一に加わるようなブレーキ部材９６４ａ～９６４ｃの配置が必要となる。また、経年変化によるブラシ９６５ａ～９６５ｃの磨耗や、ブレーキ部材９６４ａ～９６４ｃの変形を抑止するためには、可動錘９６３の往復運動に支障をきたさない範囲で、可動錘９６３とブラシ９６５ａ～９６５ｃの接触面をなるべく広くとることが有効である。

このような可動錘９６３のブレーキ機構の無い振動アクチュエータは、例えば、図６８に示す期間Ｔ１の駆動信号の印加が停止された場合に、図６９に示すように可動錘９６３の往復運動がすぐには止まらず、不要な振動が残ってしまう。したがって、このような振動アクチュエータは、短時間のうちに振動の強弱をはっきりと示さなければならないクリック感などの操作感覚を振動刺激によりユーザに与えることができない。また、同様に、振動時と非振動時のメリハリをはっ

きりとつけることができない。

これに対して本実施形態の第１例によれば、振動アクチュエータ９５０は、図６８に示す駆動信号の印加が停止された場合に、図７０に示すように、可動錘９６３の往復運動がブレーキ部材９６４の接触抵抗により速やかに停止させられる。したがって、不要な振動が残らず、クリック感のような「かっちり」とした操作感覚を振動刺激によりユーザに与えることができる。また、振動時と非振動時のメリハリをはっきりとつけることができる。

［Ｍ－２：第２例］

図７１は、本実施形態の第２例に係る振動アクチュエータ９５１の内部構造を例示する断面図である。同図において、振動アクチュエータ９５１は、ケース９６１内部に、コイル９６２と、可動錘９６３と、スプリング９６６と、ブレーキ部材９７１と、ブレーキ用コイル９７２とを有する。なお、同図において被振動体は、コイル９６２に対してケース９６１を挟んで対向する位置に設けられている。また、ケース９６１、コイル９６２および可動錘９６３は、本実施形態の第１例と同じものであるため説明を省略する。

ブレーキ部材９７１は、表面がゴムで覆われたブレーキ面９７１ａとマグネット９７１ｂとを有する。また、このブレーキ部材９７１には、ブレーキ面９７１ａを可動錘９６３の側面に引き寄せるスプリング９７３が取り付けられている。ブレーキ部材９７１は、ブレーキ用コイル９７２に駆動信号が印加されていない期間において、スプリング９７３の力によりブレーキ面９７１ａが可動錘９６３の側面に押し付けられている。一方、ブレーキ用コイル９７２へ駆動信号が印加されている期間には、ブレーキ部材９７１は、マグネット９７１ｂがブレーキ用コイル９７２へ引き寄せられるので、ブレーキ面９７１ａが可動錘９６３の側面から離れる。なお、ブレーキ面９７１ａの表面には、ゴムの代わりに、スポンジやウレタン、フェルト、ブラシなどが取り付けられていてもよい。

図７２は、コイル９６２およびブレーキ用コイル９７２に駆動信号を印加するための回路構成を例示する図である。同図において、発振器９７４は、コイル９

６２を駆動するための駆動信号を発振する。この発振器９７４から発振される駆動信号の波形例を図７３に示す。同図に示すような交流波形がコイル９６２に印加されることで、可動錘９６３が往復運動を行う。また、ブレーキ制御回路９７５は、ブレーキ用コイル９７２へ印加する駆動信号を生成する。このブレーキ制御回路９７５は、発振器９７４から発振される駆動信号を監視し、図７４に示すように、発振器９７４から駆動信号が発振されている期間Ｔ２の間だけ、ブレーキ用コイル９７２へ方形波の駆動信号を出力する。

したがって、発振器９７４がコイル９６２へ駆動信号を印加している期間には、ブレーキ制御回路９７５からブレーキ用コイル９７２へ駆動信号が印加されるので、ブレーキ部材９７１のブレーキ面９７１ａが可動錘９６３の側面から離れる。また、この期間においては、発振器９７４からコイル９６２へ駆動信号が供給されているので、可動錘９６３は往復運動を行う。これに対して、発振器９７４からコイル９６２への駆動信号の印加が停止された場合には、ブレーキ制御回路９７５からブレーキ用コイル９７２への駆動信号の印加も停止される。したがって、ブレーキ部材９７１のブレーキ面９７１ａが可動錘９６３の側面に押し付けられ、可動錘９６３の往復運動を速やかに停止させる。よって、上述した本実施形態の第１例と同様の効果を奏する。

［Ｍ－３：第３例］

図７５は、本実施形態の第３例に係る振動アクチュエータ９５２の内部構造を例示する断面図である。同図において、振動アクチュエータ９５２は、ケース９６１内部に、コイル９６２と、可動錘９６３と、スプリング９６６とを有する。これらのコイル９６２、可動錘９６３およびスプリング９６６は、本実施形態の第１例と同じものである。また、同図において被振動体は、コイル９６２とケース９６１を挟んで対向する位置に、ケース９６１に接して設けられている。

次に、図７６は、コイル９６２に駆動信号を印加するための回路構成を例示する図である。同図に示す発振器９７４は、本実施形態の第２例と同じものであるため説明を省略する。制御回路９８１は、スイッチ回路９８２内の２箇所のスイ

ッチＳＷ１，ＳＷ２の切り換え制御を行う。この制御回路９８１は、発振器９７４から発振される駆動信号（図７３参照）を監視し、図７７に示すように、発振器９７４から駆動信号が発振されている期間Ｔ２の間だけ“Ｈｉ”レベルとなるＣＴＲＬ信号を出力する。スイッチ回路９８２のスイッチＳＷ１，ＳＷ２は、制御回路９８１から供給されるＣＴＲＬ信号が“Ｈｉ”レベルの場合に、発振器９７４とコイル９６２とを接続する。したがって、ＣＴＲＬ信号が“Ｈｉ”レベルの間、発振器９７４からコイル９６２へ駆動信号が印加され、可動錘９６３が往復運動を行う。

これに対して、制御回路９８１から供給されるＣＴＲＬ信号が“Ｌｏｗ”レベルになると、すなわち、発振器９７４からコイル９６２への駆動信号の印加が停止されると、スイッチ回路９８２のスイッチＳＷ１，ＳＷ２は、図７６に示すように接点を切り替え、コイル９６２を短絡する。したがって、電磁ブレーキ作用により、駆動信号の印加停止時に可動錘９６３の往復運動を速やかに停止させることができる。よって、上述した本実施形態の第１例と同様の効果を奏する。

以上説明した本実施形態の第１例～第３例に示した振動アクチュエータ９５０～９５２を、上記第１～第１２実施形態における電子機器の振動発生器として用いれば、ユーザに与える振動をより好適に制御することができる。

なぜならば、まず、第１に、これらの振動アクチュエータ９５０～９５２には、ブレーキ機構が備わっている。したがって、短時間のうちに振動の強弱をはっきりと示さなければならない、例えば、クリック感などの操作感覚をはっきりとユーザに与えることができる。

第２に、これらの振動アクチュエータ９５０～９５２は、リニア振動アクチュエータであるため、発生させる振動の方向精度が高い。また、第３に、これらの振動アクチュエータ９５０～９５２は、磁気シールドとして密閉されたケース９６１の内部にコイル９６２と可動錘９６３とを収容しているので、周囲の電子部品などから磁力の影響を受けない。したがって、振動アクチュエータ９５０～９５２から発生させる振動の方向にズレが生じたり、あるいは振動の振幅形状に歪みが生じることがない。以上の第２および第３の利点により、振動アクチュエー

タ９５０～９５２から発生させる振動を、より木目細やかに制御することが可能となる。よって、タッチパネルに対してタッチ操作が行われた場合や、薄型の操作キーの押下操作が行われた場合に、押し込み感やクリック感を振動刺激によりユーザに与えることができる。また、振動アクチュエータ９５０～９５２は、周囲の電子部品などに対して磁力による誤動作を生じさせることがない。

第４に、これらの振動アクチュエータ９５０～９５２は１パッケージ化されている。したがって、振動アクチュエータの部材を分離設置する場合と比較して、まず、永久磁石とコイルの取り付け精度の良し悪しがほとんど生じない。また、経年変化による永久磁石とコイルの設置精度の悪化が生じにくい。よって、振動アクチュエータ９５０～９５２から安定した精度で振動を発生させることができる。また、電子機器への組み込みが容易である。さらに、振動アクチュエータ９５０～９５２の設置された被振動部材（例えば、タッチパネルや液晶表示パネルなど）を支持する電子機器本体や筐体などの支持体が確実に固定されていない場合や、支持体の質量が被振動部材に対して十分に大きくない場合であっても、振動アクチュエータ９５０～９５２は、十分な大きさの振動を被振動部材に与えることができる。これは、特に、軽量の電子機器や携帯型の電子機器に用いた場合に好適である。

第５に、振動アクチュエータ９５０～９５２において、コイル９６２に可聴帯域の音声信号を印加することで、振動アクチュエータ９５０～９５２を発音源としても利用することができる。このように振動発生器と発音源とを兼用することができると、特に、小型電子機器において、構成部品の設置スペースを大幅に節約できる。

なお、本実施形態の第１例～第３例に示した振動アクチュエータ９５０～９５２は、防磁効果を有するケース１１５ａで密閉する構成としたが、このようなケース９６１で密閉されていなくてもよい。また、可動錘９６３を支持するスプリング９６６は、ケース９６１ではなく、直接、被振動体につながれていてもよい。

［N：変形例］

以上、本発明の実施形態について説明したが、この実施形態はあくまでも例示であり、本発明の趣旨から逸脱しない範囲で様々な変形が可能である。変形例としては、例えば以下のようなものが考えられる。

［変形例１］

上記第１実施形態において、メモリ１１２に複数種類の波形データを格納し、ＣＰＵ１１３は、複数種類の波形データのうち、あらかじめユーザからの操作入力により指定された波形データを読み出して振動アクチュエータ１１５を駆動する構成としてもよい。このような構成とすれば、報知の際に用いる振動の形態に、より多くのバリエーションを持たせることができる。例えば、振動時間、振動の大きさ、振動の強弱の周期などを任意に変更できる。

また、メモリ１１２には、駆動信号波形のサンプルデータが格納され、駆動信号生成回路１１４は、このサンプルデータをＤ／Ａ（Digital / Analog）変換することにより駆動信号を生成する構成としてもよい。

［変形例２］

上記第１～第３実施形態において、さらに、振動による報知機能の有効／無効をユーザが指定可能な構成としてもよい。この場合、ＣＰＵ１１３は、振動による報知機能を有効とするか、無効とするかをユーザに指定させるための画面表示を行う。ＣＰＵ１１３は、ユーザからの操作入力により有効あるいは無効が指定されると、その指定内容に応じてメモリ１１２内の振動フラグの値を「０」（無効）あるいは「１」（有効）にセットする。そして、ＣＰＵ１１３は、タッチパネル１０２や操作キー１０４ａ～１０４ｃからの操作入力を検知した場合に、振動フラグの値に応じて振動報知を行うか否かを決定する。

［変形例３］

例えば、図７８に示すように、照明設備本体と離れた場所に設置され、設備本体に操作指令を入力するための操作パネル９９０に対して本発明を適用してもよい。同図に示す操作パネル９９０は、例えば、室内の壁面に設置されるものである。この操作パネル９９０の裏面には、例えば、振動アクチュエータ１１５など

の振動発生器９９１が設けられている。また、図示を省略しているが、照明設備本体の制御を行う制御装置において、振動発生器９９１の駆動を含む振動報知の制御が行われる。

この操作パネル９９０の点灯／消灯キー９９２をユーザが指先で切り換えると、制御装置が振動発生器９９１を駆動して、点灯／消灯キー９９２に触れているユーザの指先に振動を与える。また、この照明設備は、照明の光量を明と暗の間で連続的に可変することができる。この照明の光量を制御装置へ指示するためのスライダスイッチ９９３をユーザが指先で操作すると、この操作により変更された照明の光量に応じた大きさの振動が、スライダスイッチ９９３を操作しているユーザの指先に与えられる。なお、スライダスイッチ９９３の代わりに、このスライダスイッチ９９３と同様の機能を有する図７９に示すダイアル型スイッチ９９４や、図８０に示すプラスキー９９５およびマイナスキー９９６を用いる構成であってもよい。

また、図８１に示すように、テレビやビデオのリモートコントローラなど、タッチパネルや表示部など持たない電子機器に対しても本発明が適用可能であることは勿論である。このような電子機器の場合、操作キーからの入力を受付けたことを、操作キーや筐体を振動させてユーザに報知する構成とすればよい。

［変形例４］

上記第１～第１２実施形態において、振動アクチュエータやバイブレータなどの振動発生器から発生させる振動の方向は、タッチパネルの表面や、操作キーの押下方向に対して垂直となる方向に限定されるものではない。また、振動アクチュエータに印加する駆動信号の周波数は、電子機器の筐体やタッチパネル、あるいはタッチパネルを具備した液晶表示パネルや振動アクチュエータ自身を共振させる周波数に限定されるものではない。同様に、バイブレータに印加する駆動電圧も、ＤＣモータの回転数を電子機器の筐体やタッチパネル、あるいはタッチパネルを具備した液晶表示パネルやバイブレータ自身の固有振動数と一致させる駆動電圧に限定されるものではない。

［変形例５］

上記第１～第１２実施形態において、振動発生器は、リニア振動アクチュエータや偏心錘を有するバイブレータに限定されるものではない。例えば、圧電素子を用いた振動発生器などを用いてもよい。

また、第２実施形態を除く各実施形態では、永久磁石を可動錘として用いたリニア振動アクチュエータについて説明した。ここで、可動錘に必要となるのは、振動を発生させるために必要となる適度な質量と、当該可動錘が往復運動を行うための運動力を得る機構である。上記各実施形態では、適度な質量および運動力を得る機構として永久磁石を用いた。しかしながら、この可動錘は、錘としての部材の一部に永久磁石が組み込まれている構成であってもよい。また、リニア振動アクチュエータのケース内部に永久磁石を固定し、コイルを可動錘として用いる形態であってもよい。また、ケース内部にコイルを固定し、別のコイルを可動錘として用いる形態であってもよい。当然、このような場合に、可動錘として用いるコイルに十分な質量がない場合は、適度な質量を有する錘の一部としてコイルを用いる構成とすればよい。さらに、リニア振動アクチュエータは、鉄心可動型のリニア振動アクチュエータであってもよい。

また、振動アクチュエータは、静電力を利用した、いわゆる静電型の振動アクチュエータであってもよい。図８２は、本変形例の第１例に係る静電型の振動アクチュエータ８００について説明するための図である。同図において振動アクチュエータ８００は、ケース８０１内部に、電極８０２が設けられた可動錘８０３（錘体）と、ケース８０１内壁に設けられた電極８０４と、スプリング８０５とを有する。なお、同図において被振動体は、電極８０４に対してケース８０１を挟んで対向する位置に設けられているものとする。

可動錘８０３は、円柱状の錘であって、その底面に円環状の電極８０２が設けられている。この可動錘８０３は、ケース８０１内部に形成された空間に、図中、上下方向に直線的な往復運動が可能な状態で、スプリング８０５により支持されている。このスプリング８０５は、同図に示すように、一方の端が、被振動体に接するケース８０１（ベース部材）につなげられており、他方の端が可動錘８０３につなげられている。なお、電極８０２を除く可動錘８０３は、適度な質量

を有する錘であればよい。また、電極８０２と対向するケース８０１の内壁面には、円環状の電極８０４が設けられている。

この電極８０４には、振動アクチュエータ８００の外部から、プラスまたはマイナスの定電位が当該振動アクチュエータ８００の駆動時に常時印加される。一方、可動錘８０３の電極８０２には、振動アクチュエータ８００の外部から、プラスとマイナスに交互に振れる交流電圧（駆動信号）が増幅器８１０を介して印加される。

ここで、電極８０２と電極８０３との電位が互いに同極、すなわち、プラスとプラスあるいはマイナスとマイナスになる場合は、同符合の電荷は互いに反発するという静電力の性質により、可動錘８０３が図中、上方向に移動する。一方、電極８０２と電極８０３との電位が互いに異極、すなわち、プラスとマイナスになる場合は、異符合の電荷は互いに吸引するという静電力の性質により、可動錘８０３が図中、下方向に移動する。

このように本変形例に係る振動アクチュエータ８００は、静電力により可動錘８０３が図中、上下方向に直線的な往復運動を行う。そして、この可動錘８０３の往復運動の反力として、スプリング８０５がつなげられたケース８０１部分に振動加速度が生じ、被振動体に振動が伝わる。なお、スプリング８０５がつなげられたケース８０１部分には、可動錘８０３の往復運動に伴い、この往復運動の反力の他に、可動錘８０３からスプリング８０５を介して伝わる振動成分が加わるが、この振動アクチュエータ８００における振動発生原理の基本は、上記第１実施形態で説明した振動アクチュエータ１１５などと同様に、可動錘８０３の往復運動の反力として生じた振動加速度を用いることにある。

また、図８３は、本変形例の第２例に係る静電型の振動アクチュエータ８５０について説明するための図である。同図に示すような構成としても、図８２に示した振動アクチュエータ８００と同様に、静電力により可動錘８１３が往復運動を行い、振動が発生する。また、この振動アクチュエータ８５０は、電極８１２ａと電極８１４ａ、電極８１２ｂと電極８１４ｂの計２対の対向電極を有し、一方の対向電極間が反発の状態にある場合は、他方の対向電極間が吸引の状態とな

る。したがって、図８２に示した振動アクチュエータ８００と比較して、可動錘８１３を往復運動させる静電力が倍となり、より大きな振動を発生させることができる。

なお、図８２および図８３に示した静電型の振動アクチュエータ８００，８５０に、さらに上記第１３実施形態の第１例および第２例で説明したブレーキ機構を組み込んでもよい。また、電極や駆動信号の波形形状などは、図８２および図８３に示したものに限定されるものではない。

［変形例６］

また、振動アクチュエータにおいて、可動錘を空中で往復運動可能に支持する支持部材は、スプリングやひも状のゴムなどに限定されるものではない。例えば、支持部材は、図８４に示すようなガイドレール９６７であってもよい。同図において、可動錘９６３ａには、中央部に図中、上下方向に貫通する穴が設けられている。ガイドレール９６７は、可動錘９６３ａの穴を貫通するようにして設けられており、その一端が被振動体の接するケース９６１に固定されている。このようなガイドレール９６７を用いても、コイル９６２ａから発生する磁力により可動錘９６３ａを空中で往復運動可能に支持することができる。また、このガイドレール９６７は、可動錘９６３ａの運動方向を限定し、直線的な往復運動を行わせる役割も担っている。

［変形例７］

上記第１～第１２実施形態において、振動発生器により振動させる操作部は、タッチパネルや操作キーに限定されるものではない。例えば、複数の操作キーを有するキーボード自体や、マウス、トラックパッド、タブレットなどの各種ポインティングディバイスであってもよい。また、光結合型、抵抗型、接触型、磁気結合型、容量結合型などの様々なタイプのタッチパネルを用いることができる。

［変形例８］

上記第１実施形態～第１２実施形態では、本発明をＰＤＡやＡＴＭに適用した場合について説明した。しかしながら、本発明は、例えば、携帯電話機、電子手帳、モバイル型コンピュータ、腕時計、電卓、電子機器のリモートコントローラ

などの各種携帯型電子機器に適用可能であることは勿論である。さらに、本発明は、据置型のコンピュータや、自動販売機、キャッシュレジスタ、カーナビゲーション装置、家電製品など、携帯性を有さない各種電子機器に対しても適用可能である。

なお、携帯性を有さない電子機器においては、当該電子機器をユーザが一方の手で把持しながら他方の手で操作入力を行うという使用形態は想定しにくい。したがって、このような電子機器において操作部以外の部位を振動させる場合には、操作時にユーザの体の一部が接触する、または接触するであろうと想定される筐体の一部分を振動させる構成とすればよい。

例えば、図８５は、本変形例に係るＡＴＭ１５０の外観を例示する斜視図である。同図において、ＡＴＭ１５０の操作卓１５１上には、透明のタッチパネル１５２が重ねられた液晶表示パネル１５３が開口部に臨んで設けられている。ユーザは、操作卓１５１の前に立って、タッチパネル１５２に対するタッチ操作を行う。なお、操作卓１５１上には、タッチパネル１５２の他に紙幣入出金口１５４や硬貨入出金口１５５が設けられている。また、ＡＴＭ１５０の正面上方の側面には、通帳挿入口１５６やカード挿入口１５７が設けられている。

このようなＡＴＭ１５０に対してユーザがタッチ操作を行う場合、タッチ操作を行う手とは異なるもう一方の手が、操作卓１５１の卓上領域１５１ａまたは卓上領域１５１ｂにおかれていることなどが想定できる。したがって、ＡＴＭ１５０の制御部は、タッチパネル１５２に対するタッチ操作の検知に応じて図示を省略した振動発生器を駆動し、卓上領域１５１ａまたは卓上領域１５１ｂを振動させる構成とすればよい。また、同様にユーザがタッチ操作を行っている場合、この操作卓１５１の手前に設けられた卓縁部材１５８に、ユーザの大腿部や胴体の一部分が接触していることが想定できる。したがって、ＡＴＭ１５０の制御部は、タッチパネル１５２に対するタッチ操作の検知に応じて、この卓縁部材１５８を振動させる構成とすればよい。

請 求 の 範 囲

1． 操作入力を受付ける操作部と、

当該電子機器の把持部に振動を与える振動発生器と、

前記操作部に対する操作入力が受付けられたことを検知した場合に、前記振動発生器から振動を発生させる振動制御手段と

を具備することを特徴とする電子機器。

2． 前記振動発生器は、

錘体と、

前記錘体を空中で往復運動可能に支持するとともに、前記把持部または前記把持部に接する当該振動発生器のベース部材につながれた支持部材と、

前記錘体に往復運動を行わせるための運動力を与える運動力発生手段と

を具備することを特徴とする請求項１に記載の電子機器。

3． 前記振動制御手段は、前記振動発生器を駆動して振動を発生させる場合に、この振動発生器または前記把持部を共振させる駆動信号を前記振動発生器に印加することを特徴とする請求項１に記載の電子機器。

4． 前記振動発生器は、回転軸に偏心錘を取り付けたモータであることを特徴とする請求項１に記載の電子機器。

5． 前記振動制御手段は、前記モータを回転させて振動を発生させる場合に、当該モータの回転数を、このモータまたは前記把持部が共振を起こす振動数と一致させることを特徴とする請求項４に記載の電子機器。

6． 前記振動制御手段は、前記モータの回転を停止させる場合に、前記偏心錘が同じ位置で停止するように前記モータの回転を停止させることを特徴とする請

求項４または５に記載の電子機器。

７． 操作入力に応じて振動報知を行うか否かを指定する指定手段をさらに具備し、

前記振動制御手段は、前記指定手段により振動報知を行うことが指定されている場合に、操作入力の検知に応じて前記振動発生器から振動を発生させることを特徴とする請求項１に記載の電子機器。

８． 操作入力を受付ける操作部と、

前記操作部に振動を与える振動発生器と、

前記操作部に対する操作入力が受付けられたことを検知した場合に、前記振動発生器から振動を発生させる振動制御手段とを具備し、

前記振動発生器は、

錘体と、

前記錘体を空中で往復運動可能に支持するとともに、前記操作部または前記操作部に接する当該振動発生器のベース部材につながれた支持部材と、

前記錘体に往復運動を行わせるための運動力を与える運動力発生手段とを具備する

ことを特徴とする電子機器。

９． 前記振動発生器は、前記操作部に対する操作入力時の操作者の接触方向およびその反対方向に前記操作部を振動させることを特徴とする請求項８に記載の電子機器。

１０． 前記振動制御手段は、前記操作部に対する操作入力が受付けられたことを検知した後、１秒以下の所定期間、前記振動発生器から振動を発生させることを特徴とする請求項８に記載の電子機器。

１１．　前記振動制御手段は、前記振動発生器を駆動して振動を発生させる場合に、この振動発生器または前記操作部を共振させる駆動信号を前記振動発生器に印加することを特徴とする請求項８または１０に記載の電子機器。

１２．　前記操作部はタッチパネルであって、

前記振動発生器は、前記タッチパネルあるいは前記タッチパネルが具備された表示手段を振動させることを特徴とする請求項８～１１のいずれか１の請求項に記載の電子機器。

１３．　前記操作部は操作子を有し、

前記振動発生器は前記操作子を振動させることを特徴とする請求項８～１１のいずれか１の請求項に記載の電子機器。

１４．　操作入力に応じて振動報知を行うか否かを指定する指定手段をさらに具備し、

前記振動制御手段は、前記指定手段により振動報知を行うことが指定されている場合に、操作入力の検知に応じて前記振動発生器から振動を発生させることを特徴とする請求項８に記載の電子機器。

１５．　操作入力を受付ける操作部と、

操作者に振動を与える振動発生器と、

前記操作部に対する操作入力によって指示された処理の実行が終了したことを検知した場合に、前記振動発生器から振動を発生させる振動制御手段と

を具備することを特徴とする電子機器。

１６．　前記振動制御手段は、前記処理の実行結果に応じて前記振動発生器の振動形態を切り替えることを特徴とする請求項１５に記載の電子機器。

１７．　前記振動発生器は、前記操作部または当該電子機器の把持部に振動を与えることを特徴とする請求項１５または１６に記載の電子機器。

１８．　前記振動発生器は、前記操作部に振動を与えるものであり、当該振動発生器は、

錘体と、

前記錘体を空中で往復運動可能に支持するとともに、前記操作部または前記操作部に接する当該振動発生器のベース部材につながれた支持部材と、

前記錘体に往復運動を行わせるための運動力を与える運動力発生手段と

を具備することを特徴とする請求項１５または１６に記載の電子機器。

１９．　前記振動発生器は、当該電子機器の把持部に振動を与えるものであり、当該振動発生器は、

錘体と、

前記錘体を空中で往復運動可能に支持するとともに、前記把持部または前記把持部に接する当該振動発生器のベース部材につながれた支持部材と、

前記錘体に往復運動を行わせるための運動力を与える運動力発生手段と

を具備することを特徴とする請求項１５または１６に記載の電子機器。

２０．　前記振動発生器は、前記操作部または当該電子機器の把持部に振動を与え、

前記振動制御手段は、前記振動発生器を駆動して振動を発生させる場合に、この振動発生器、前記操作部および前記把持部のいずれかを共振させる駆動信号を前記振動発生器に印加することを特徴とする請求項１５または１６に記載の電子機器。

２１．　操作入力を受付ける操作部と、

前記操作部に振動を与える第１の振動発生器と、

当該電子機器の把持部に振動を与える第２の振動発生器と、

前記操作部に対する操作入力が受付けられたことを検知した場合に、前記第１の振動発生器および前記第２の振動発生器のうち、あらかじめ操作者により指定されたいずれか一方以上から振動を発生させる振動制御手段と

を具備することを特徴とする電子機器。

２２．　操作入力を受付ける操作部と、

前記操作部に振動を与える第１の振動発生器と、

当該電子機器の把持部に振動を与える第２の振動発生器と、

当該電子機器が操作者により把持されているか否かを検知する検知手段と、

前記操作部に対する操作入力が受付けられたことを検知した場合に、前記第１の振動発生器および前記第２の振動発生器のうち、前記検知手段による検知結果に応じていずれか一方以上を選択し、当該選択された振動発生器から振動を発生させる振動制御手段と

を具備することを特徴とする電子機器。

２３．　前記振動制御手段は、前記操作部に対する操作入力が受付けられたことを検知した場合に、前記検知手段により当該電子機器が操作者に把持されていないことが検知された場合は、前記第１の振動発生器のみから振動を発生させることを特徴とする請求項２２に記載の電子機器。

２４．　前記第１の振動発生器は、

錘体と、

前記錘体を空中で往復運動可能に支持するとともに、前記操作部または前記操作部に接する当該振動発生器のベース部材につながれた支持部材と、

前記錘体に往復運動を行わせるための運動力を与える運動力発生手段と

を具備することを特徴とする請求項２１または２２に記載の電子機器。

２５．　前記第２の振動発生器は、

錘体と、

前記錘体を空中で往復運動可能に支持するとともに、前記把持部または前記把持部に接する当該振動発生器のベース部材につながれた支持部材と、

前記錘体に往復運動を行わせるための運動力を与える運動力発生手段と

を具備することを特徴とする請求項２１または２２に記載の電子機器。

２６．　前記振動発生器は、

前記運動力発生手段から発生させた運動力により前記錘体に往復運動を行わせ、当該往復運動の反力として前記操作部に振動加速度を生じさせる、あるいは前記往復運動の反力として前記ベース部材に生じた振動加速度を前記操作部に与えることを特徴とする請求項８、１８、および２４のいずれか１の請求項に記載の電子機器。

２７．　前記振動発生器は、

前記運動力発生手段から発生させた運動力により前記錘体に往復運動を行わせ、当該往復運動の反力として前記把持部に振動加速度を生じさせる、あるいは前記往復運動の反力として前記ベース部材に生じた振動加速度を前記把持部に与えることを特徴とする請求項２、１９および２５のいずれか１の請求項に記載の電子機器。

２８．　前記支持部材は、弾性体を用いて構成されており、一方の端が前記操作部または前記ベース部材につながれ、他方の端が前記錘体につながれていることを特徴とする請求項８、１８、および２４のいずれか１の請求項に記載の電子機器。

２９．　前記支持部材は、弾性体を用いて構成されており、一方の端が前記把持部または前記ベース部材につながれ、他方の端が前記錘体につながれていること

を特徴とする請求項２、１９および２５のいずれか１の請求項に記載の電子機器。

３０．　前記振動発生器は、前記錘体に直線的な往復運動を行わせるための前記錘体のガイド機構をさらに具備することを特徴とする請求項２、８、１８、１９、２４および２５のいずれか１の請求項に記載の電子機器。

３１．　前記運動力発生手段は、前記運動力として磁力を発生させることを特徴とする請求項２、８、１８、１９、２４および２５のいずれか１の請求項に記載の電子機器。

３２．　前記運動力発生手段は、前記運動力として静電力を発生させることを特徴とする請求項２、８、１８、１９、２４および２５のいずれか１の請求項に記載の電子機器。

３３．　前記振動発生器は、前記錘体に直線的な往復運動を行わせるものであって、往復運動を行う前記錘体の、往復運動の方向と平行な側面に常時接触し、前記錘体に接触抵抗を与える抵抗付与部材をさらに具備することを特徴とする請求項２、８、１８、１９、２４および２５のいずれか１の請求項に記載の電子機器。

３４．　前記振動発生器は、

前記運動力発生手段からの運動力の発生が停止したときに、前記錘体に接触して当該錘体の往復運動を停止させるブレーキ手段をさらに具備することを特徴とする請求項２、８、１８、１９、２４、２５および３０のいずれか１の請求項に記載の電子機器。

３５．　前記振動発生器は、

前記運動力発生手段として磁力を発生させるコイルを具備し、

前記電子機器は、

前記コイルに対して電流の供給を停止したときに、前記コイルの入力端を短絡させる短絡手段をさらに具備することを特徴とする請求項２、８、１８、１９、２４、２５および３０のいずれか１の請求項に記載の電子機器。

３６．　前記運動力発生手段は、前記運動力として磁力を発生させるものであり、

前記振動発生器は、防磁効果を有するケースで密閉された空間に、前記錘体、前記支持部材および前記運動力発生手段を収容していることを特徴とする請求項２、８、１８、１９、２４および２５のいずれか１の請求項に記載の電子機器。

３７．　前記運動力発生手段は、前記運動力として磁力を発生させるものであり、

前記錘体は、永久磁石を用いて構成されていることを特徴とする請求項２、８、１８、１９、２４および２５のいずれか１の請求項に記載の電子機器。

３８．　タッチパネルが重ねられた表示パネルと、

前記表示パネルに設置された振動発生器と、

前記振動発生器から発生する振動により前記表示パネルを振動可能に支持する、弾性体を用いて構成された弾性部材と、

前記タッチパネルに対するタッチ操作が受付けられたことを検知した場合に、前記振動発生器から振動を発生させる振動制御手段とを具備し、

前記振動発生器は、

錘体と、

前記錘体を空中で往復運動可能に支持するとともに、前記表示パネルまたは前記表示パネルに接する当該振動発生器のベース部材につながれた支持部材と、

前記錘体に往復運動を行わせるための運動力を与える運動力発生手段とを具備

する

ことを特徴とする電子機器。

３９．　前記表示パネルは、前記弾性部材を介して当該電子機器の筐体に取り付けられていることを特徴とする請求項３８に記載の電子機器。

４０．　前記表示パネルは、前記弾性部材を介して当該電子機器の本体装置に取り付けられていることを特徴とする請求項３８に記載の電子機器。

４１．　タッチパネルが重ねられた表示パネルと、

前記表示パネルを支持するとともに、前記表示パネルに振動を与える振動発生器と、

前記タッチパネルに対するタッチ操作が受付けられたことを検知した場合に、前記振動発生器から振動を発生させる振動制御手段とを具備し、

前記振動発生器は、

錘体と、

前記錘体を空中で往復運動可能に支持するとともに、前記表示パネルまたは前記表示パネルに接する当該振動発生器のベース部材につながれた支持部材と、

前記錘体に往復運動を行わせるための運動力を与える運動力発生手段とを具備する

ことを特徴とする電子機器。

４２．　前記表示パネルは、前記振動発生器を介して当該電子機器の筐体に取り付けられていることを特徴とする請求項４１に記載の電子機器。

４３．　前記表示パネルは、前記振動発生器を介して当該電子機器の本体装置に取り付けられていることを特徴とする請求項４１に記載の電子機器。

４４．　前記振動発生器は、

前記運動力発生手段から発生させた運動力により前記錘体に往復運動を行わせ、当該往復運動の反力として前記表示パネルに振動加速度を生じさせる、あるいは前記往復運動の反力として前記ベース部材に生じた振動加速度を前記表示パネルに与えることを特徴とする請求項３８または４１に記載の電子機器。

４５．　前記支持部材は、弾性体を用いて構成されており、一方の端が前記表示パネルまたは前記ベース部材につながれ、他方の端が前記錘体につながれていることを特徴とする請求項３８または４１に記載の電子機器。

４６．　前記振動発生器は、前記表示パネルを当該表示パネルの表面に対して垂直となる方向に振動させることを特徴とする請求項３８または４１に記載の電子機器。

４７．　前記振動制御手段は、前記タッチパネルに対するタッチ操作が受付けられたことを検知した後、１秒以下の所定期間、前記振動発生器から振動を発生させることを特徴とする請求項３８または４１に記載の電子機器。

４８．　前記振動制御手段は、前記振動発生器を駆動して振動を発生させる場合に、この振動発生器または前記表示パネルを共振させる駆動信号を前記振動発生器に印加することを特徴とする請求項３８、４１および４７のいずれか１の請求項に記載の電子機器。

４９．　ディスプレイと、

前記ディスプレイの表示画面を覆うタッチパネルと、

前記ディスプレイと前記タッチパネルとの間に設けられ、前記タッチパネルを前記表示画面上に支持するとともに、前記タッチパネルに振動を与える振動発生器と、

前記タッチパネルに対するタッチ操作が受付けられたことを検知した場合に、前記振動発生器から振動を発生させる振動制御手段と

を具備することを特徴とする電子機器。

５０．　ディスプレイと、

前記ディスプレイの表示画面を覆うタッチパネルと、

前記タッチパネルに設置され、当該タッチパネルに振動を与える振動発生器と、

前記ディスプレイと前記タッチパネルとの間に設けられ、前記振動発生器から発生した振動のうち、前記ディスプレイに伝わろうとする振動成分を吸収する振動吸収部材と、

前記タッチパネルに対するタッチ操作が受付けられたことを検知した場合に、前記振動発生器から振動を発生させる振動制御手段と

を具備することを特徴とする電子機器。

５１．　前記振動発生器は、

錘体と、

前記錘体を空中で往復運動可能に支持するとともに、前記タッチパネルまたは前記タッチパネルに接する当該振動発生器のベース部材につながれた支持部材と、

前記錘体に往復運動を行わせるための運動力を与える運動力発生手段と

を具備することを特徴とする請求項４９または５０に記載の電子機器。

５２．　前記振動発生器は、

前記運動力発生手段から発生させた運動力により前記錘体に往復運動を行わせ、当該往復運動の反力として前記タッチパネルに振動加速度を生じさせる、あるいは前記往復運動の反力として前記ベース部材に生じた振動加速度を前記タッチパネルに与えることを特徴とする請求項３８または４１に記載の電子機器。

５３．　前記支持部材は、弾性体を用いて構成されており、一方の端が前記タッチパネルまたは前記ベース部材につながれ、他方の端が前記錘体につながれていることを特徴とする請求項５１に記載の電子機器。

５４．　前記振動吸収部材に弾性体を用いていることを特徴とする請求項５０に記載の電子機器。

５５．　前記振動吸収部材は、前記表示画面と重ならない位置に設けられていることを特徴とする請求項５０または５４に記載の電子機器。

５６．　前記振動発生器は、前記表示画面と重ならない位置に設けられていることを特徴とする請求項４９または５０に記載の電子機器。

５７．　前記振動発生器は、前記タッチパネルを当該タッチパネルの表面に対して垂直となる方向に振動させることを特徴とする請求項４９～５２および５６のいずれか１の請求項に記載の電子機器。

５８．　前記振動制御手段は、前記タッチパネルに対するタッチ操作が受付けられたことを検知した後、１秒以下の所定期間、前記振動発生器から振動を発生させることを特徴とする請求項４９または５０に記載の電子機器。

５９．　前記振動制御手段は、前記振動発生器を駆動して振動を発生させる場合に、この振動発生器または前記タッチパネルを共振させる駆動信号を前記振動発生器に印加することを特徴とする請求項４９、５０および５８のいずれか１の請求項に記載の電子機器。

６０．　操作入力を受付ける操作部と、

少なくともその一部が当該電子機器の筐体から外部に露出して設けられ、操作者に直接振動を与える振動発生器と、

前記操作部に対する操作入力が受付けられたことを検知した場合に、前記振動発生器から振動を発生させる振動制御手段と

を具備することを特徴とする電子機器。

６１．　操作入力を受付ける操作部と、

前記操作部とは異なる当該電子機器の筐体の一部に振動を与える振動発生器と、

前記操作部に対する操作入力が受付けられたことを検知した場合に、その操作入力の種類を特定し、当該操作入力の種類に対応付けられた振動形態で前記振動発生器から振動を発生させる振動制御手段と

を具備することを特徴とする電子機器。

６２．　前記操作部はタッチパネルであって、

前記振動制御手段は、前記タッチパネルに対するタッチ操作が受付けられたことを検知した場合に、前記タッチパネルにおける前記タッチ操作のタッチ位置を検出し、当該タッチ位置に対応付けられた振動形態で前記振動発生器から振動を発生させることを特徴とする請求項６１に記載の電子機器。

６３．　前記操作部は操作子を複数有し、

前記振動制御手段は、前記操作部に対する操作入力が受付けられたことを検知した場合に、操作された前記操作子の種類を特定し、当該操作子の種類に対応付けられた振動形態で前記振動発生器から振動を発生させることを特徴とする請求項６１に記載の電子機器。

６４．　前記振動制御手段は、前記操作部に対する操作入力が受付けられたことを検知した場合に、その操作入力が指示する指令の種類を特定し、当該指令の種

類に対応付けられた振動形態で前記振動発生器から振動を発生させることを特徴とする請求項６１に記載の電子機器。

６５．　操作入力を受付ける操作部と、

前記操作部と異なる当該電子機器の筐体の一部に振動を与える振動発生器と、

前記操作部に対する操作入力に応じて当該電子機器を制御するためのパラメータ値を変更する変更手段と、

前記操作部に対して前記パラメータ値を変更する操作入力が受付けられたことを検知した場合に、当該操作入力によって前記変更手段により変更されたパラメータ値に対応付けられた振動形態で前記振動発生器から振動を発生させる振動制御手段と

を具備することを特徴とする電子機器。

６６．　前記振動発生器は、

錘体と、

前記錘体を空中で往復運動可能に支持するとともに、前記筐体の一部または前記筐体の一部に接する当該振動発生器のベース部材につながれた支持部材と、

前記錘体に往復運動を行わせるための運動力を与える運動力発生手段と

を具備することを特徴とする請求項６１または６５に記載の電子機器。

６７．　前記振動発生器は、

前記運動力発生手段から発生させた運動力により前記錘体に往復運動を行わせ、当該往復運動の反力として前記筐体の一部に振動加速度を生じさせる、あるいは前記往復運動の反力として前記ベース部材に生じた振動加速度を前記筐体の一部に与えることを特徴とする請求項６６に記載の電子機器。

６８．　前記支持部材は、弾性体を用いて構成されており、一方の端が前記筐体の一部または前記ベース部材につながれ、他方の端が前記錘体につながれている

ことを特徴とする請求項６６に記載の電子機器。

６９．　前記振動制御手段は、前記振動発生器を駆動して振動を発生させる場合に、この振動発生器または前記筐体の一部を共振させる駆動信号を前記振動発生器に印加することを特徴とする請求項６１～６５のいずれか１の請求項に記載の電子機器。

７０．　操作入力を受付ける操作部と、

前記操作部に振動を与える振動発生器と、

前記操作部に対する操作入力が受付けられたことを検知した場合に、その操作入力の種類を特定し、当該操作入力の種類に対応付けられた振動形態で前記振動発生器から振動を発生させる振動制御手段とを具備し、

前記振動発生器は、

錘体と、

前記錘体を空中で往復運動可能に支持するとともに、前記操作部または前記操作部に接する当該振動発生器のベース部材につながれた支持部材と、

前記錘体に往復運動を行わせるための運動力を与える運動力発生手段とを具備する

ことを特徴とする電子機器。

７１．　前記操作部はタッチパネルであって、

前記振動制御手段は、前記タッチパネルに対するタッチ操作が受付けられたことを検知した場合に、前記タッチパネルにおける前記タッチ操作のタッチ位置を検出し、当該タッチ位置に対応付けられた振動形態で前記振動発生器から振動を発生させることを特徴とする請求項７０に記載の電子機器。

７２．　前記操作部は操作子を複数有し、

前記振動制御手段は、前記操作部に対する操作入力が受付けられたことを検知

した場合に、操作された前記操作子の種類を特定し、当該操作子の種類に対応付けられた振動形態で前記振動発生器から振動を発生させることを特徴とする請求項７０に記載の電子機器。

７３．　前記振動制御手段は、前記操作部に対する操作入力が受付けられたことを検知した場合に、その操作入力が指示する指令の種類を特定し、当該指令の種類に対応付けられた振動形態で前記振動発生器から振動を発生させることを特徴とする請求項７０に記載の電子機器。

７４．　操作入力を受付ける操作部と、

前記操作部に振動を与える振動発生器と、

前記操作部に対する操作入力に応じて当該電子機器を制御するためのパラメータ値を変更する変更手段と、

前記操作部に対して前記パラメータ値を変更する操作入力が受付けられたことを検知した場合に、当該操作入力によって前記変更手段により変更されたパラメータ値に対応付けられた振動形態で前記振動発生器から振動を発生させる振動制御手段とを具備し、

前記振動発生器は、

錘体と、

前記錘体を空中で往復運動可能に支持するとともに、前記操作部または前記操作部に接する当該振動発生器のベース部材につながれた支持部材と、

前記錘体に往復運動を行わせるための運動力を与える運動力発生手段とを具備する

ことを特徴とする電子機器。

７５．　前記振動発生器は、

前記運動力発生手段から発生させた運動力により前記錘体に往復運動を行わせ、当該往復運動の反力として前記操作部に振動加速度を生じさせる、あるいは前

記往復運動の反力として前記ベース部材に生じた振動加速度を前記操作部に与えることを特徴とする請求項７０または７４に記載の電子機器。

７６．　前記支持部材は、弾性体を用いて構成されており、一方の端が前記操作部または前記ベース部材につながれ、他方の端が前記錘体につながれていることを特徴とする請求項７０または７４に記載の電子機器。

７７．　前記振動発生器は、前記操作部に対する操作入力時の操作者の接触方向およびその反対方向に前記操作部を振動させることを特徴とする請求項７０～７４のいずれか１の請求項に記載の電子機器。

７８．　前記振動制御手段は、前記操作部に対する操作入力が受付けられたことを検知した後、１秒以下の所定期間、前記振動発生器から振動を発生させることを特徴とする請求項７０～７４のいずれか１の請求項に記載の電子機器。

７９．　前記振動制御手段は、前記振動発生器を駆動して振動を発生させる場合に、この振動発生器または前記操作部を共振させる駆動信号を前記振動発生器に印加することを特徴とする請求項７０～７４および７８のいずれか１の請求項に記載の電子機器。

８０．　当該電子機器を制御するためのパラメータ値を連続的に変化させる操作子と、

操作者に振動を与える振動発生器と、

前記操作子の操作量に基づいて前記パラメータ値を変更する変更手段と、

前記操作子の操作が受付けられたことを検知した場合に、当該操作によって前記変更手段により変更されたパラメータ値に対応付けられた振動形態で前記振動発生器から振動を発生させる振動制御手段と

を具備することを特徴とする電子機器。

８１．　操作入力を受付けるとともに、当該操作入力の押圧レベルを検知する操作部と、

操作者に振動を与える振動発生器と、

前記操作部に対する操作入力が受付けられたことを検知した場合に、前記操作部により検知された当該操作入力の押圧レベルに対応付けられた振動形態で前記振動発生器から振動を発生させる振動制御手段と

を具備することを特徴とする電子機器。

８２．　前記操作部は、操作者の指先または操作具が当該操作部に接触したことと、前記指先または操作具が当該操作部を所定の押圧レベル以上の力で押圧したことを異なる押圧レベルとして検知することを特徴とする請求項８１に記載の電子機器。

８３．　前記操作部はタッチパネルであることを特徴とする請求項８１または８２に記載の電子機器。

８４．　前記操作部は、操作者の指先または操作具が当該操作部に接触したことを検知してタッチ操作として受付ける第１のタッチパネルと、前記指先または操作具が当該操作部を所定の押圧レベル以上の力で押圧したことを検知してタッチ操作として受付ける第２のタッチパネルと、を重ね合わせたものであることを特徴とする請求項８１に記載の電子機器。

８５．　操作入力を受付ける操作部と、

操作者に報知音を与える発音手段と、

操作者に振動を与える振動発生器と、

前記操作部に対する操作入力が受付けられたことを検知した場合に、前記発音手段および前記振動発生器のうち、あらかじめ操作者により指定されたいずれか

一方以上を用いて操作入力が受付けられたことを操作者に報知する報知制御手段と

を具備することを特徴とする電子機器。

８６．　操作入力を受付ける操作部と、

操作者に報知音を与える発音手段と、

操作者に振動を与える振動発生器と、

当該電子機器の周囲の音量を測定する測定手段と、

前記操作部に対する操作入力が受付けられたことを検知した場合に、前記発音手段および前記振動発生器のうち、前記測定手段による測定結果に基づいていずれか一方以上を選択し、当該選択されたものを用いて操作入力が受付けられたことを操作者に報知する報知制御手段と

を具備することを特徴とする電子機器。

８７．　前記報知制御手段は、前記操作部に対する操作入力が受付けられたことを検知した場合に、前記測定手段により測定された音量があらかじめ設定された音量以上である場合は、少なくとも前記振動発生器を用いて操作入力が受付けられたことを操作者に報知することを特徴とする請求項８６記載の電子機器。

８８．　操作入力を受付ける操作部と、

操作者に報知音を与える発音手段と、

操作者に振動を与える振動発生器と、

当該電子機器が在圏しているエリアをカバーする基地局から、前記発音手段または前記振動発生器のいずれか一方以上を指定する信号を受信する受信手段と、

前記操作部に対する操作入力が受付けられたことを検知した場合に、前記受信手段により受信された信号が指定する前記発音手段または前記振動発生器のいずれか一方以上を用いて操作入力が受付けられたことを操作者に報知する報知制御手段と

を具備することを特徴とする電子機器。

８９．　操作入力を受付ける操作部と、

操作者に報知音を与える発音手段と、

操作者に振動を与える振動発生器と、

当該電子機器の位置情報を取得する取得手段と、

前記操作部に対する操作入力が受付けられたことを検知した場合に、前記発音手段および前記振動発生器のうち、前記取得手段により取得された位置情報に基づいていずれか一方以上を選択し、当該選択されたものを用いて操作入力が受付けられたことを操作者に報知する報知制御手段と

を具備することを特徴とする電子機器。

９０．　前記報知制御手段は、前記操作部に対する操作入力が受付けられたことを検知した場合に、前記取得手段により取得された位置情報に基づいて当該電子機器があらかじめ設定されたエリア内に位置している場合は、前記振動発生器のみを用いて操作入力が受付けられたことを操作者に報知することを特徴とする請求項８９記載の電子機器。

９１．　操作入力を受付ける操作部と、

操作者に振動を与えると同時に音を発生させることが可能な振動発生器と、

前記操作部に対する操作入力が受付けられたことを検知した場合に、前記振動発生器から振動とともに音を発生させる場合は、前記振動発生器を駆動して振動を発生させるための駆動信号と、前記振動発生器を駆動して音を発生させるための音声信号とを合成し、当該合成した信号を前記振動発生器に印加する駆動制御手段と

を具備することを特徴とする電子機器。

９２．　前記振動発生器は、当該電子機器を構成するいずれかの部材を振動させ

て操作者に振動を与えるものであり、当該振動発生器は、

錘体と、

前記錘体を空中で往復運動可能に支持するとともに、前記電子機器の被振動部材または前記被振動部材に接する当該振動発生器のベース部材につながれた支持部材と、

前記錘体に往復運動を行わせるための運動力を与える運動力発生手段と

を具備することを特徴とする請求項８０、８１、８５、８６、８８、８９および９１のいずれか１の請求項に記載の電子機器。

９３．　前記振動発生器は、

前記運動力発生手段から発生させた運動力により前記錘体に往復運動を行わせ、当該往復運動の反力として前記被振動部材に振動加速度を生じさせる、あるいは前記往復運動の反力として前記ベース部材に生じた振動加速度を前記被振動部材に与えることを特徴とする請求項９２に記載の電子機器。

９４．　前記支持部材は、弾性体を用いて構成されており、一方の端が前記被振動部材または前記ベース部材につながれ、他方の端が前記錘体につながれていることを特徴とする請求項９２に記載の電子機器。

９５．　タッチ操作を受付ける操作パネルと、

前記操作パネルに振動を与える複数の振動発生器と、

前記操作パネルにおけるタッチ位置を検出する検出手段と、

前記操作パネルに対するタッチ操作が受付けられたことを検知した場合に、前記検出手段により検出された前記タッチ操作のタッチ位置に基づいて前記複数の振動発生器のいずれか１以上を選択し、当該選択された振動発生器から振動を発生させる振動制御手段と

を具備することを特徴とする電子機器。

９６．　タッチ操作を受付ける操作パネルと、

前記操作パネルに振動を与える複数の振動発生器と、

前記操作パネルにおけるタッチ位置を検出する検出手段と、

前記操作パネルに対するタッチ操作が受付けられたことを検知した場合に、前記複数の振動発生器の各々から発生させる振動波の相互干渉によって、前記検出手段により検出された前記タッチ操作のタッチ位置に生じる振動の振幅が増幅されるように、前記複数の振動発生器の各々を駆動する駆動信号を生成する生成手段と、

前記生成手段により生成された各駆動信号を対応する前記振動発生器に印加し、当該各振動発生器から振動を発生させる振動制御手段と

を具備することを特徴とする電子機器。

９７．　前記生成手段は、前記操作パネルに対するタッチ操作が受付けられたことを検知した場合に、前記複数の振動発生器の各々から発生させる振動波の相互干渉によって、前記検出手段により検出された前記タッチ操作のタッチ位置に生じる振動の振幅が増幅されるように、前記複数の振動発生器の各々を駆動する駆動信号の位相を調整することを特徴とする請求項９６に記載の電子機器。

９８．　前記生成手段は、前記操作パネルに対するタッチ操作が受付けられたことを検知した場合に、前記複数の振動発生器の各々から発生させる振動波の相互干渉によって、前記検出手段により検出された前記タッチ操作のタッチ位置に生じる振動の振幅が最も大きくなるように、前記複数の振動発生器の各々を駆動する駆動信号を生成することを特徴とする請求項９６に記載の電子機器。

９９．　振動により変形可能な変形層が積層された操作パネルと、

前記操作パネルに振動を与える複数の振動発生器と、

前記操作パネルにおけるタッチ位置を検出する検出手段と、

前記操作パネルに対するタッチ操作が受付けられたことを検知した場合に、前

記複数の振動発生器の各々から発生させる振動波の相互干渉によって、前記検出手段により検出された前記タッチ操作のタッチ位置の前記変形層の層厚が非タッチ時と比較して薄くまたは厚くなるように、前記複数の振動発生器の各々を駆動する駆動信号を生成する生成手段と、

前記生成手段により生成された各駆動信号を対応する前記振動発生器に印加し、当該各振動発生器から振動を発生させる振動制御手段と

を具備することを特徴とする電子機器。

１００．　前記変形層は、液体、ゲルおよび粒子状の物質のいずれかを用いて構成されていることを特徴とする請求項９９に記載の電子機器。

１０１．　前記振動発生器は、

錘体と、

前記錘体を空中で往復運動可能に支持するとともに、前記操作パネルまたは前記操作パネルに接する当該振動発生器のベース部材につながれた支持部材と、

前記錘体に往復運動を行わせるための運動力を与える運動力発生手段と

を具備することを特徴とする請求項９５、９６および９９のいずれか１の請求項に記載の電子機器。

１０２．　前記振動発生器は、

前記運動力発生手段から発生させた運動力により前記錘体に往復運動を行わせ、当該往復運動の反力として前記操作パネルに振動加速度を生じさせる、あるいは前記往復運動の反力として前記ベース部材に生じた振動加速度を前記操作パネルに与えることを特徴とする請求項１０１に記載の電子機器。

１０３．　前記支持部材は、弾性体を用いて構成されており、一方の端が前記操作パネルまたは前記ベース部材につながれ、他方の端が前記錘体につながれていることを特徴とする請求項１０１に記載の電子機器。

１０４．　前記振動発生器は、前記錘体に直線的な往復運動を行わせるための前記錘体のガイド機構をさらに具備することを特徴とする請求項３８、４１、５１、６６、７０、７４、９２および１０１のいずれか１の請求項に記載の電子機器。

１０５．　前記運動力発生手段は、前記運動力として磁力を発生させることを特徴とする請求項３８、４１、５１、６６、７０、７４、９２および１０１のいずれか１の請求項に記載の電子機器。

１０６．　前記運動力発生手段は、前記運動力として静電力を発生させることを特徴とする請求項３８、４１、５１、６６、７０、７４、９２および１０１のいずれか１の請求項に記載の電子機器。

１０７．　前記振動発生器は、前記錘体に直線的な往復運動を行わせるものであって、往復運動を行う前記錘体の、往復運動の方向と平行な側面に常時接触し、前記錘体に接触抵抗を与える抵抗付与部材をさらに具備することを特徴とする請求項３８、４１、５１、６６、７０、７４、９２および１０１のいずれか１の請求項に記載の電子機器。

１０８．　前記振動発生器は、

前記運動力発生手段からの運動力の発生が停止したときに、前記錘体に接触して当該錘体の往復運動を停止させるブレーキ手段をさらに具備することを特徴とする請求項３８、４１、５１、６６、７０、７４、９２および１０１のいずれか１の請求項に記載の電子機器。

１０９．　前記振動発生器は、

前記運動力発生手段として磁力を発生させるコイルを具備し、

前記電子機器は、

前記コイルに対して電流の供給を停止したときに、前記コイルの入力端を短絡させる短絡手段をさらに具備することを特徴とする請求項３８、４１、５１、６６、７０、７４、９２および１０１のいずれか１の請求項に記載の電子機器。

１１０．　前記運動力発生手段は、前記運動力として磁力を発生させるものであり、

前記振動発生器は、防磁効果を有するケースで密閉された空間に、前記錘体、前記支持部材および前記運動力発生手段を収容していることを特徴とする請求項３８、４１、５１、６６、７０、７４、９２および１０１のいずれか１の請求項に記載の電子機器。

１１１．　前記運動力発生手段は、前記運動力として磁力を発生させるものであり、

前記錘体は、永久磁石を用いて構成されていることを特徴とする請求項３８、４１、５１、６６、７０、７４、９２および１０１のいずれか１の請求項に記載の電子機器。

１１２．　錘体と、

前記錘体を空中で直線的な往復運動を可能に支持するとともに、当該振動発生器が振動を与える被振動体または前記被振動体に接する当該振動発生器のベース部材につながれた支持部材と、

前記錘体に往復運動を行わせるための運動力を与える運動力発生手段と、

前記運動力発生手段から発生させた運動力により直線的な往復運動を行う前記錘体の、往復運動の方向と平行な側面に常時接触し、前記錘体に接触抵抗を与える抵抗付与部材と

を具備することを特徴とする振動発生器。

１１３．　前記抵抗付与部材は、前記錘体の、往復運動の方向と平行な全側面を

取り囲んでいることを特徴とする請求項１１２記載の振動発生器。

１１４．　前記抵抗付与部材は、前記錘体の、往復運動の方向と平行な全側面を取り囲むように等間隔で複数設けられていることを特徴とする請求項１１２記載の振動発生器。

１１５．　錘体と、

前記錘体を空中で往復運動可能に支持するとともに、当該振動発生器が振動を与える被振動体または前記被振動体に接する当該振動発生器のベース部材につながれた支持部材と、

前記錘体に往復運動を行わせるための運動力を与える運動力発生手段と、

前記運動力発生手段からの運動力の発生が停止したときに、前記錘体に接触して当該錘体の往復運動を停止させるブレーキ手段と

を具備することを特徴とする振動発生器。

１１６．　前記錘体に直線的な往復運動を行わせるための前記錘体のガイド機構をさらに具備することを特徴とする請求項１１５に記載の振動発生器。

１１７．　前記運動力発生手段から発生させた運動力により前記錘体に往復運動を行わせ、当該往復運動の反力として前記被振動体に振動加速度を生じさせる、あるいは前記往復運動の反力として前記ベース部材に生じた振動加速度を前記被振動体に与えることを特徴とする請求項１１２または１１５に記載の振動発生器。

１１８．　前記支持部材は、弾性体を用いて構成されており、一方の端が前記被振動体または前記ベース部材につながれ、他方の端が前記錘体につながれていることを特徴とする請求項１１２または１１５に記載の振動発生器。

１１９．　前記運動力発生手段は、前記運動力として磁力を発生させることを特徴とする請求項１１２または１１５に記載の振動発生器。

１２０．　前記運動力発生手段は、前記運動力として静電力を発生させることを特徴とする請求項１１２または１１５に記載の振動発生器。

１２１．　前記運動力発生手段は、前記運動力として磁力を発生させるものであり、

前記錘体は、永久磁石を用いて構成されていることを特徴とする請求項１１２または１１５に記載の振動発生器。

１２２．　電子機器における振動による報知方法であって、

操作部に対する操作入力が受付けられたことを検知した場合に、この電子機器に具備された振動発生器から振動を発生させて当該電子機器の把持部を振動させる

ことを特徴とする振動による報知方法。

１２３．　電子機器における振動による報知方法であって、

操作部に対する操作入力が受付けられたことを検知した場合に、この電子機器に具備された振動発生器を駆動して、当該振動発生器において、前記操作部または前記操作部に接する当該振動発生器のベース部材につながれた支持部材により空中で往復運動可能に支持された錘体に往復運動を行わせることで、前記操作部を振動させる

ことを特徴とする振動による報知方法。

１２４．　電子機器における振動による報知方法であって、

操作部に対する操作入力によって指示された処理の実行が終了したことを検知した場合に、この電子機器に具備された振動発生器から振動を発生させて操作者

に振動を与える

ことを特徴とする振動による報知方法。

１２５．　電子機器における振動による報知方法であって、

操作部に対する操作入力が受付けられたことを検知した場合に、この電子機器に具備された、前記操作部に振動を与える第１の振動発生器および当該電子機器の把持部に振動を与える第２の振動発生器のうち、あらかじめ操作者により指定されたいずれか一方以上から振動を発生させて操作者に振動を与える

ことを特徴とする振動による報知方法。

１２６．　電子機器における振動による報知方法であって、

操作部に対する操作入力が受付けられたことを検知した場合に、この電子機器に具備された、前記操作部に振動を与える第１の振動発生器および当該電子機器の把持部に振動を与える第２の振動発生器のうち、当該電子機器が操作者により把持されているか否かを検知するセンサの検知結果に応じていずれか一方以上を選択し、当該選択された振動発生器から振動を発生させて操作者に振動を与える

ことを特徴とする振動による報知方法。

１２７．　電子機器における振動による報知方法であって、

操作部に対する操作入力が受付けられたことを検知した場合に、その操作入力の種類を特定し、この電子機器に具備された振動発生器から前記操作入力の種類に対応付けられた振動形態で振動を発生させて、前記操作部とは異なる当該電子機器の筐体の一部を振動させる

ことを特徴とする振動による報知方法。

１２８．　電子機器における振動による報知方法であって、

操作部に対する操作入力が受付けられたことを検知した場合に、その操作入力の種類を特定してこの電子機器に具備された振動発生器を駆動し、当該振動発生

器において、前記操作部または前記操作部に接する当該振動発生器のベース部材につながれた支持部材により空中で往復運動可能に支持された錘体に往復運動を行わせることで、前記操作部を振動させる

ことを特徴とする振動による報知方法。

１２９．　電子機器における振動による報知方法であって、

操作部に対する操作入力が受付けられたことを検知した場合に、この電子機器に具備された振動発生器から振動とともに音を発生させる場合は、前記振動発生器を駆動して振動を発生させるための駆動信号と、前記振動発生器を駆動して音を発生させるための音声信号とを合成し、当該合成した信号を用いて前記振動発生器を駆動して操作者に振動を与えると同時に音を発生させる

ことを特徴とする振動による報知方法。

１３０．　電子機器における振動による報知方法であって、

操作パネルに対するタッチ操作が受付けられたことを検知した場合に、そのタッチ位置を検出し、当該タッチ位置に基づいてこの電子機器が具備する複数の振動発生器のいずれか１以上を選択し、当該選択された振動発生器から振動を発生させて操作者に振動を与える

ことを特徴とする振動による報知方法。

１３１．　電子機器における振動による報知方法であって、

操作パネルに対するタッチ操作が受付けられたことを検知した場合に、そのタッチ位置を検出し、この電子機器が具備する複数の振動発生器の各々から発生させる振動波の相互干渉によって前記操作パネルのタッチ位置に生じる振動の振幅が増幅されるように、前記複数の振動発生器の各々に印加する駆動信号を生成して当該各振動発生器を駆動し、操作者に振動を与える

ことを特徴とする振動による報知方法。

１３２．　電子機器における報知制御方法であって、

操作部に対する操作入力が受付けられたことを検知した場合に、この電子機器に具備された、操作者に報知音を与える発音手段および操作者に振動を与える振動発生器のうち、あらかじめ操作者により指定されたいずれか一方以上を用いて操作入力が受付けられたことを操作者に報知する

ことを特徴とする報知制御方法。

１３３．　電子機器における報知制御方法であって、

操作部に対する操作入力が受付けられたことを検知した場合に、この電子機器に具備された、操作者に報知音を与える発音手段および操作者に振動を与える振動発生器のうち、当該電子機器の周囲の音量を測定する測定手段の測定結果に基づいていずれか一方以上を選択し、当該選択されたものを用いて操作入力が受付けられたことを操作者に報知する

ことを特徴とする報知制御方法。

１３４．　電子機器における報知制御方法であって、

操作部に対する操作入力が受付けられたことを検知した場合に、この電子機器に具備された、操作者に報知音を与える発音手段および操作者に振動を与える振動発生器のうち、当該電子機器が在圏しているエリアをカバーする基地局から受信した信号が指定するいずれか一方以上を用いて操作入力が受付けられたことを操作者に報知する

ことを特徴とする報知制御方法。

１３５．　電子機器における報知制御方法であって、

操作部に対する操作入力が受付けられたことを検知した場合に、この電子機器に具備された、操作者に報知音を与える発音手段および操作者に振動を与える振動発生器のうち、当該電子機器の位置情報に基づいていずれか一方以上を選択し、当該選択されたものを用いて操作入力が受付けられたことを操作者に報知する

ことを特徴とする報知制御方法。

図 1

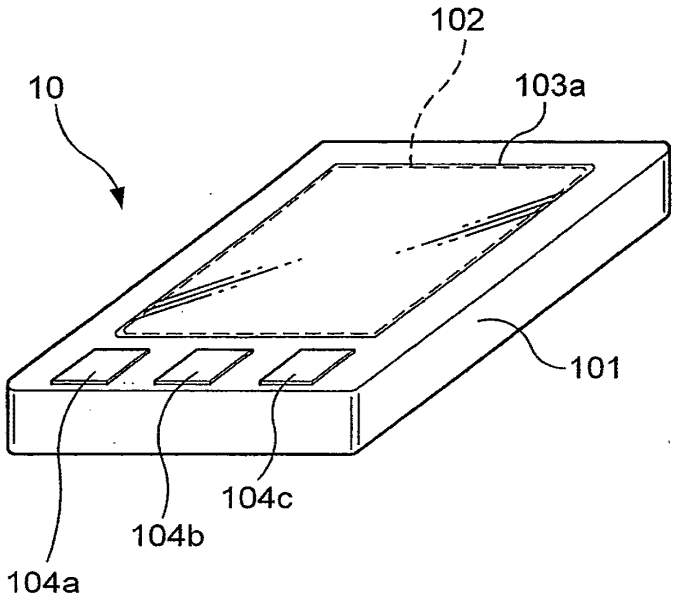

102
10
103a
101
104c
104b
104a

図 2

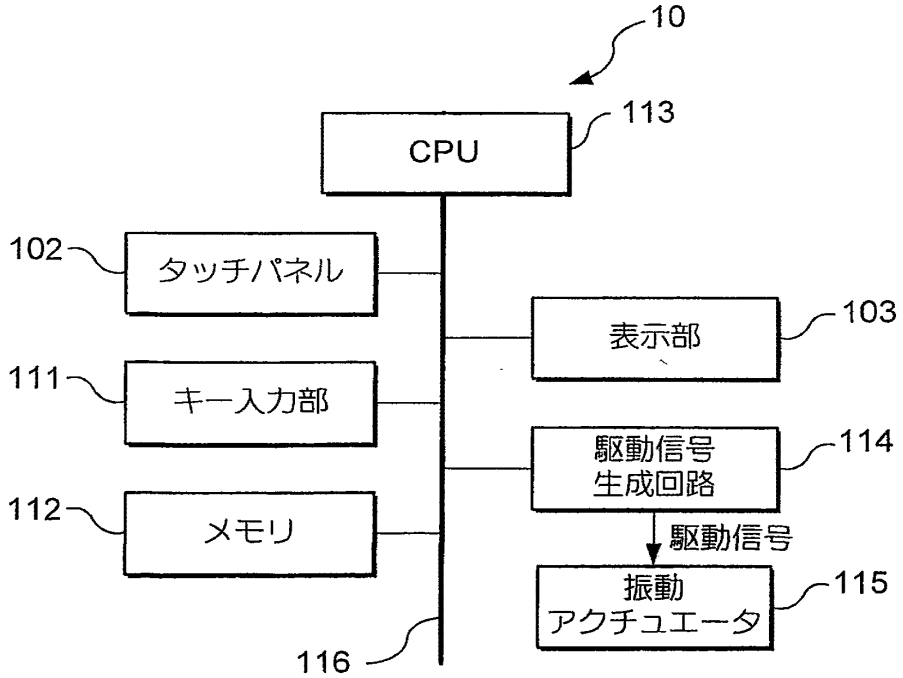

10
113
CPU
102
タッチパネル
表示部
103
111
キー入力部
駆動信号
生成回路
114
112
メモリ
駆動信号
振動
アクチュエータ
115
116

図 3

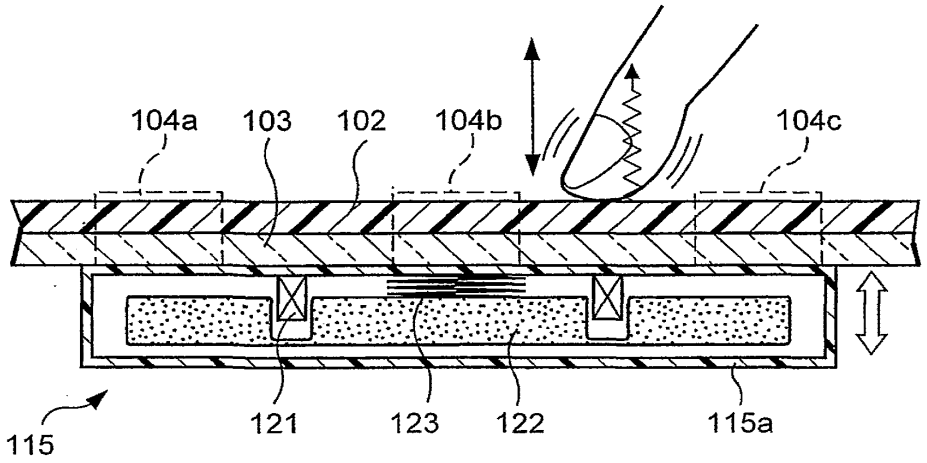


図 4

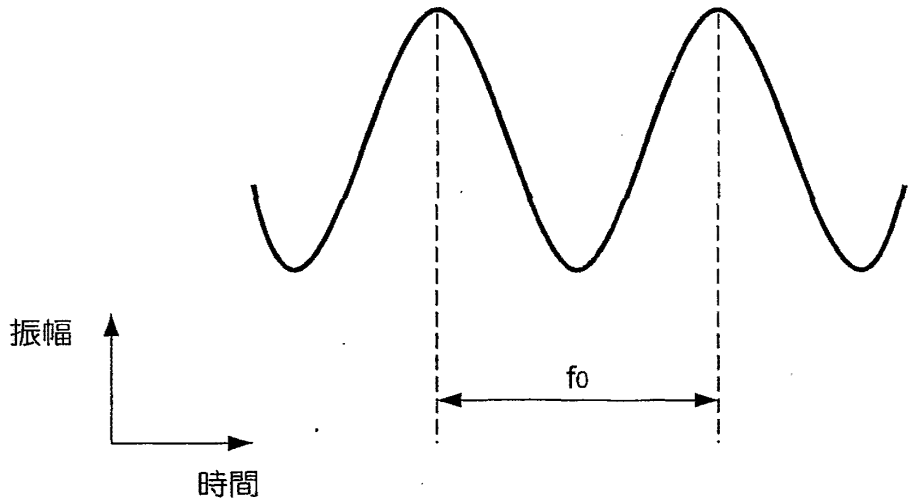


図 5

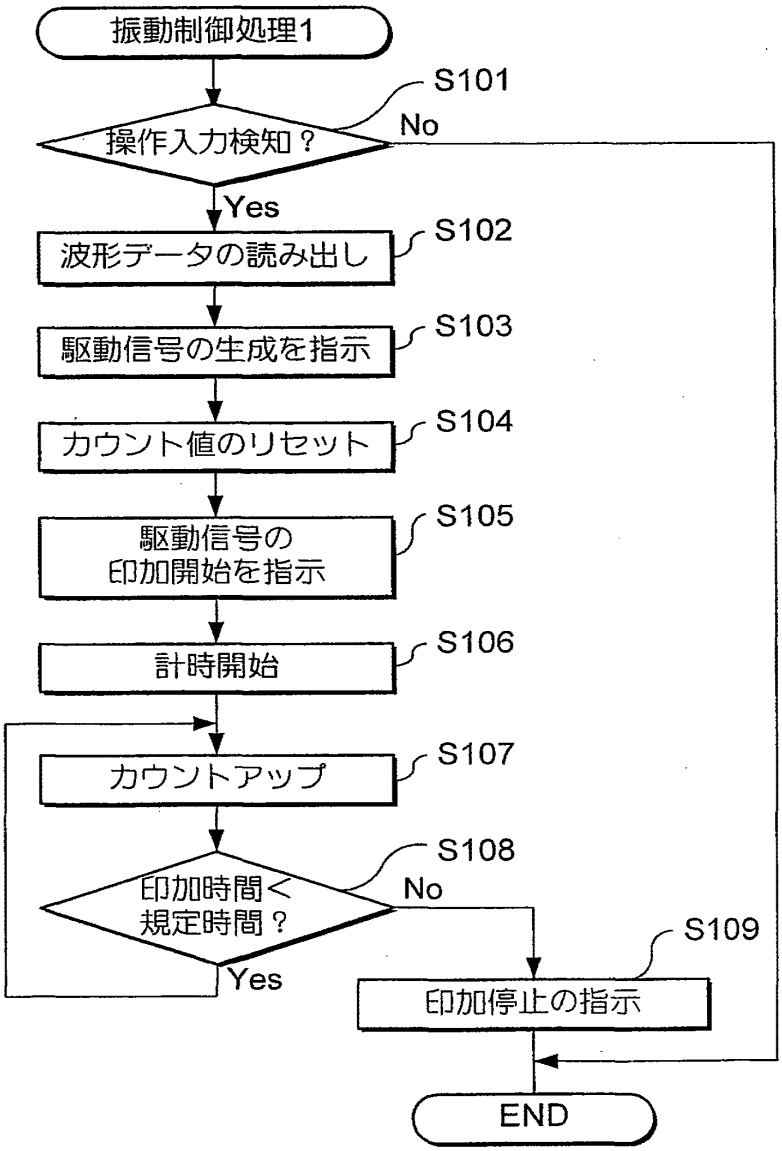

振動制御処理1
S101
操作入力検知？
No
Yes
S102
波形データの読み出し
S103
駆動信号の生成を指示
S104
カウント値のリセット
S105
駆動信号の
印加開始を指示
S106
計時開始
S107
カウントアップ
S108
印加時間＜
規定時間？
No
Yes
S109
印加停止の指示
END

図 6

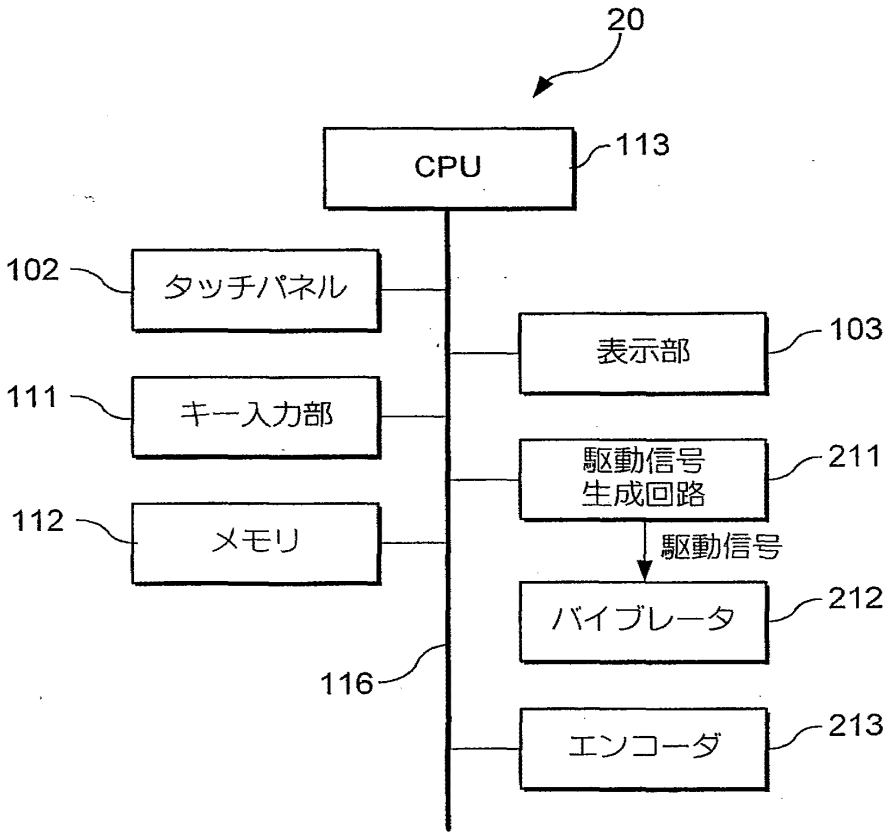

20
CPU
113
102
タッチパネル
表示部
103
111
キー入力部
駆動信号
生成回路
211
112
メモリ
駆動信号
バイブレータ
212
116
エンコーダ
213

図 7

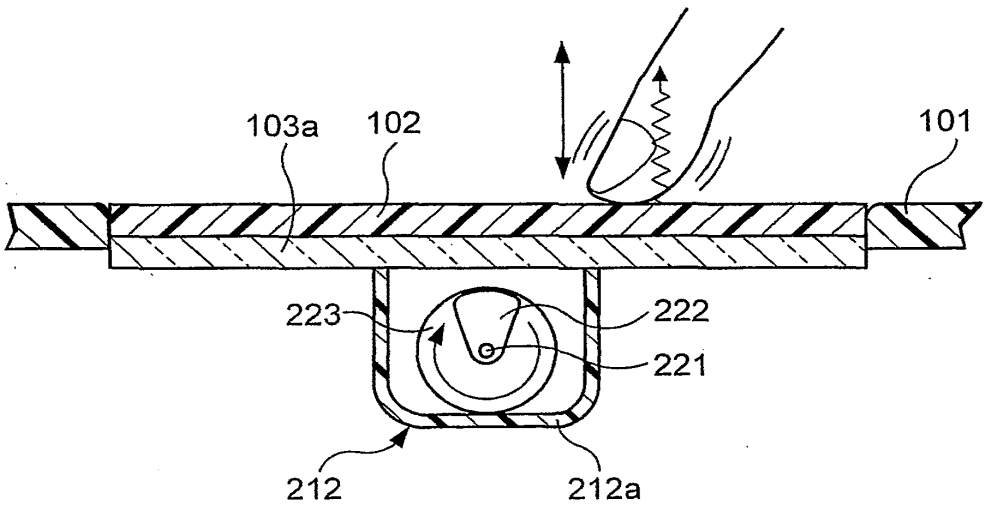


図 8

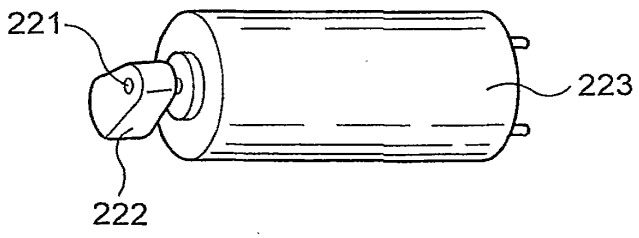


図 9

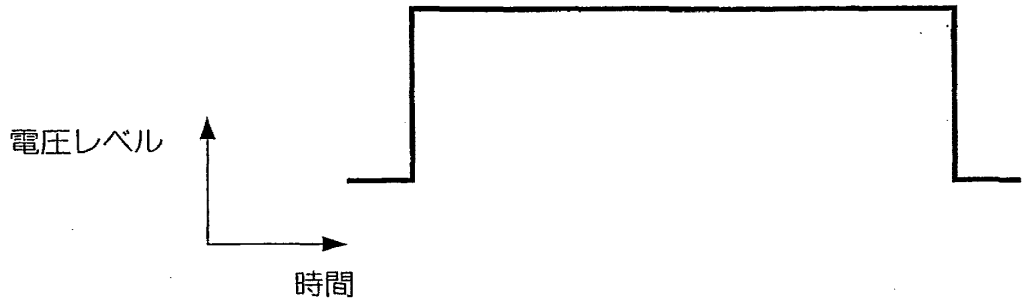


図 10

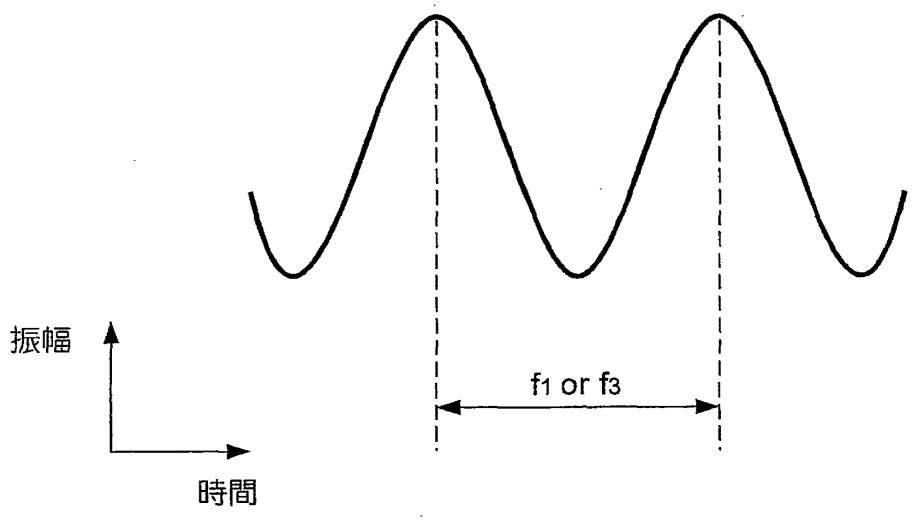


図 11

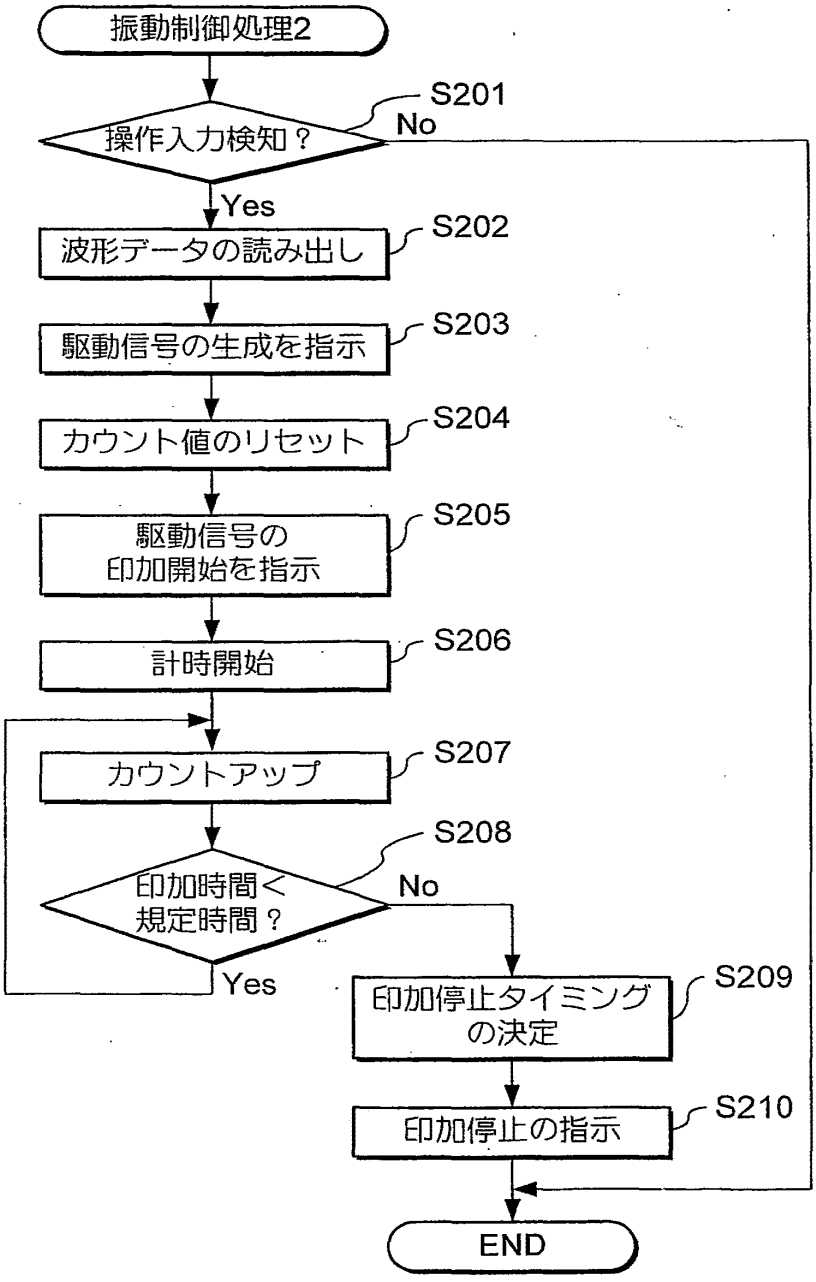

振動制御処理2
S201
操作入力検知？
No
Yes
S202
波形データの読み出し
S203
駆動信号の生成を指示
S204
カウント値のリセット
S205
駆動信号の
印加開始を指示
S206
計時開始
S207
カウントアップ
S208
印加時間＜
規定時間？
No
Yes
S209
印加停止タイミング
の決定
S210
印加停止の指示
END

図 12

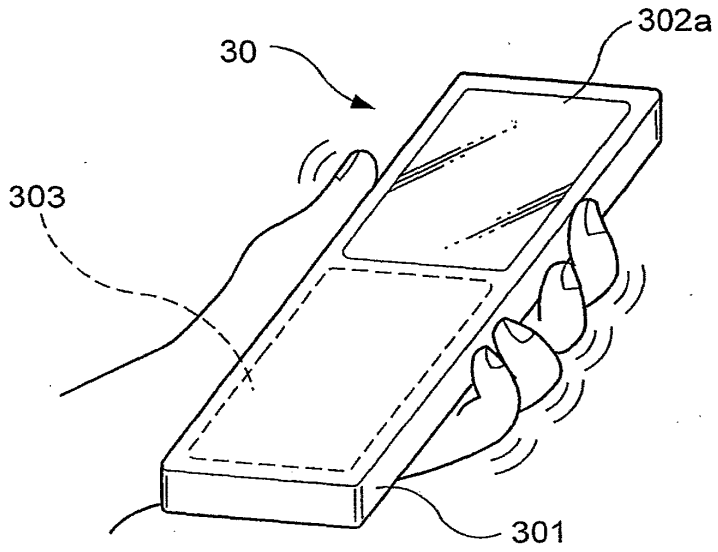

30
302a
303
301

図 13

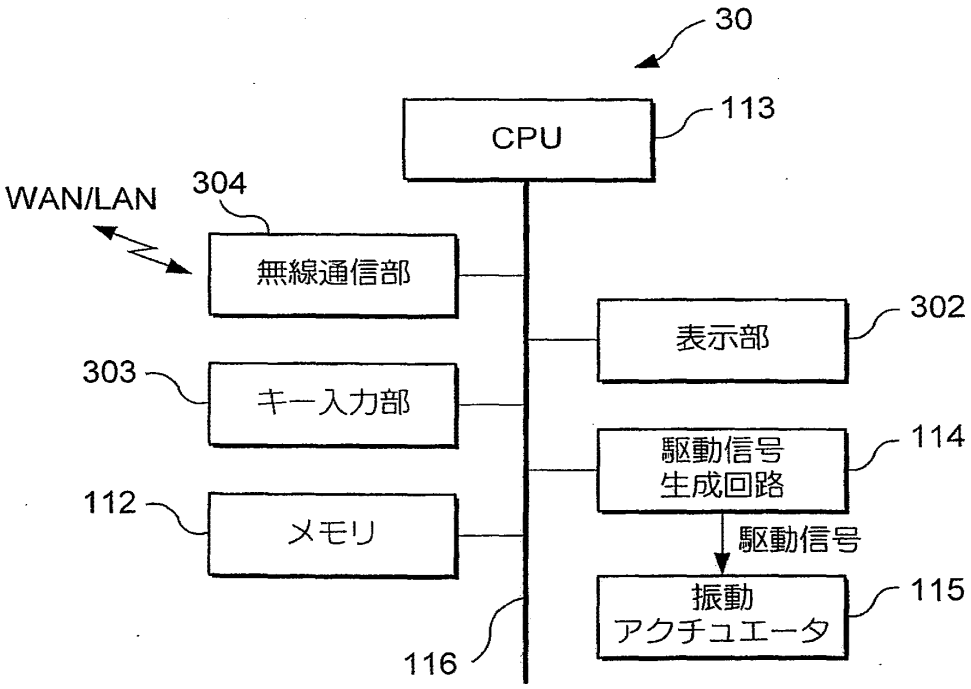

30
CPU
113
WAN/LAN
304
無線通信部
表示部
302
303
キー入力部
駆動信号
生成回路
114
112
メモリ
駆動信号
振動
アクチュエータ
115
116

図 14

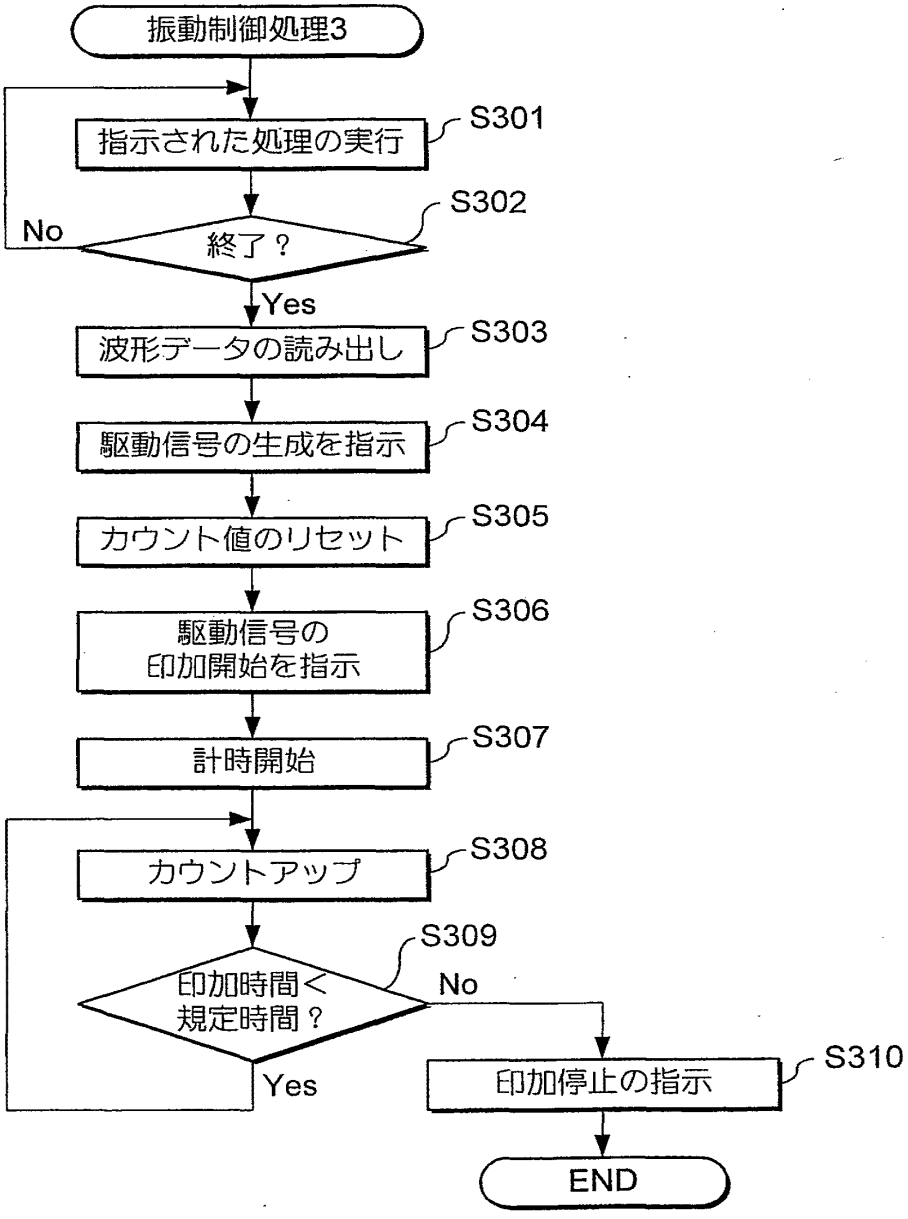

振動制御処理3
指示された処理の実行
S301
終了？
S302
No
Yes
波形データの読み出し
S303
駆動信号の生成を指示
S304
カウント値のリセット
S305
駆動信号の
印加開始を指示
S306
計時開始
S307
カウントアップ
S308
印加時間＜
規定時間？
S309
No
Yes
印加停止の指示
S310
END

図 15

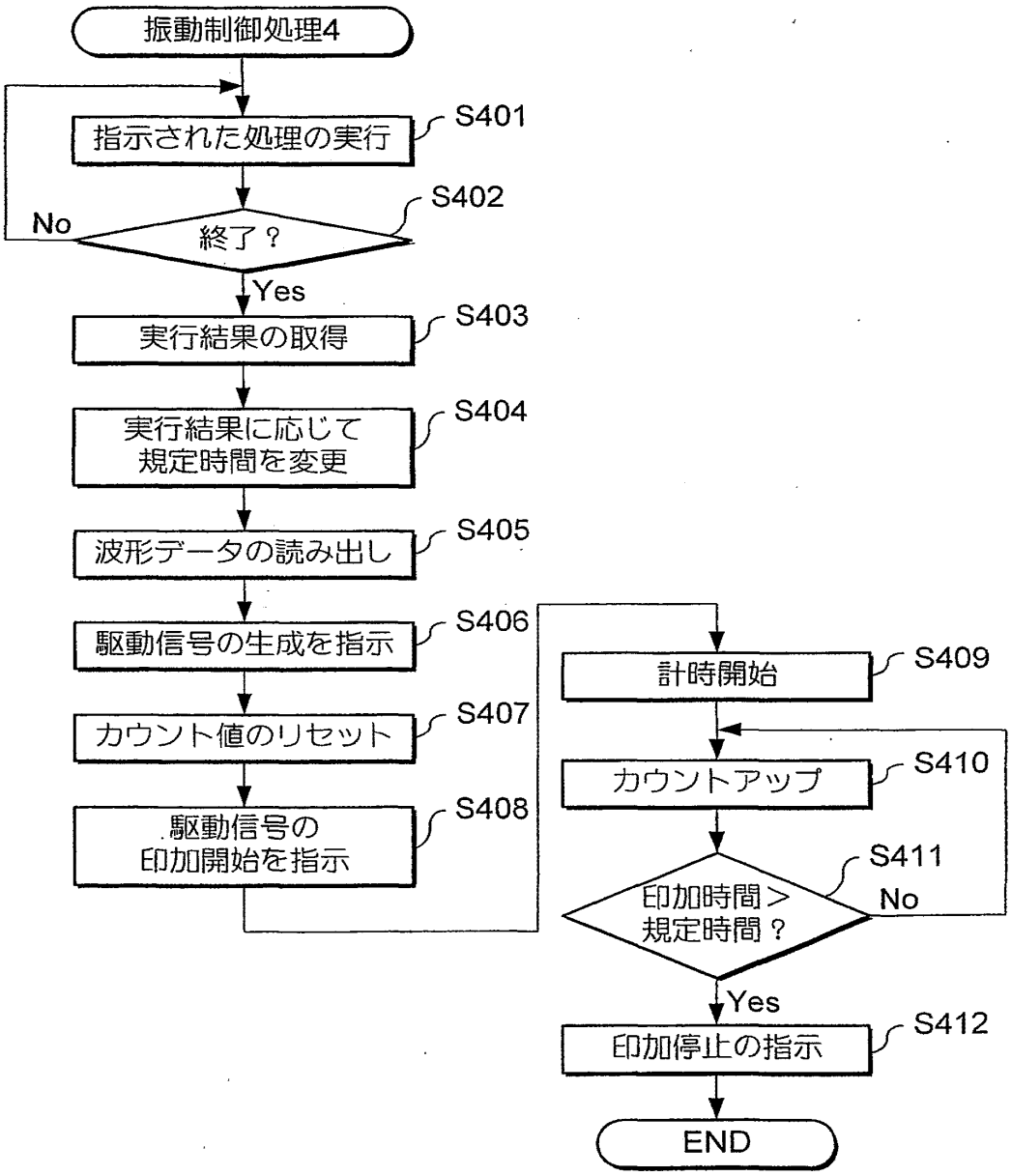

振動制御処理4
指示された処理の実行
S401
終了？
S402
No
Yes
実行結果の取得
S403
実行結果に応じて
規定時間を変更
S404
波形データの読み出し
S405
駆動信号の生成を指示
S406
カウント値のリセット
S407
駆動信号の
印加開始を指示
S408
計時開始
S409
カウントアップ
S410
印加時間＞
規定時間？
S411
No
Yes
印加停止の指示
S412
END

図 16

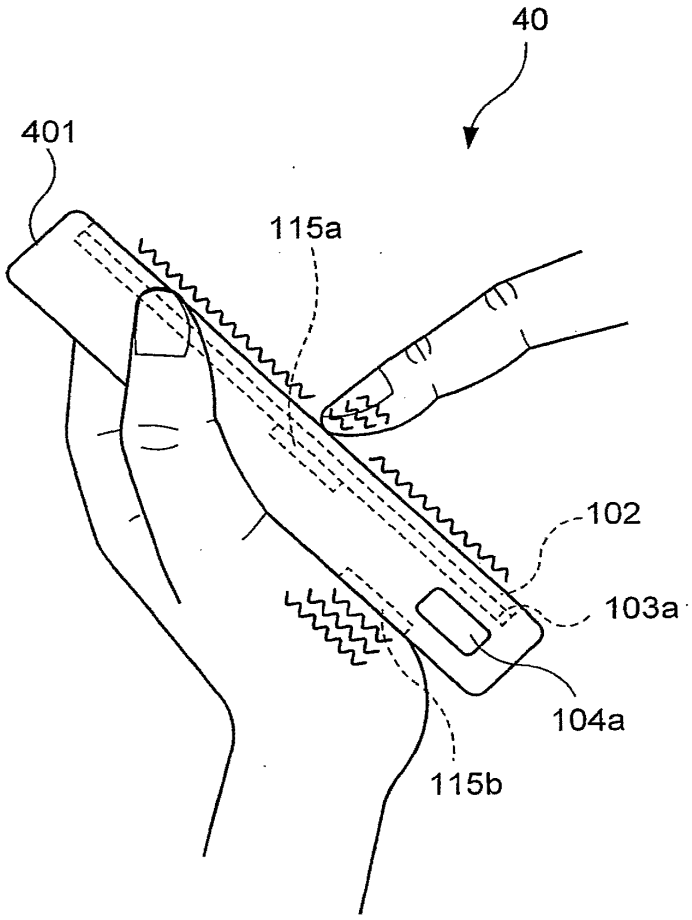


図 17

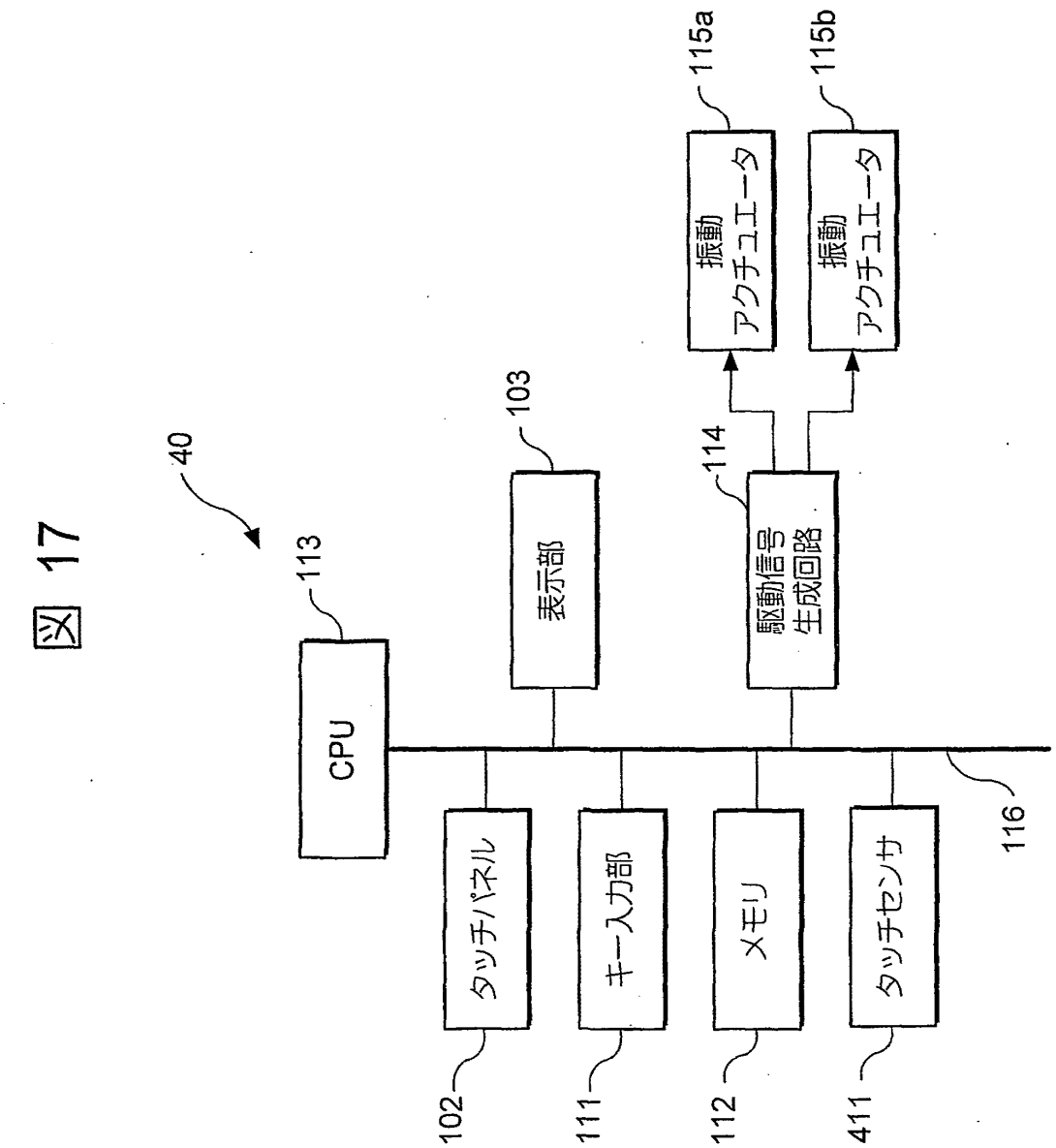

40
113
CPU
103
表示部
114
駆動信号
生成回路
115a
振動
アクチュエータ
115b
振動
アクチュエータ
116
102
タッチパネル
111
キー入力部
112
メモリ
411
タッチセンサ

図 18

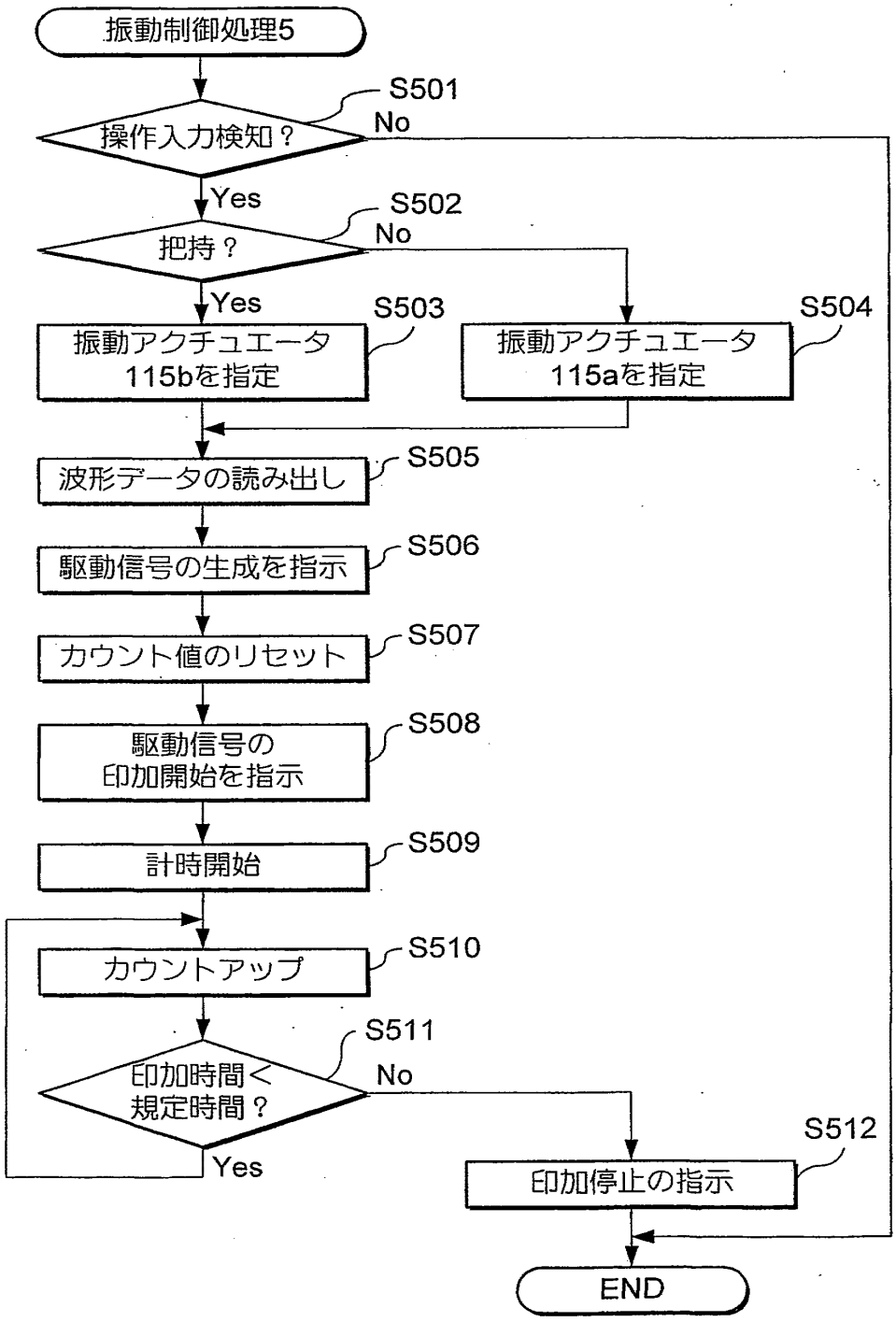

振動制御処理5
S501
操作入力検知？
No
Yes
S502
把持？
No
Yes
S503
振動アクチュエータ
115bを指定
S504
振動アクチュエータ
115aを指定
S505
波形データの読み出し
S506
駆動信号の生成を指示
S507
カウント値のリセット
S508
駆動信号の
印加開始を指示
S509
計時開始
S510
カウントアップ
S511
印加時間＜
規定時間？
No
Yes
S512
印加停止の指示
END

図 19

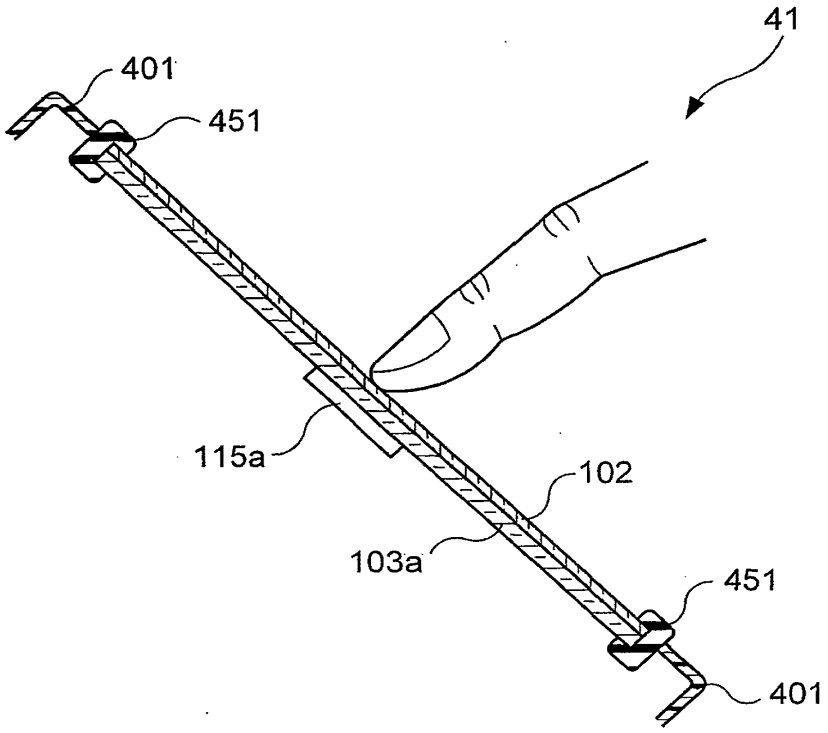


図 20

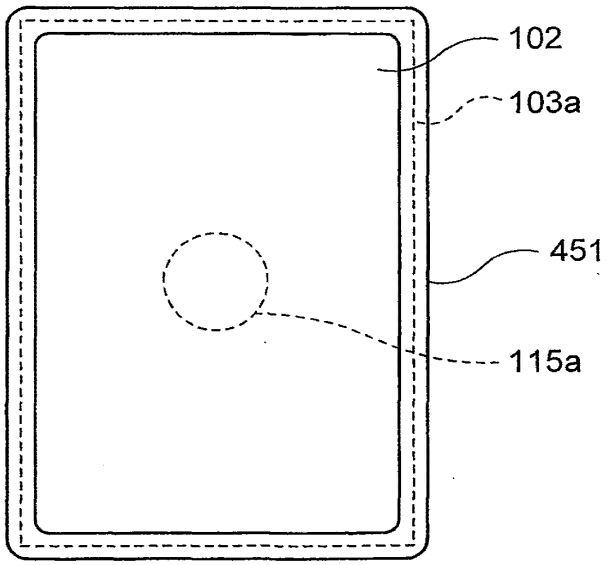


図 21

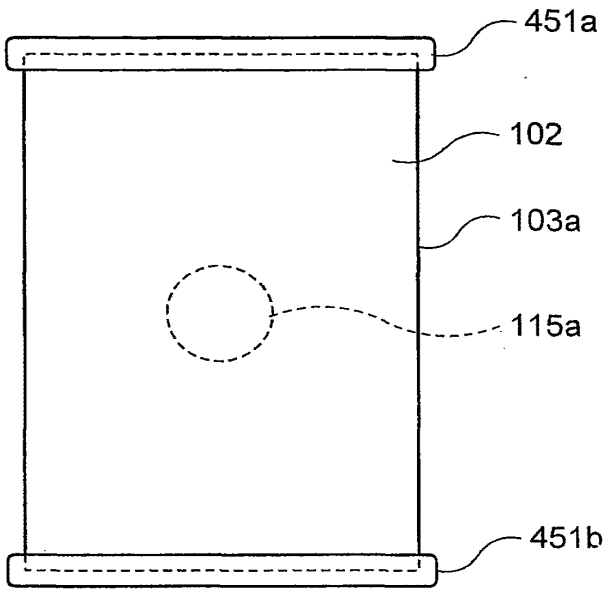


図 22

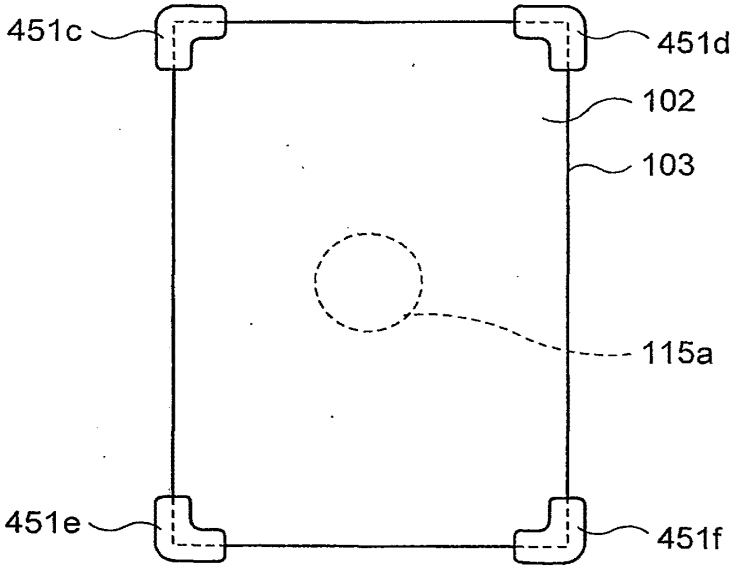


図 23

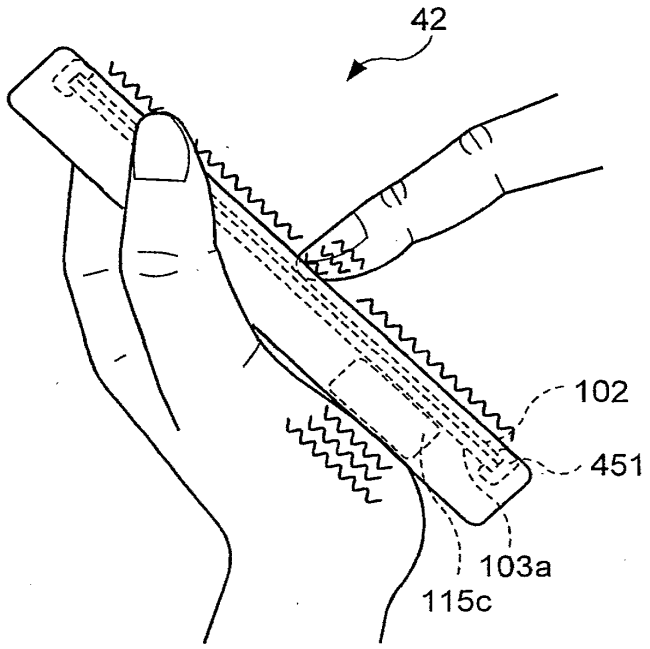


図 24

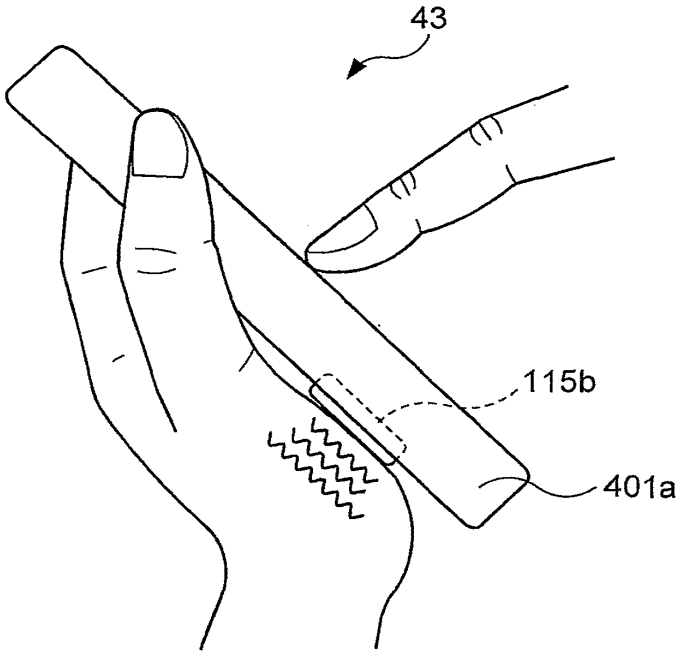


図 25

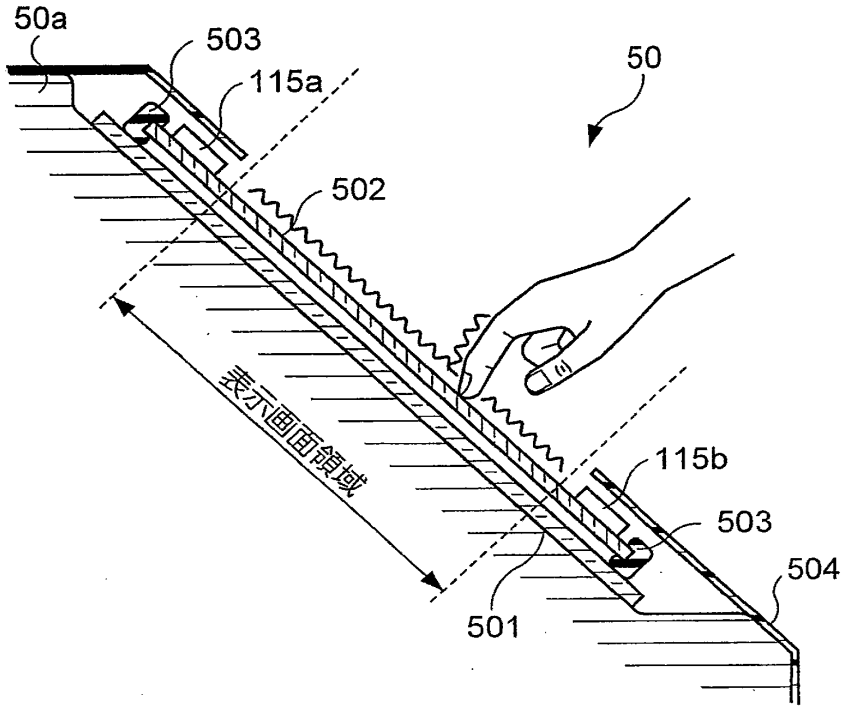

50a
503
115a
50
502
表示画面領域
115b
503
504
501

図 26

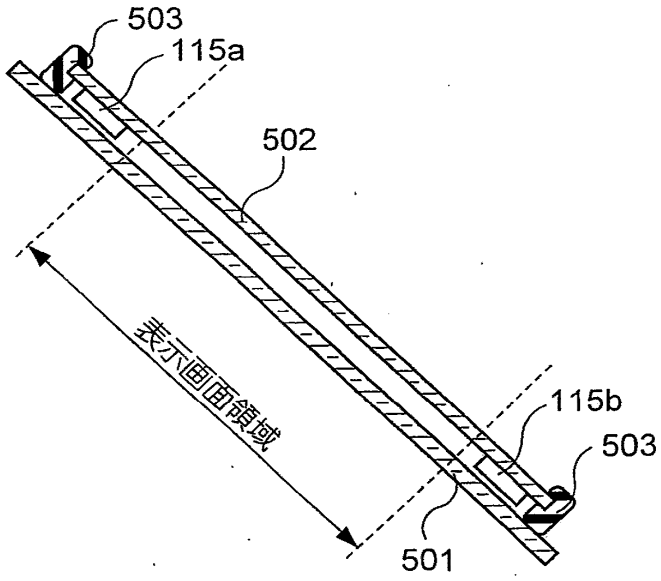

503
115a
502
表示画面領域
115b
503
501

図 27

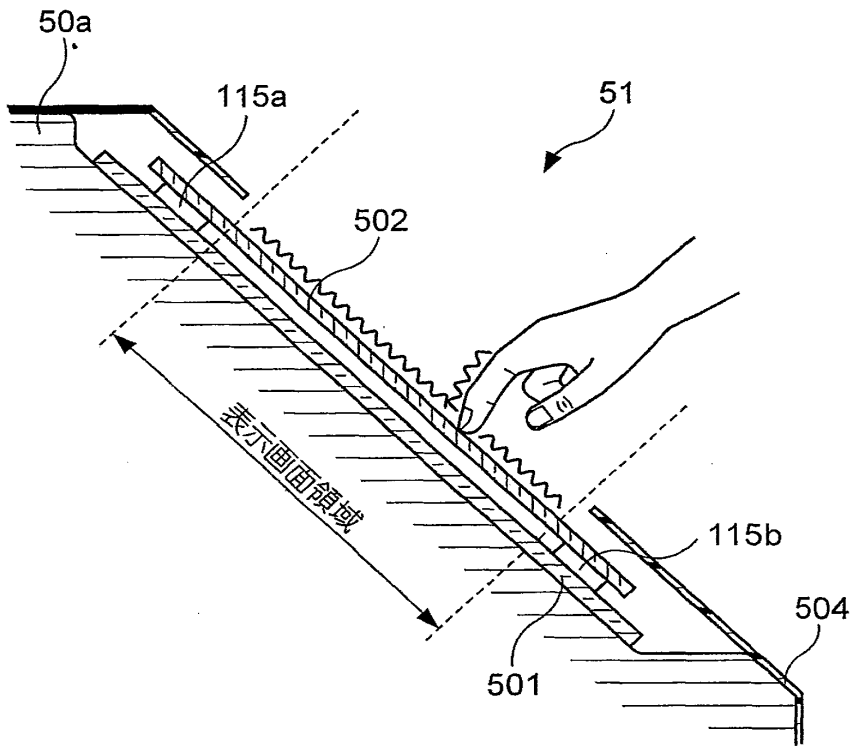


図 28

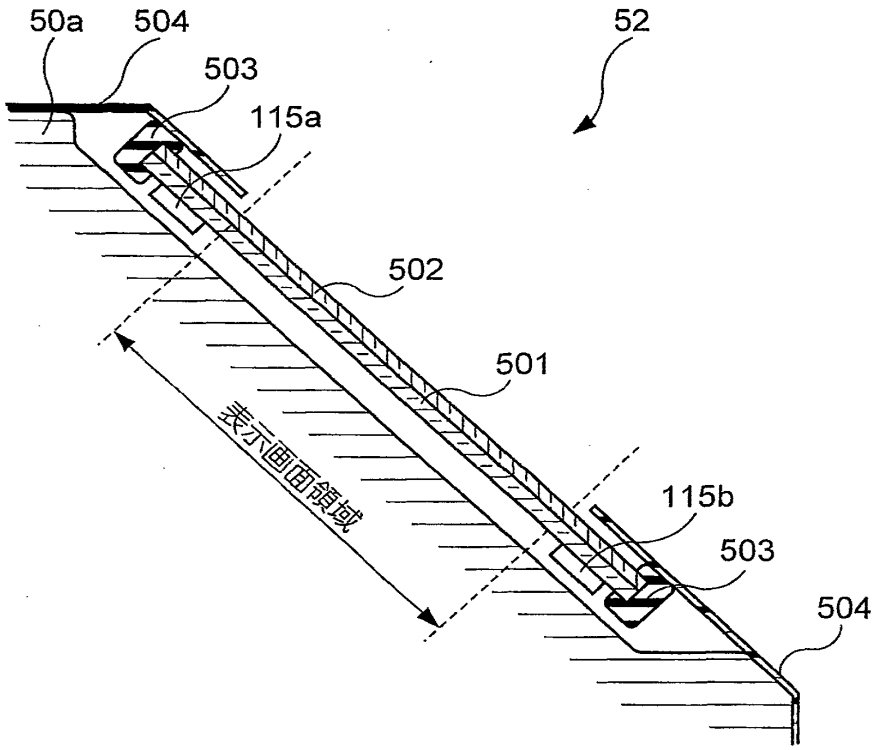


図 29

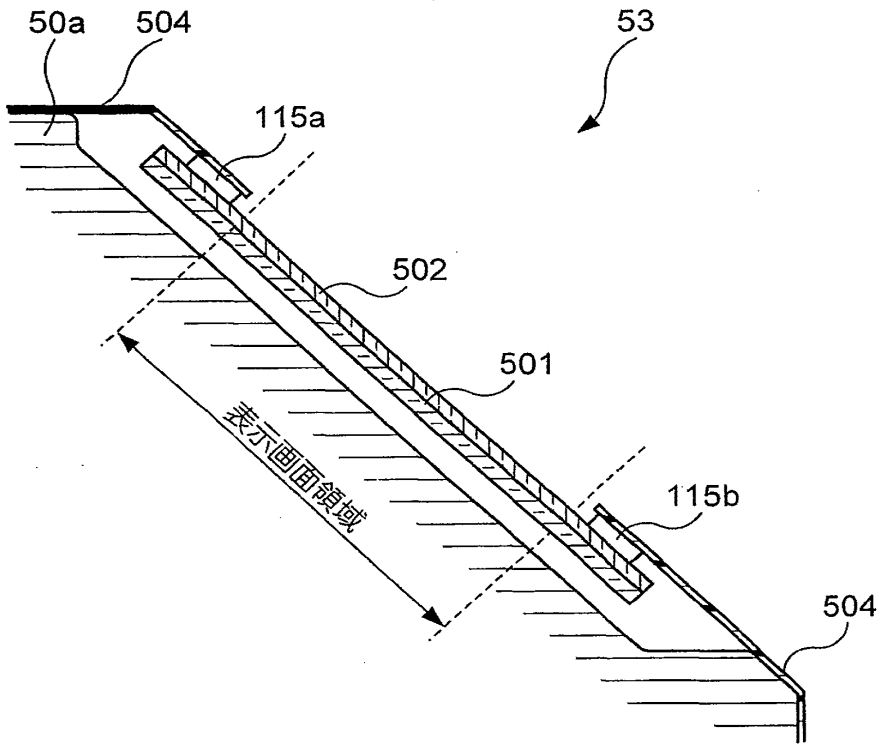


図 30

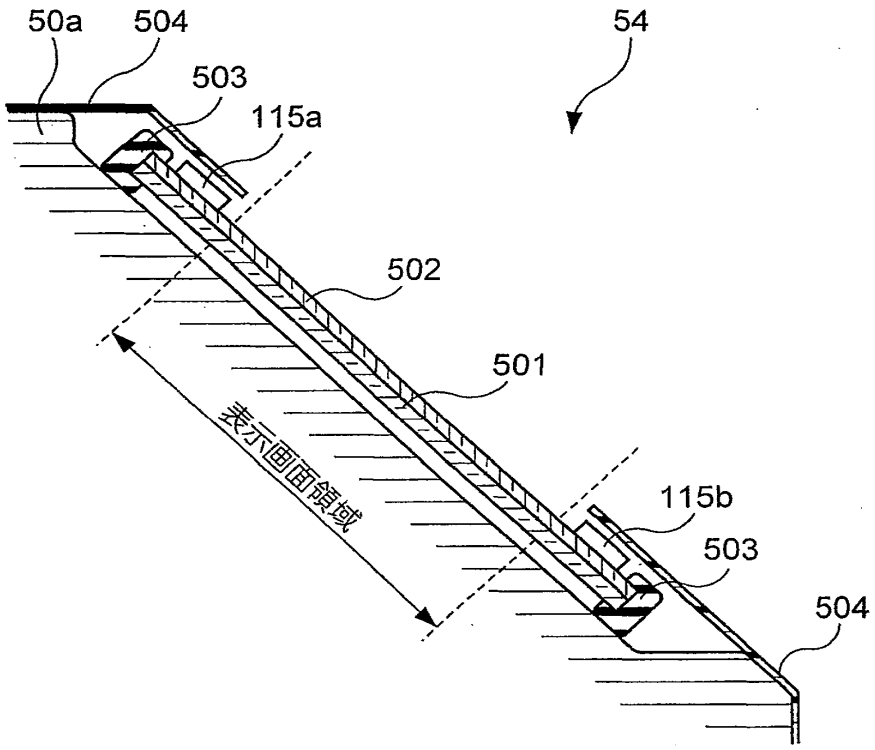


図 31

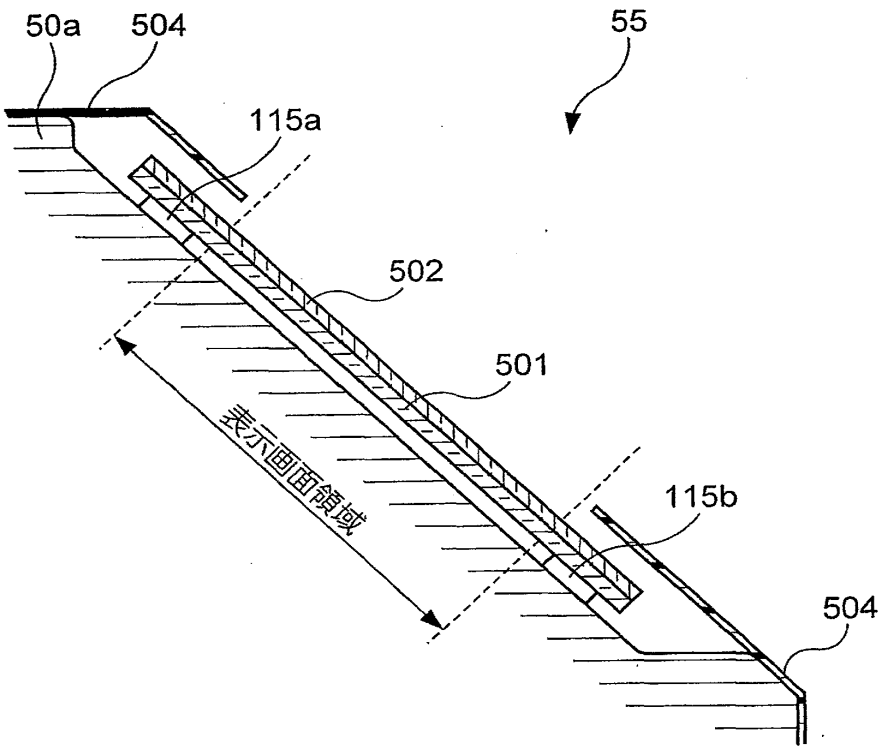


図 32

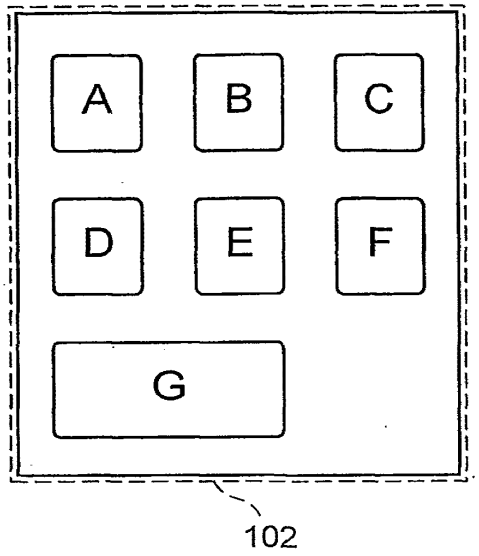


図 33

112a

タッチボタン	エリアデータ	波形データ
A		
B		
C		
⋮	⋮	⋮

図 34

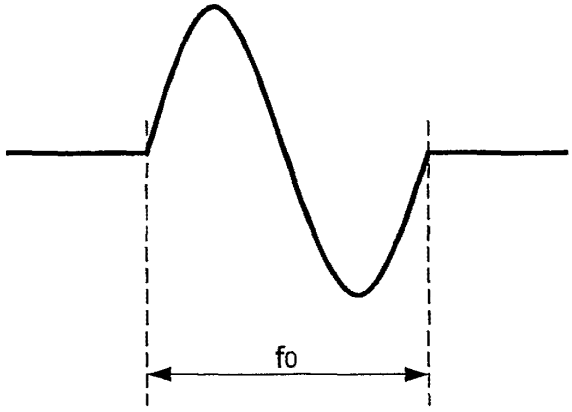


図 35

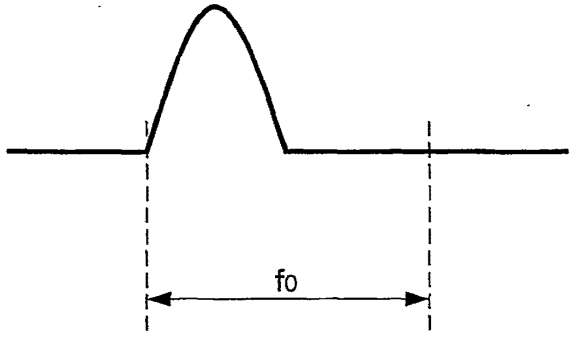


図 36

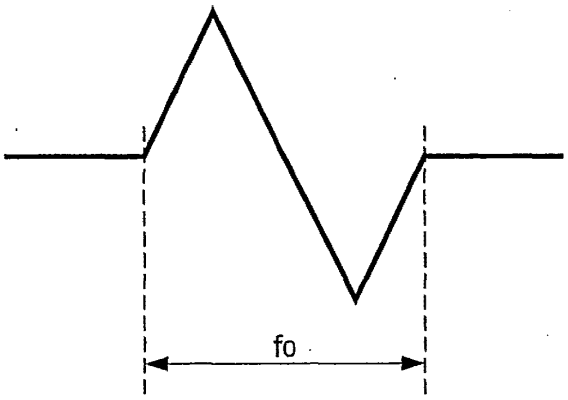


図 37

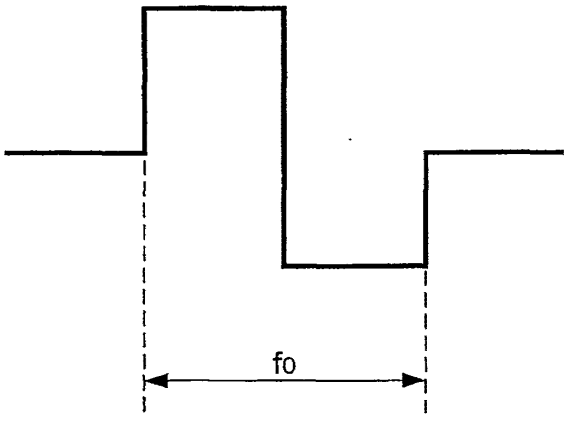


図 38

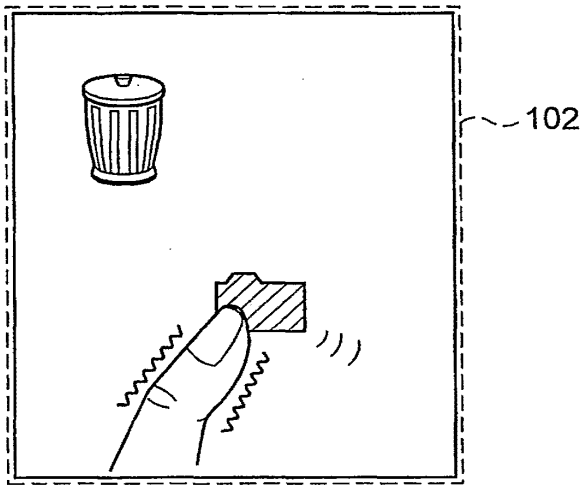


図 39

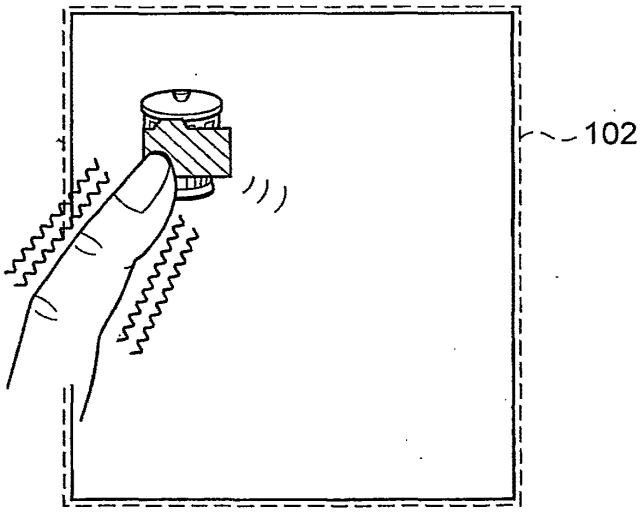


図 40

112b

操作指令	波形データ
決定	
キャンセル	
クリック	
ドラッグ	
アイコンの選択	
データの削除	
ファイルのオープン	
電源OFF	
⋮	⋮

図 41

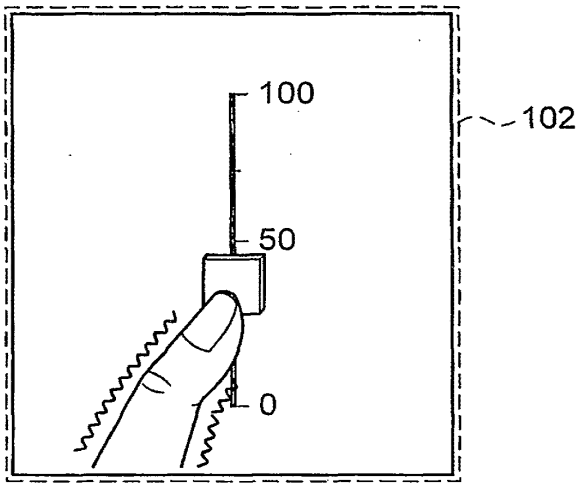


図 42

112c

パラメータ値	波形データ
0~25	
26~50	
51~75	
76~100	

図 43

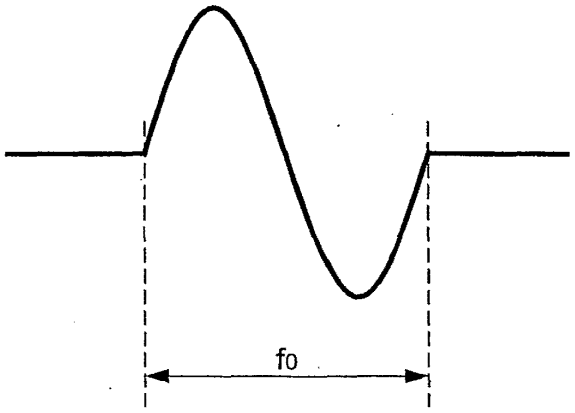


図 44

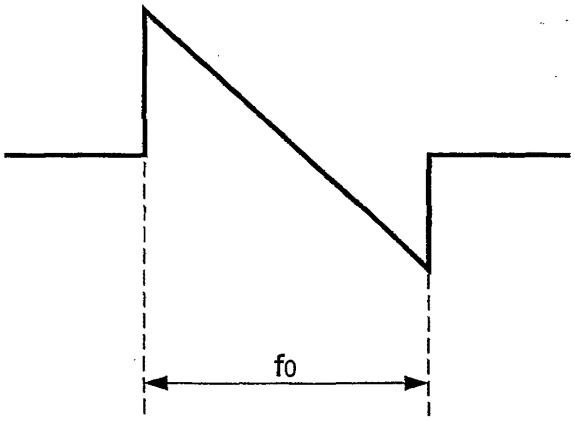


図 45

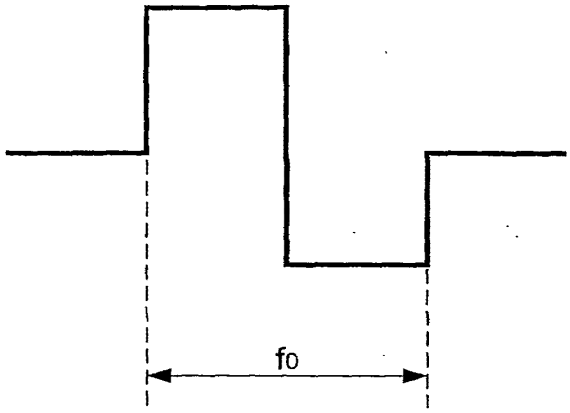


図 46

112d

タッチボタン	エリアデータ	波形データ	
A		タッチ操作	
		押圧操作	
B		タッチ操作	
		押圧操作	
C		タッチ操作	
		押圧操作	
⋮	⋮	⋮	

図 47

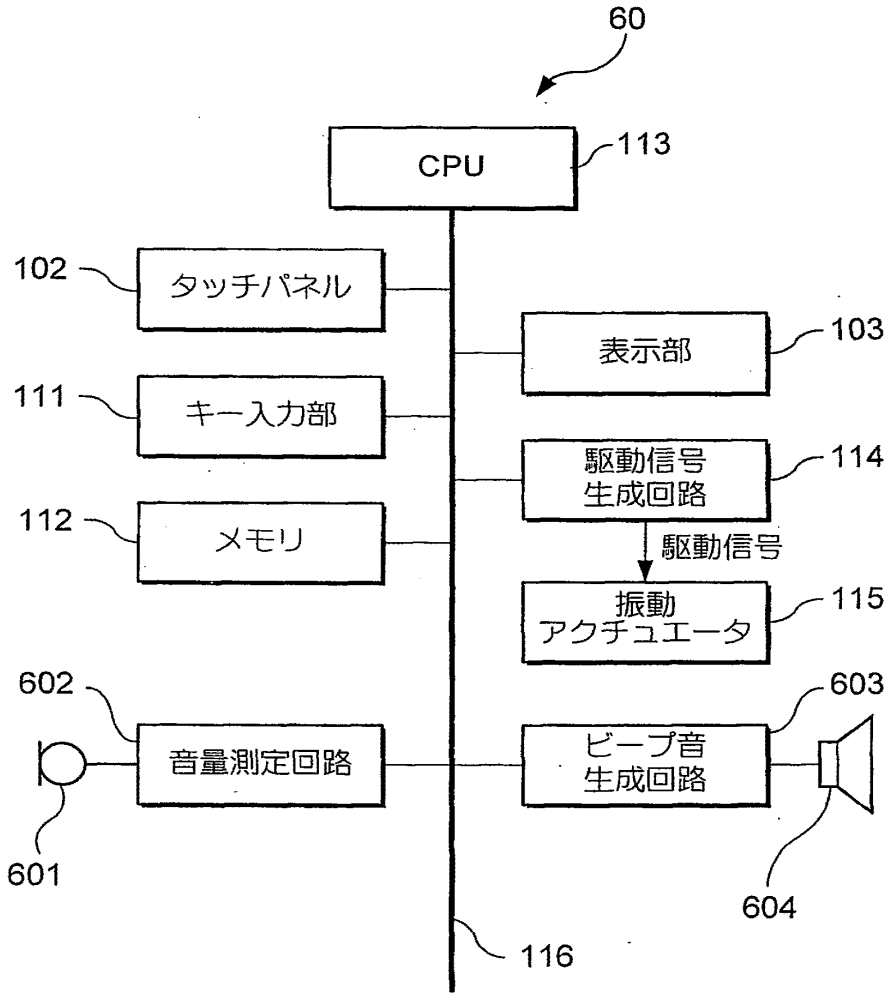

60
CPU
113
102
タッチパネル
表示部
103
111
キー入力部
駆動信号
生成回路
114
112
メモリ
駆動信号
振動
アクチュエータ
115
602
603
音量測定回路
ビープ音
生成回路
601
604
116

図 48

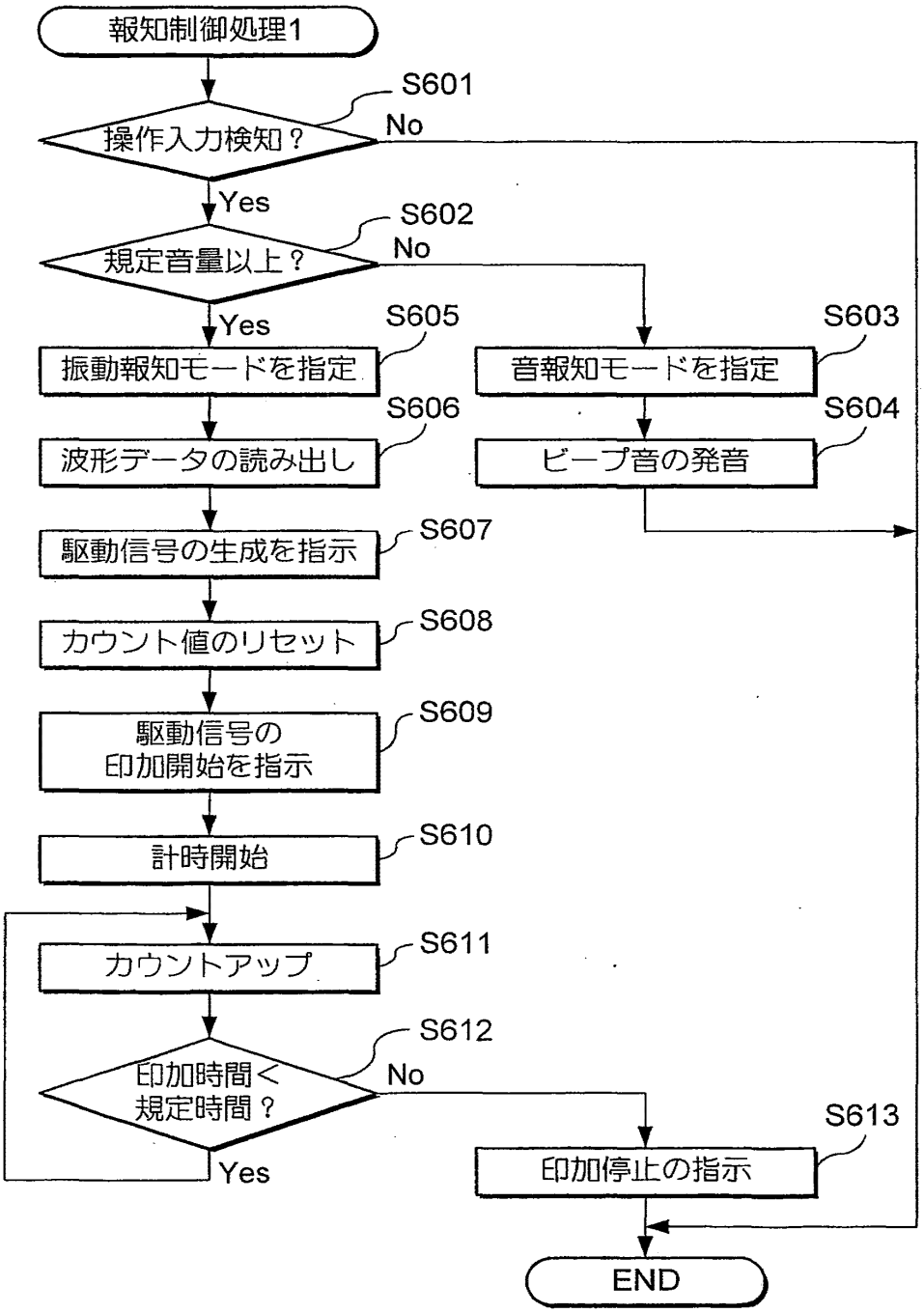

報知制御処理1
S601
操作入力検知？
No
Yes
S602
規定音量以上？
No
Yes
S605
振動報知モードを指定
S606
波形データの読み出し
S603
音報知モードを指定
S604
ビープ音の発音
S607
駆動信号の生成を指示
S608
カウント値のリセット
S609
駆動信号の
印加開始を指示
S610
計時開始
S611
カウントアップ
S612
印加時間＜
規定時間？
No
Yes
S613
印加停止の指示
END

図 49

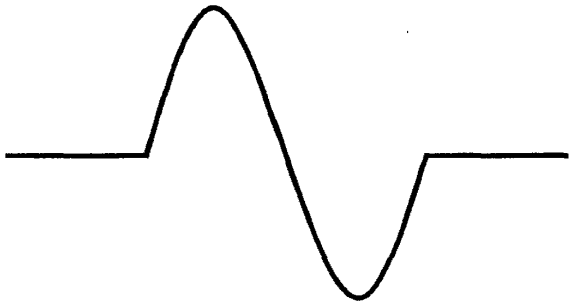


図 50



図 51

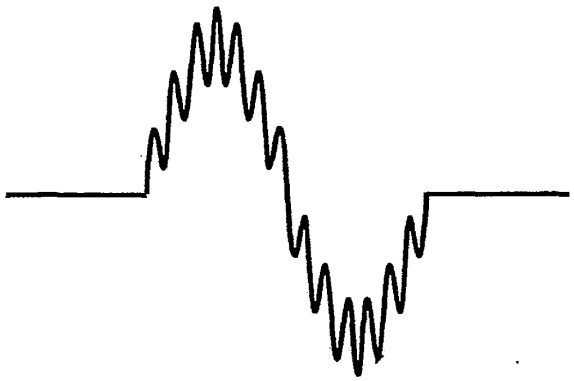


図 52

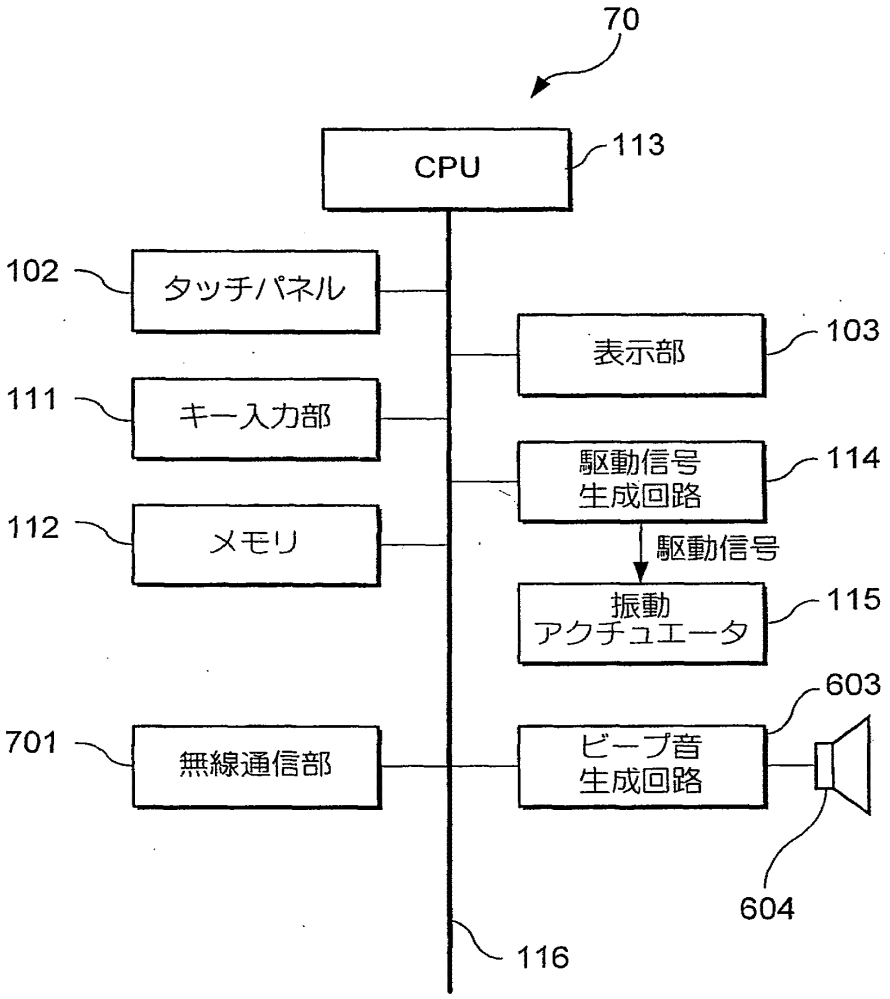

70
CPU
113
102
タッチパネル
表示部
103
111
キー入力部
駆動信号
生成回路
114
112
メモリ
駆動信号
振動
アクチュエータ
115
603
701
無線通信部
ビープ音
生成回路
604
116

図 53

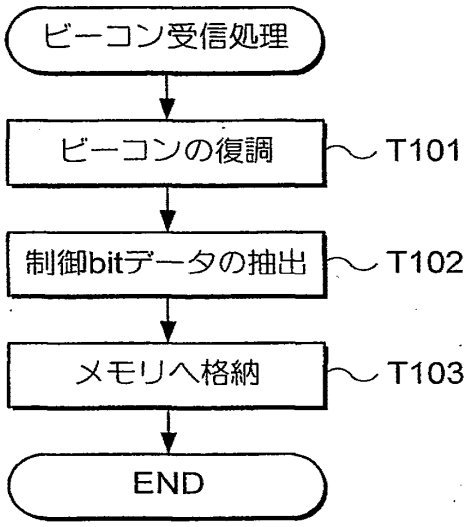


図 54

112e

モード名	基地局ID
振動報知モード	BS000001
	BS000159
	BS000439
	・・・

図 55

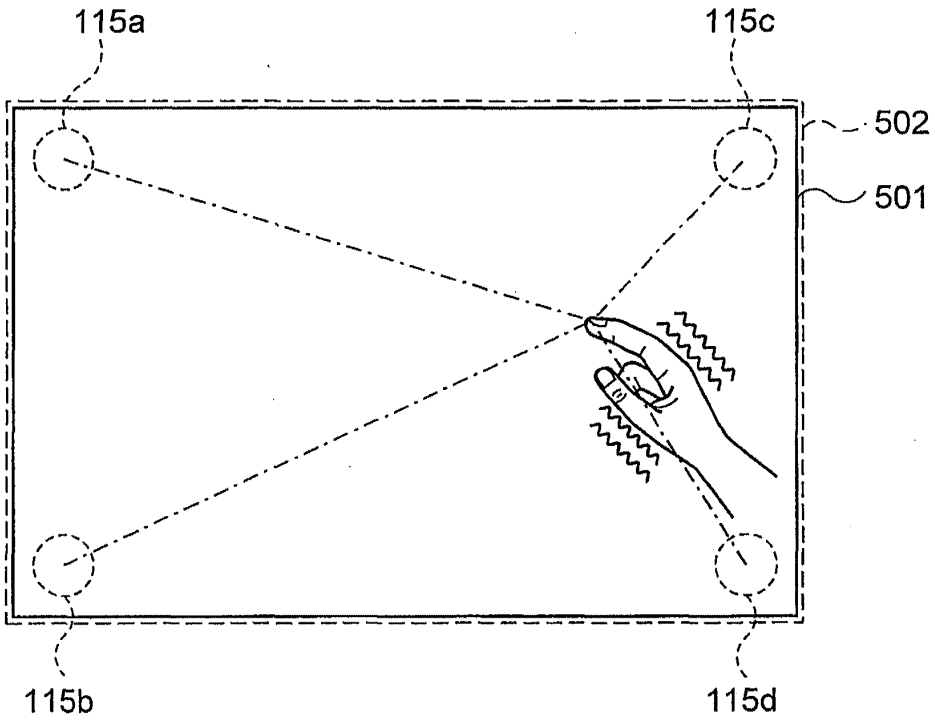


図 56

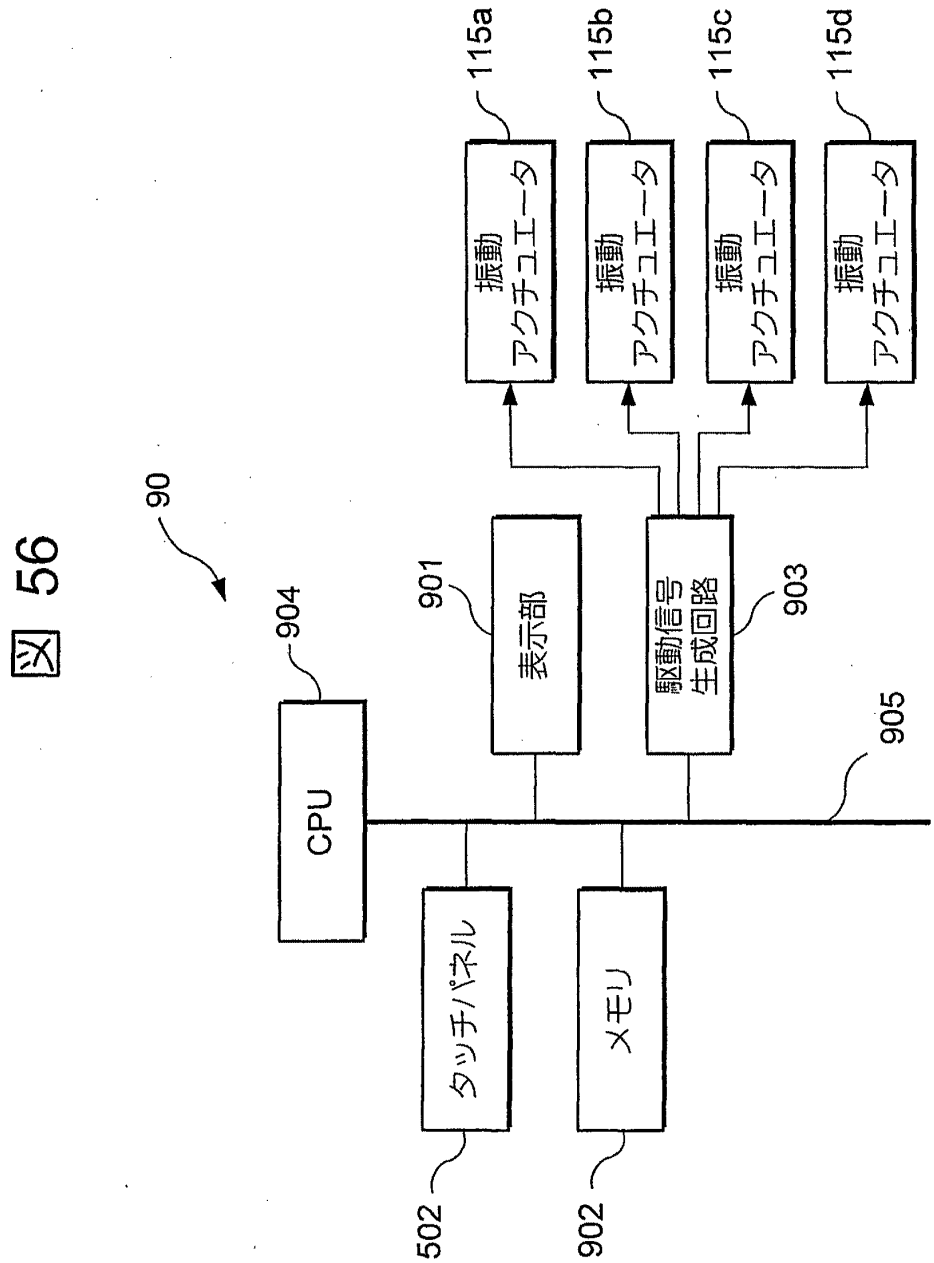

90
CPU
904
表示部
901
駆動信号
生成回路
903
905
タッチパネル
502
メモリ
902
振動
アクチュエータ
115a
振動
アクチュエータ
115b
振動
アクチュエータ
115c
振動
アクチュエータ
115d

図 57

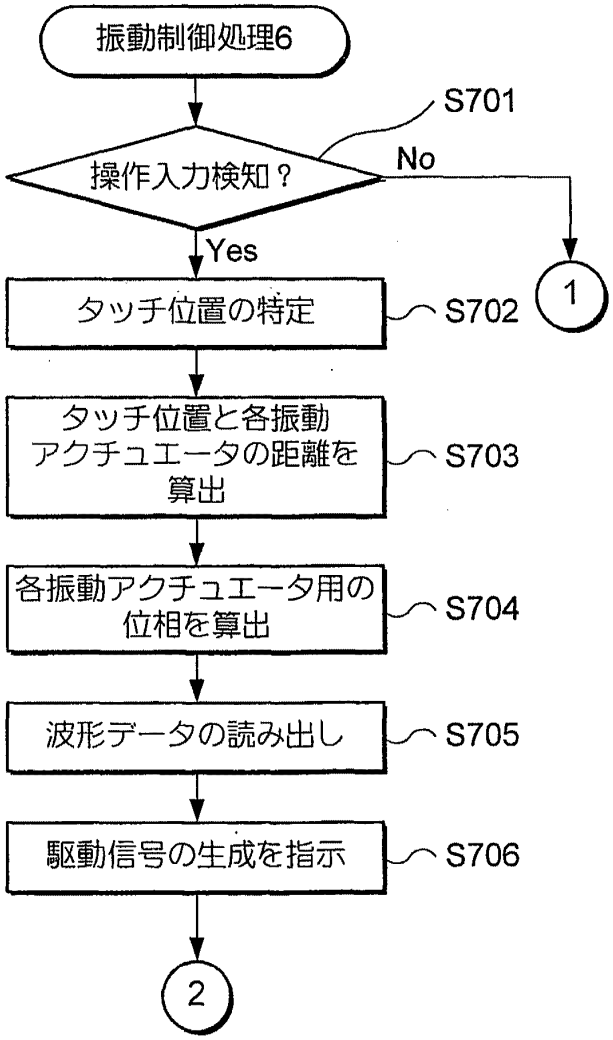

振動制御処理6
S701
操作入力検知？
No
Yes
1
タッチ位置の特定
S702
タッチ位置と各振動アクチュエータの距離を算出
S703
各振動アクチュエータ用の位相を算出
S704
波形データの読み出し
S705
駆動信号の生成を指示
S706
2

図 58

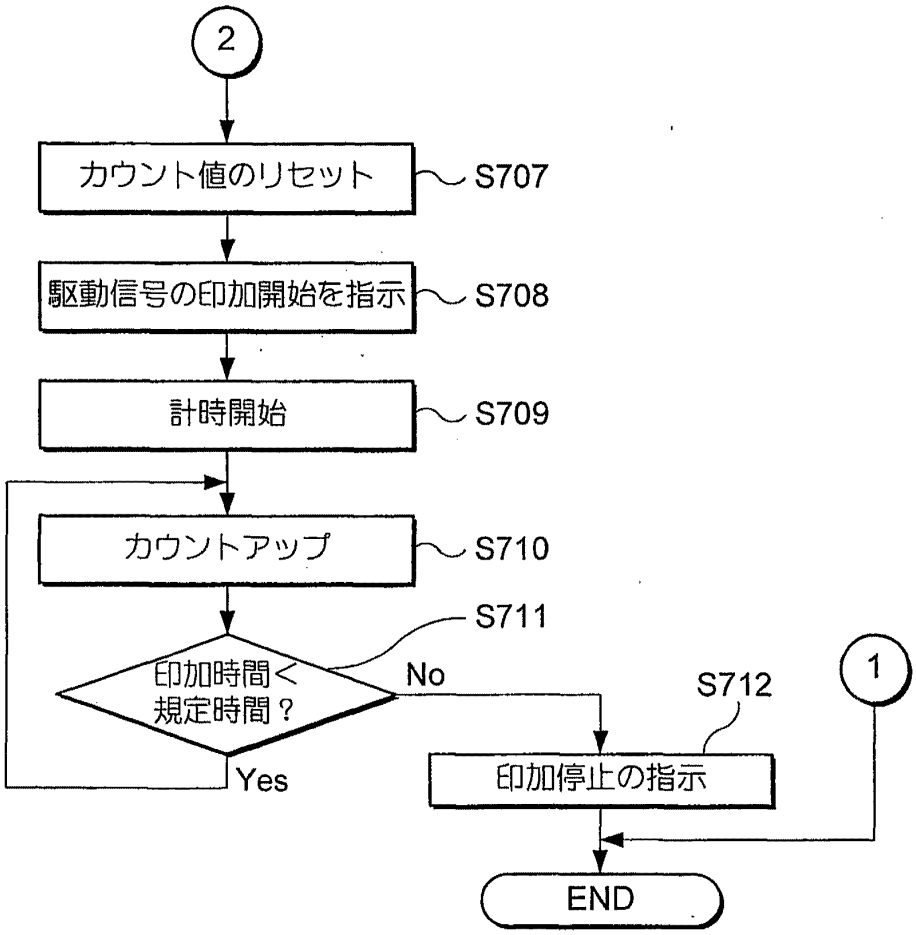

2
カウント値のリセット
S707
駆動信号の印加開始を指示
S708
計時開始
S709
カウントアップ
S710
S711
印加時間＜
規定時間？
No
Yes
S712
印加停止の指示
1
END

図 59

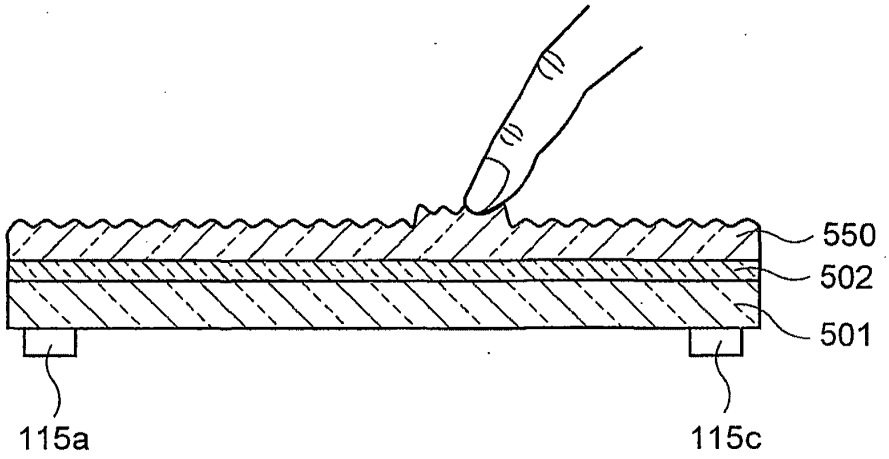


図 60

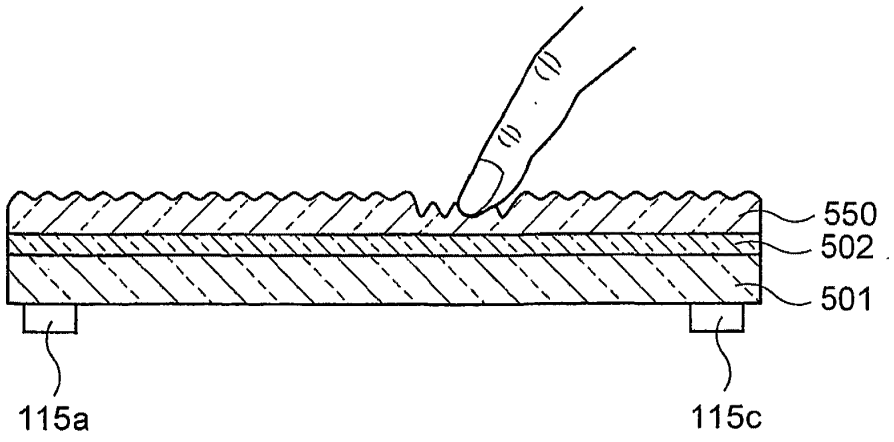


図 61

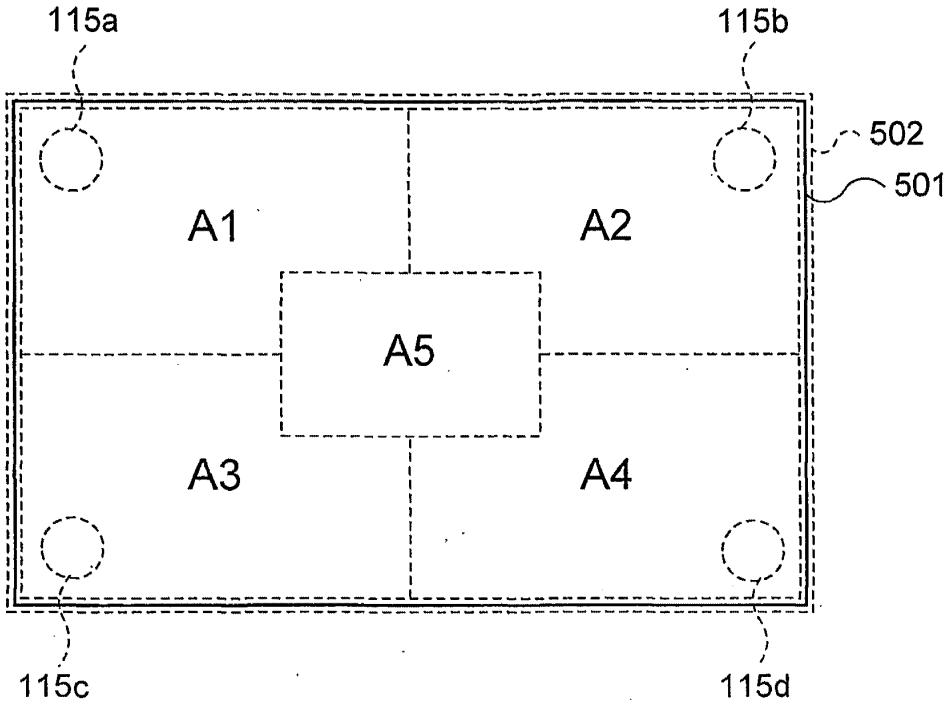


図 62

902

エリアデータ		振動アクチュエータの識別情報
A1		115a
A2		115b
A3		115c
A4		115d
A5		115a,115b,115c,115d

図 63

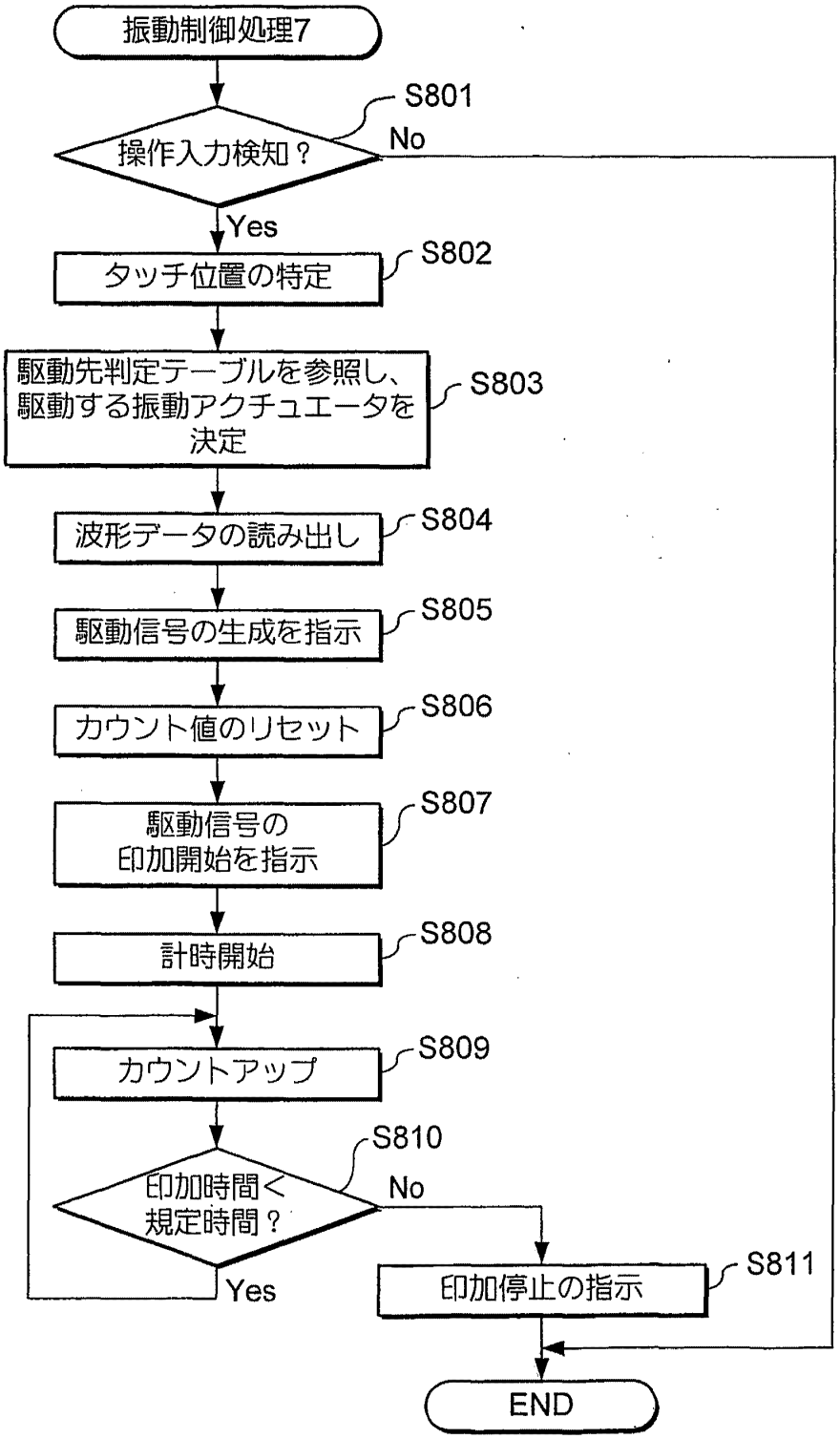

振動制御処理7
S801
操作入力検知？
No
Yes
S802
タッチ位置の特定
S803
駆動先判定テーブルを参照し、
駆動する振動アクチュエータを
決定
S804
波形データの読み出し
S805
駆動信号の生成を指示
S806
カウント値のリセット
S807
駆動信号の
印加開始を指示
S808
計時開始
S809
カウントアップ
S810
印加時間＜
規定時間？
No
Yes
S811
印加停止の指示
END

図 64

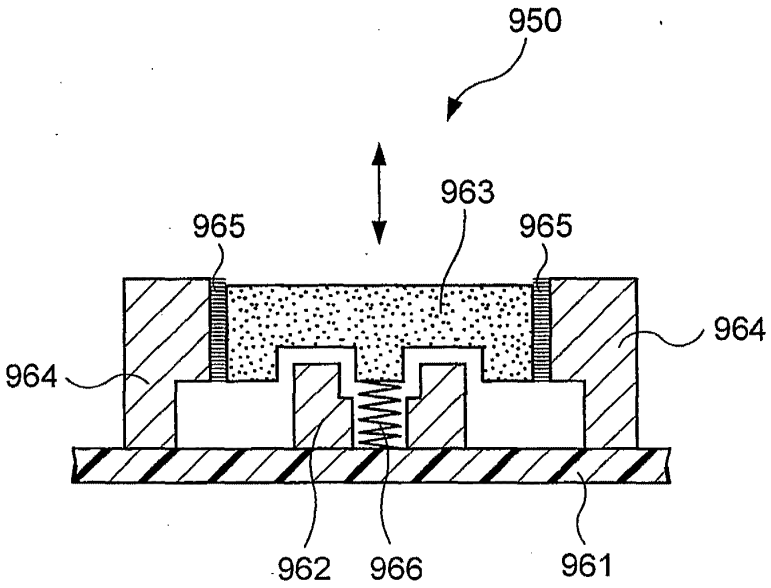

950
963
965
965
964
964
962
966
961

図 65

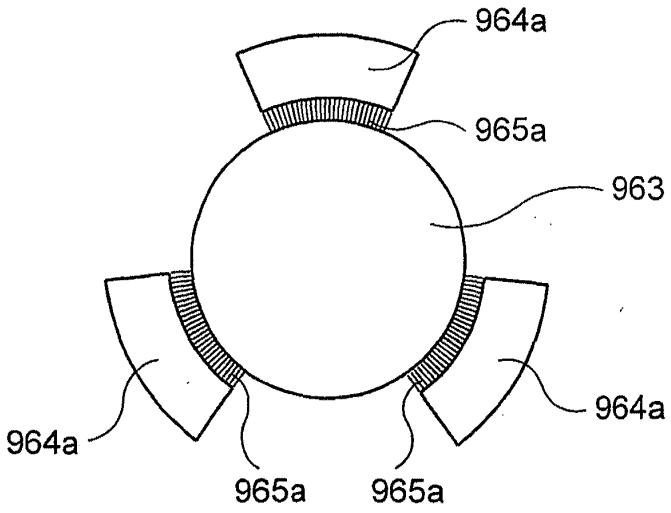

964a
965a
963
964a
964a
965a
965a

図 66

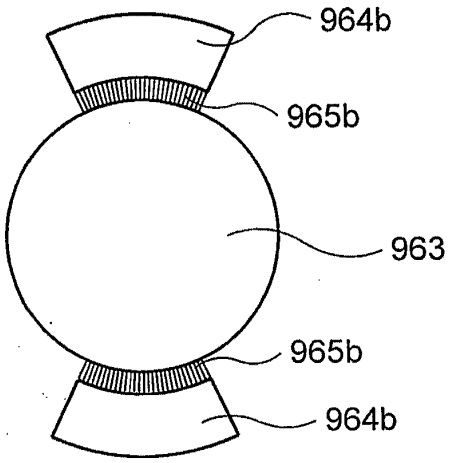


図 67

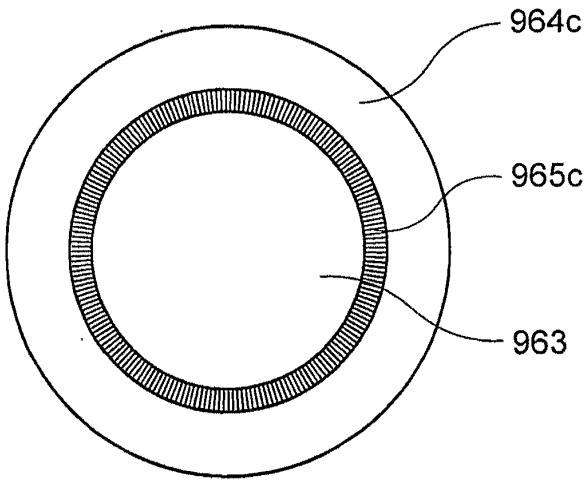


図 68

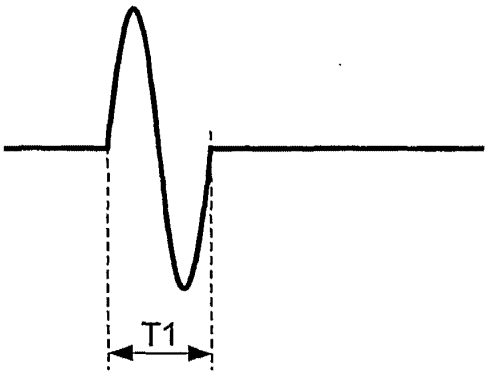


図 69

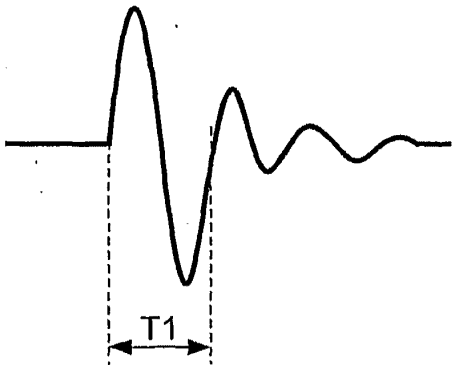


図 70

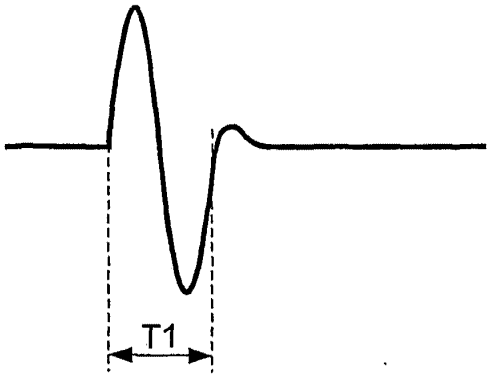


図 71

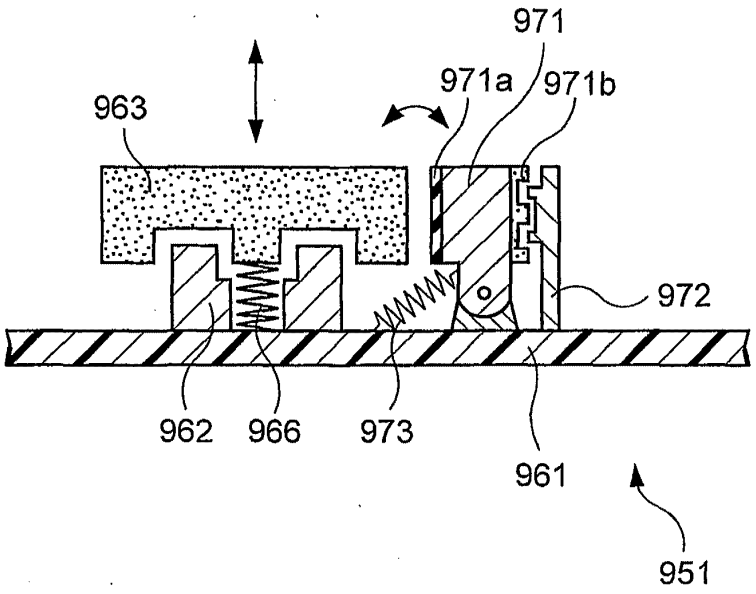

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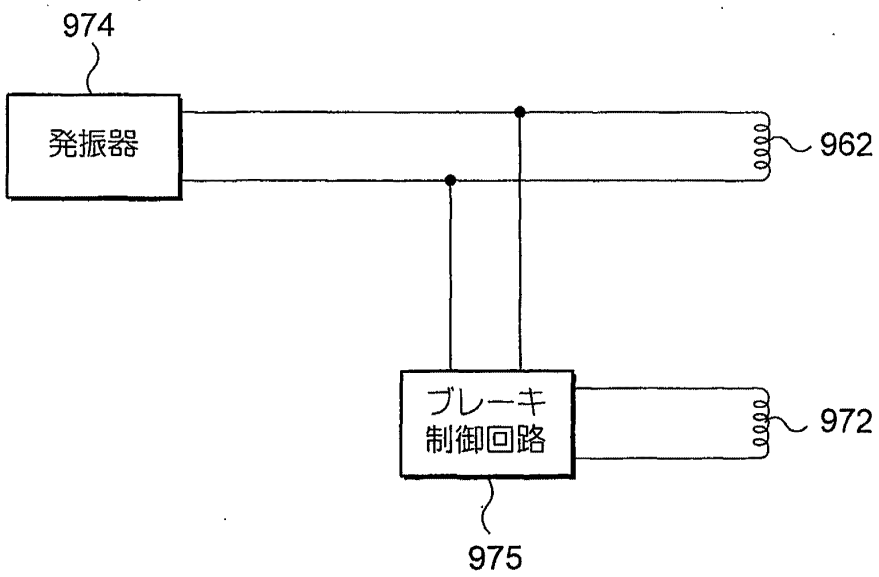

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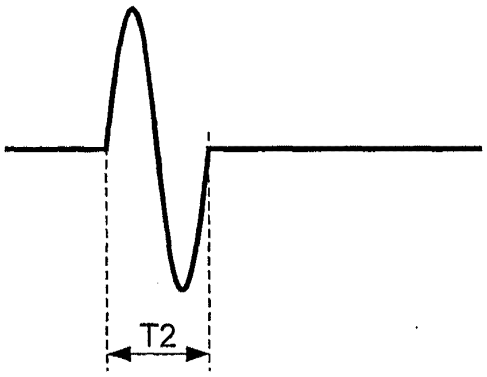


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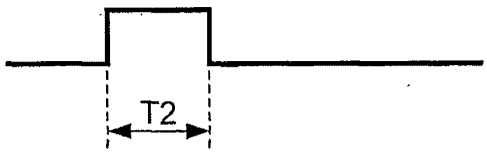


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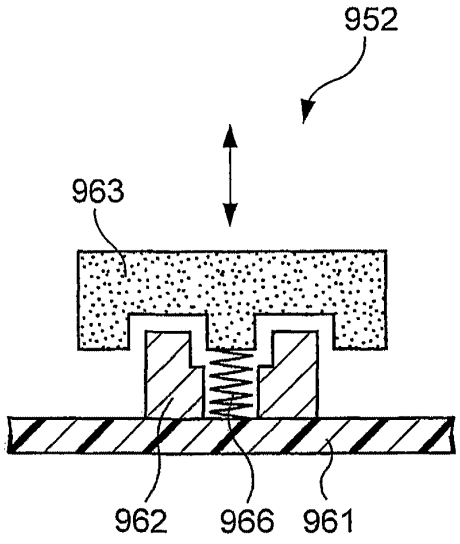


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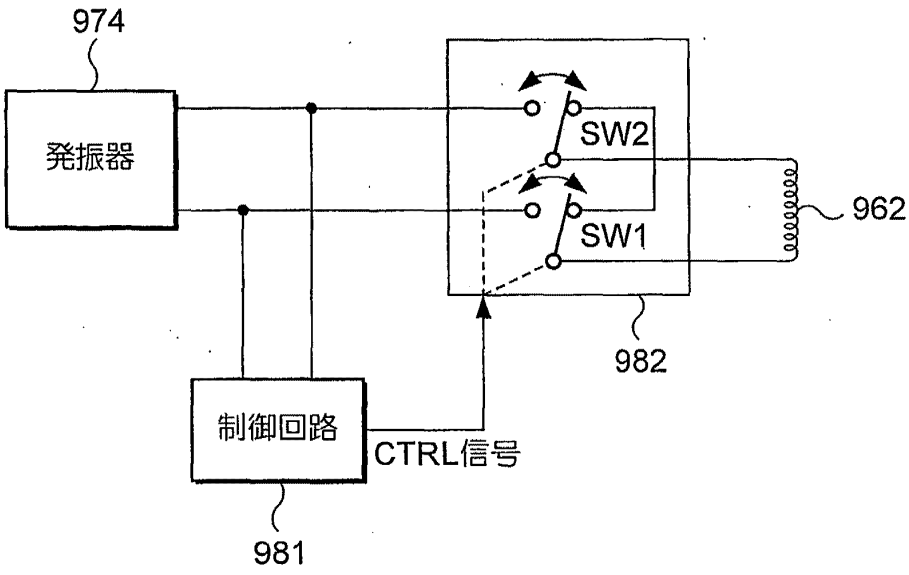


図 77

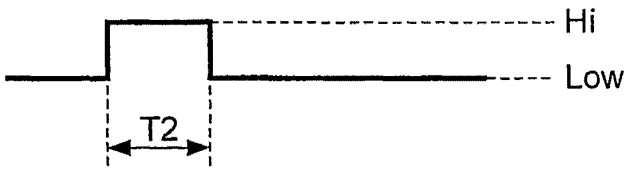


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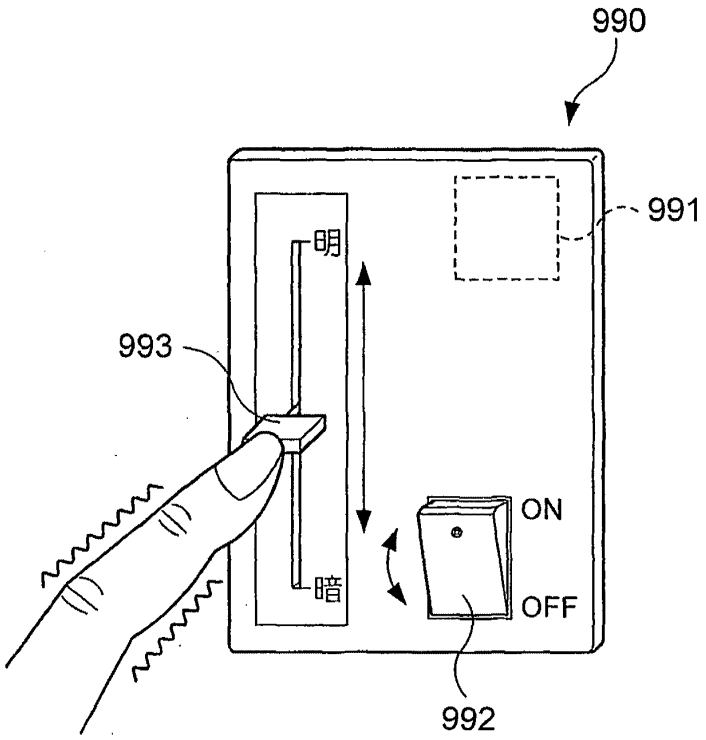


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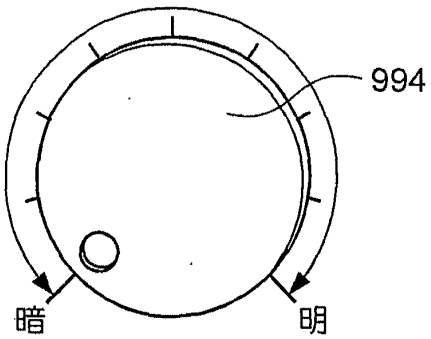


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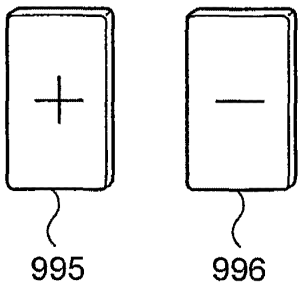


図 81

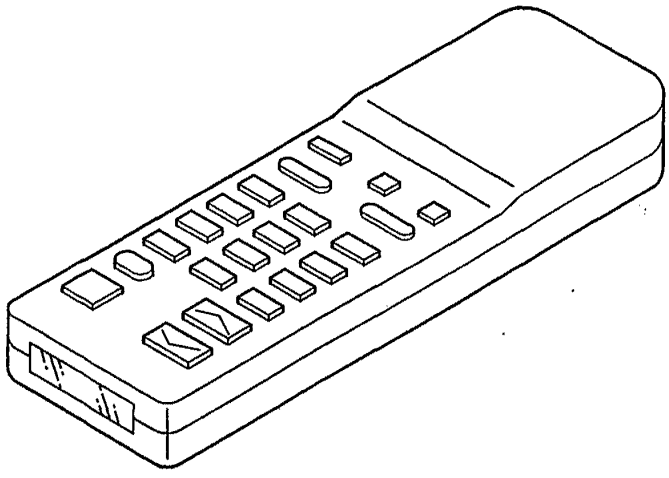


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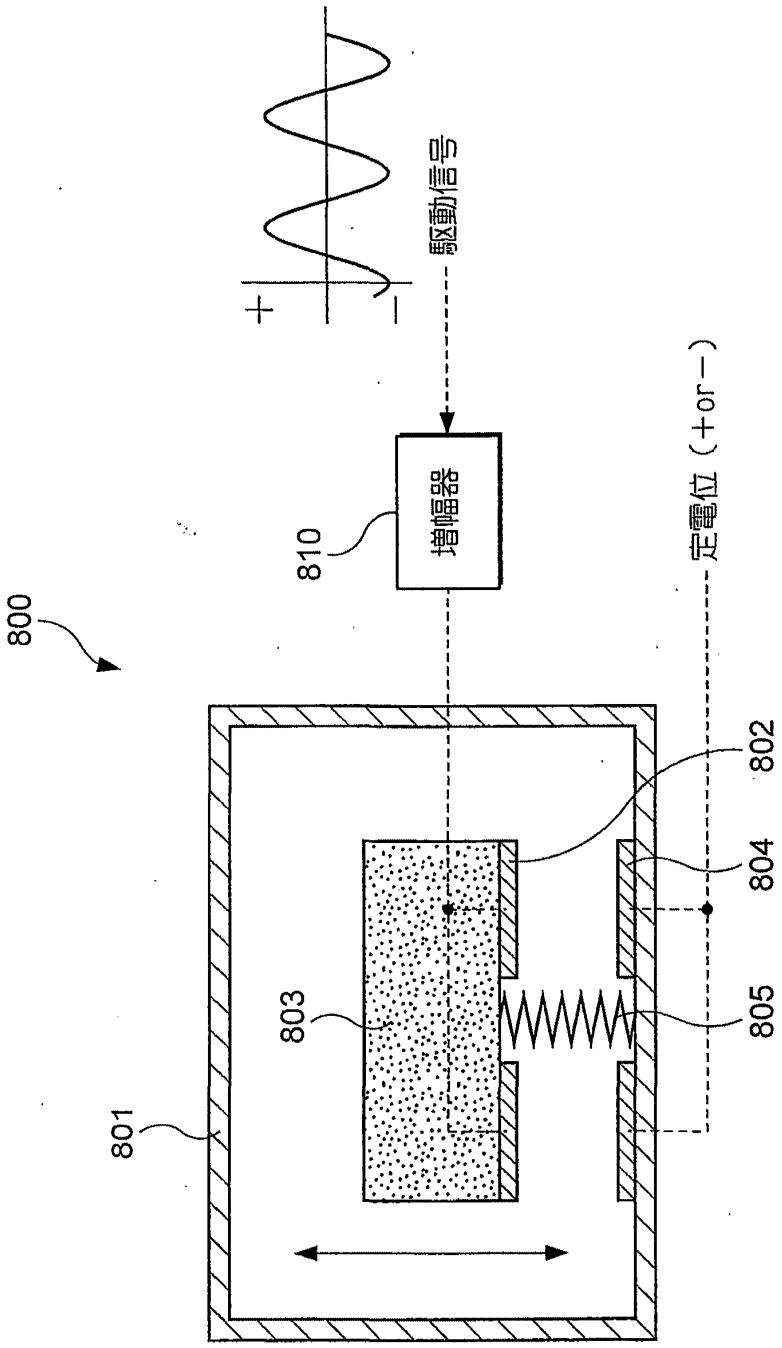


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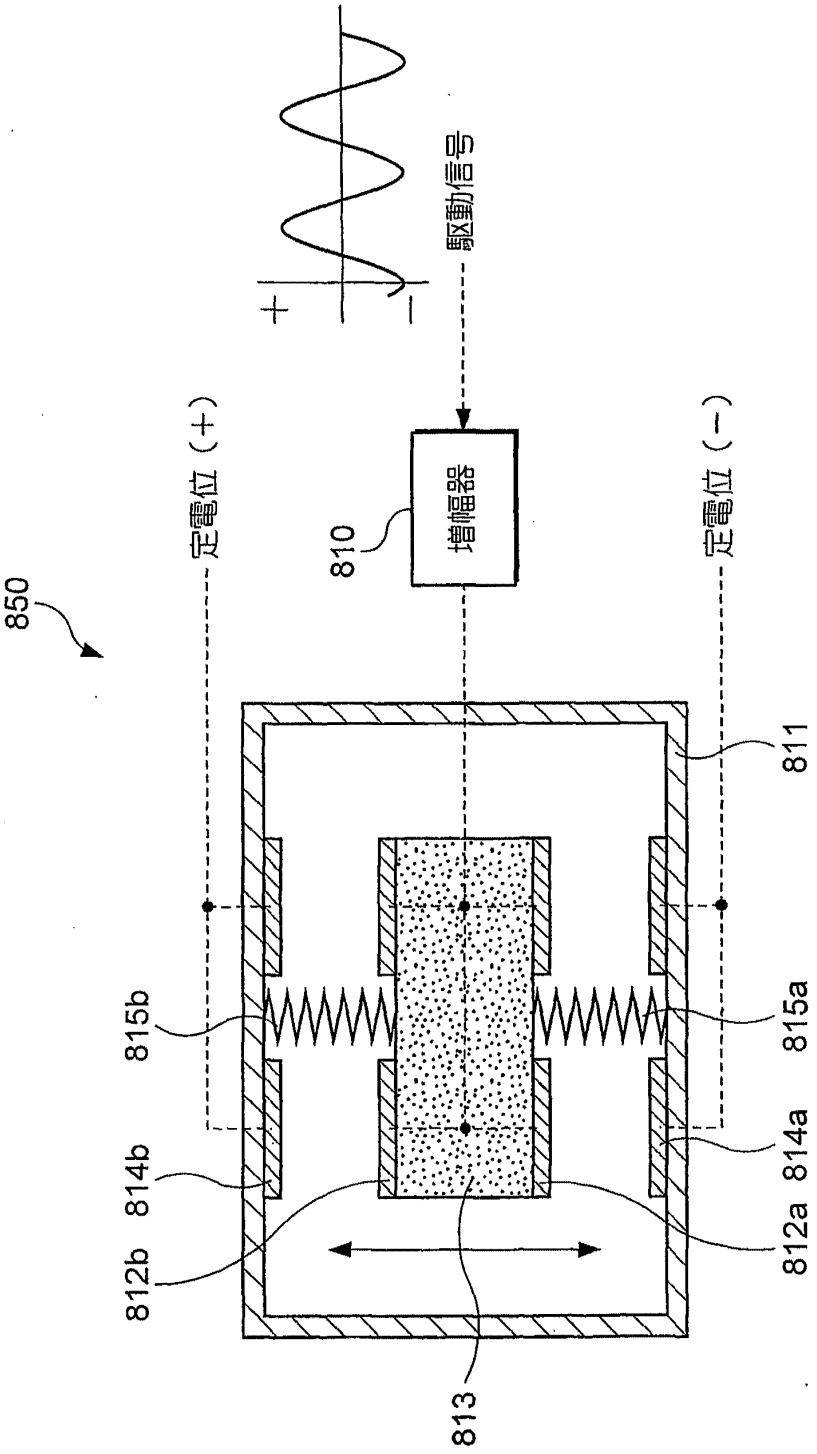


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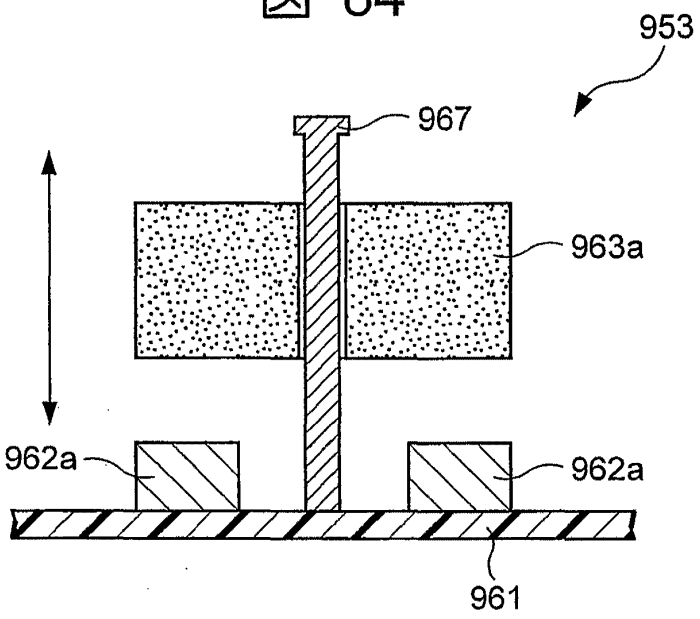
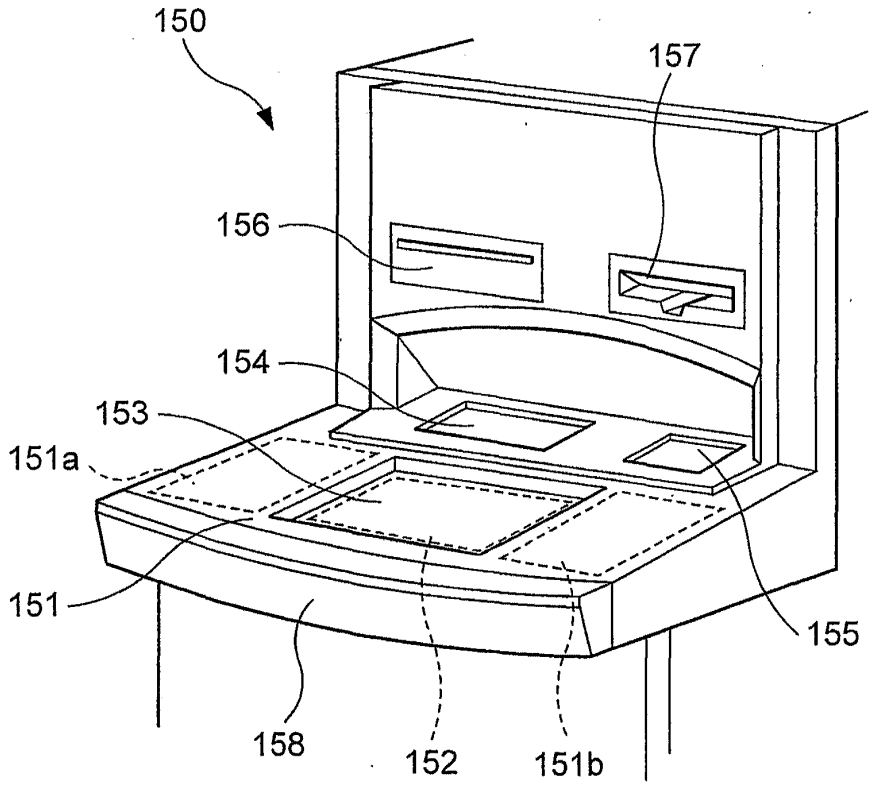

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特許協力条約に基づく国際出願願書 F0406/3105
原本（出願用）- 印刷日時 2001年08月02日 (02.08.2001) 木曜日 17時13分29秒

VIII-5-1	不利にならない開示又は新規性喪失の例外に関する申立て 不利にならない開示又は新規性喪失の例外に関する申立て（規則4.17(v)及び51の2.1(a)(v)）	本国際出願に関し、 株式会社エヌ・ティ・ティ・ドコモは、 本国際出願の請求項に記載された対象が以下のように開示されたことを申し立てる。
VIII-5-1 (i)	開示の種類	その他：学会発表
VIII-5-1 (ii)	開示の日付：	2001年03月05日 (05.03.2001)
VIII-5-1 (iii)	開示の名称：	インタラクティブ2001
VIII-5-1 (iv)	開示の場所：	早稲田大学　総合学術情報センター（国際会議場） 〒169-0051 日本国東京都新宿区西早稲田1-20-14
VIII-5-1 (i)	開示の種類	その他：学会発表
VIII-5-1 (ii)	開示の日付：	2001年03月31日 (31.03.2001)
VIII-5-1 (iii)	開示の名称：	ACM CHI2001
VIII-5-1 (iv)	開示の場所：	Washington State Convention and Trade Center, 800 Convention Place, Seattle, Washington 98101, U.S.A.
VIII-5-1 (i)	開示の種類	刊行物
VIII-5-1 (ii)	開示の日付：	2001年04月13日 (13.04.2001)
VIII-5-1 (iii)	開示の名称：	日本経済新聞
VIII-5-1 (iv)	開示の場所：	日本国
VIII-5-1 (v)	本申立ては、次の指定国のためになされたものである。：	国内特許又は広域特許のための KR の指定

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP01/06680

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl[7] G06F 3/02, G06F 3/033

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] G06F 3/02, G06F 3/033, H01H13/70

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 1994-2001
Kokai Jitsuyo Shinan Koho 1971-2001 Jitsuyo Shinan Toroku Koho 1996-2001

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.
A	WO 93/18475 A1 (Armstrong), 16 September, 1993 (16.09.93), & US 5589828 A & AU 3783693 A	1-3,8-11,61, 64,70,73, 123,128
X	DE 19638015 A (Mannesmann VDO AG), 26 March, 1998 (26.03.98), & JP 10-105337 A & US 6067081 A	1-3,8-13, 38-49,52, 70-73,123,128
A		4-7,14-37,50, 51,53-69, 74-122, 124-127, 129-135
X	JP 11-212725 A (Idec Izumi Corporation), 06 August, 1999 (06.08.99) (Family: none) Claim 3; Par. No. [0151]; Figs. 4, 21	1-3,8-13,22, 38-49,52, 61-67,70-75, 77-83,95-98, 101,102,123, 128,130,131
A		4-7,14-21, 23-37,50,51, 53-60,68,69,

☒ 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
12 October, 2001 (12.10.01)	23 October, 2001 (23.10.01)
Name and mailing address of the ISA/ Japanese Patent Office	Authorized officer

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP01/06680

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
		76,84-94,99, 100,103-122, 124-127,129, 132-135
A	EP 957423 A2 (Alps Electric Co., Ltd.), 17 November, 1999 (17.11.99), Par. No. [0091] & JP 11-339601 A	4
A	JP 11-162277 A (Omron Corporation), 18 June, 1999 (18.06.99) (Family: none)	19

国際調査報告

国際出願番号 PCT／JP01／06680

A. 発明の属する分野の分類（国際特許分類（IPC））

Int, Cl⁷ G06F 3／02, G06F 3／033

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, Cl⁷ G06F 3／02, G06F 3／033, H01H13／70

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	1971－2001年
日本国登録実用新案公報	1994－2001年
日本国実用新案登録公報	1996－2001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
A	WO 93/18475 A1(Armstrong)16.Sep.1993(16.09.93) & US 5589828 A & AU 3783693 A	1-3,8-11,61,64,70,73,123,128
X	DE 19638015 A(Mannesmann VDO AG)26.03.1998(26.03.98) & JP 10-105337 A & US 6067081 A	1-3,8-13,38-49,52,70-73,123,128
A		4-7,14-37,50,51,53-69,74-122,124-12

☒ 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 12.10.01	国際調査報告の発送日 23.10.01
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） 田中 友章　5E　9376 電話番号 03－3581－1101 内線 3520

C（続き）．　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
		7, 129-135
X	JP 11-212725 A(和泉電気株式会社)6.8月.1999(06.08.99)(ファミリーなし)請求項３、段落【０１５１】、図４、図２１参照	1-3, 8-13, 22, 38-49, 52, 61-67, 70-75, 77-83, 95-98, 101, 102, 123, 128, 130, 131
A		4-7, 14-21, 23-37, 50, 51, 53-60, 68, 69, 76, 84-94, 99, 100, 103-122, 124-127, 129, 132-135
A	EP 957423 A2(ALPS ELECTRIC CO.,LTD.)17.11.1999(17.11.99)段落【0091】 & JP 11-339601 A	4
A	JP 11-162277 A(オムロン株式会社)18.6月.1999(18.06.99)(ファミリーなし)	19

(19) Europäisches Patentamt
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(11) EP 1 182 851 A1

130

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
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Application No.: 10/723,778
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AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
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(54) Input device for a portable communication device

(57) An input device for entering control signals to a portable communication device (1) of a wireless communication system comprises an elongated scrolling means (2) which can be rotated around its axis for generating scrolling signals. In order to generate three different function activation signal said scrolling means can also be depressed on its middle portion (6) and can be actuated on its left or right end portion (7, 8), respectively. Said scrolling means may also provide a tactile feedback for the position of a users finger.

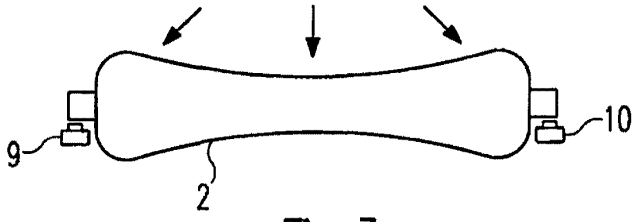


Fig. 3

EP 1 182 851 A1

Description

[0001] The present invention relates to an input device for entering control signals to a portable communication device of a wireless communication system.

[0002] Portable communication devices such as portable telephones of the recent generations provide a plurality of different functions and options which can be selected and activated by actuating different keys. Usually, text information or icons referring to the different functions and options are shown on a graphical display provided at the portable communication device. Modern displays have a relatively high resolution which makes it possible to show many information and/or icons at the same time on the display. However, in order to realise a clear arrangement only a few selectable options or functions should be shown at the same time. Other functions which are not shown can only be activated after navigating through different menus. Further, information or options are sometimes shown in lists or two-dimensional arrays and can only be activated by first navigating through these lists or arrays and pressing an enter key afterwards.

[0003] Navigation through the different menus or lists and two-dimensional arrays may be performed by one or more up/down scrolling keys or scrolling means. Such a scrolling means can be rotated around its axis for generating scrolling signals which are used to scroll through a list of information, such as names in a telephone book or characters shown on the display. A respective piece of information, such as a character, a name or an operation mode which may be selected upon pressing down the scrolling means or pressing a respective enter key is highlighted on the display so that the user knows which piece of information can actually be selected. A scrolling means which can be used for scrolling and which can be also depressed for activating the selectable option is disclosed in the European patent application EP 0 901 262 A2.

[0004] However, the known scrolling meanss only allow to scroll through a list or sequence of displayed pieces of information in a one-dimensional way. If pieces of information are displayed in a two-dimensional array, e. g. characters for entering text information, line after line has to be scrolled through in order to select one of the options. This results in a time-consuming and user-unfriendly handling of the communication device.

[0005] It is therefore an object of the present invention to provide an input device for entering control signals to a portable communication device of a wireless communication system which allows an easy and fast selection and activation of different options in menus, text entry and other situations.

[0006] The above object is achieved by an input device according to claim 1, which comprises an elongated scrolling means or scrolling key which can be rotated around its axis for generating scrolling signals, and which can be pressed down on its middle portion for generating a first function activation signal. According to the present invention said scrolling means further comprises switching means for generating a second and a third function activation signal upon actuation of its left or right end portion, respectively. The input device of the present invention therefore allows the generation of scrolling signals as well as of three additional function activation signals upon actuation of different portions of the scrolling means. For example, the signals generated by actuating the left or right end portion may be used as navigation signals for a horizontal movement of a cursor in a two-dimensional array. By pressing down the middle portion of the scrolling means the selected option may be finally activated.

[0007] The actuation of the end portions of the scrolling means may take place in different ways. For example, the switching means for generating the second and the third function activation signal can be actuated upon pressing on the left or right end portion of the scrolling means. In this case, the switching means preferably comprise two switches which are arranged under the left and right end portions of the scrolling means. Each switch is activated alone upon depression of either the left or right end portion but both switches are actuated simultaneously upon depression of the middle portion of the scrolling means. Alternatively, the switching means for generating the second and the third function activation signal are actuated upon shifting the scrolling means to the left or to the right. In this case, the input device preferably comprises three switches, the first switch being arranged under the middle portion of the scrolling means and the second and the third switch being arranged besides the left and right end portion, respectively.

[0008] In order to improve the handling of the input device said scrolling means may provide a tactile feedback for the position of a user's finger. This may be achieved by different shapes of the scrolling means. For example, the scrolling means may have at its middle portion a smaller diameter than at its end portions. In this case, the finger operating the scrolling means securely rests in the middle giving a guidance when rotating the scrolling means and a clear feeling when pressing or shifting the scrolling means. However, the scrolling means may also have at its middle portion a larger diameter than at its end portions providing also a tactile feedback for the fingers position. Finally, there may be additional palpable marks on the surface of the scrolling means.

[0009] The scrolling means according to the present invention is advantageously positioned in a central position under the display of the portable communication device, but can also be located at any other convenient position such as on one of the side walls.

[0010] In the following description, the present invention is explained in more detail by means of different embodiments relating to the enclosed drawings, in which

Figure 1 shows a schematic top view of a portable communication device of a wireless communication system according to the present invention, namely a portable telephone;

Figure 2 shows a side view of a portable telephone wherein the scrolling means is positioned on the upper left side wall;

Figure 3 shows a first embodiment of the input device according to the present invention wherein the second and the third function activation signal are generated upon depression of the end portions of the scrolling means;

Figure 4 shows a second embodiment of the input device wherein the second and third function activation signals are generated upon shifting the scrolling means;

Figure 5 shows a third embodiment of the input device comprising marks in order to provide a tactile feedback;

Figure 6 shows a fourth embodiment of the input device comprising marks at the end portions of the scrolling means; and

Figure 7 shows a fifth embodiment of the input device having a curved shape for providing a tactile feedback.

[0011] Figure 1 shows a schematic top view of a portable telephone 1 for a wireless telecommunication system as e.g. the GSM or UMTS system. Also the following description solely relates to a portable telephone, the portable communication device for a wireless communication system according to the present invention may also be any other device like a portable laptop computer, a portable palmtop computer or the like comprising functions for communicating data in a wireless communication system.

[0012] However, the present invention is particularly advantageous for portable communication devices which can be held and operated with a single hand.

[0013] The portable telephone 1 shown in figure 1 comprises a display means 4, on which pieces of information like characters, menu items, text information, names or the like can be displayed. The portable telephone 1 further comprises a loudspeaker 5 on the upper front part and a microphone 17 on the lower front part of the casing. Further, an enter or menu key 18 as enter means for selecting a respective menu item or function is provided. The portable telephone 1 further comprises the usual 10 alphanumeric keys 3 (numbers 0 to 9), a communication start key 23, a communication end key 16, a pound key 19, a star key 22, a power on/off key 20 and a clear key 21. Further, the portable telephone 1 comprises on its front side in a central position under the display means 4 as an input device a scrolling means or scrolling key 2, which is a rotatable key, a part of which is exposed to the outside. The exposed part can be touched by the finger of a user's hand and may be rotated clockwise (upwardly) or counterclockwise (downwardly) in order to scroll through pieces of information or lists displayed on the display means 4. Preferably, the display means 4 of the portable telephone 1 comprises a graphical display, which has a higher resolution than usual text or character displays.

[0014] As already mentioned, the scrolling means 2 has not necessarily to be positioned on the front side of the portable telephone 1 but can also be located at any other convenient position. Figure 2 shows an example wherein the scrolling means 2 is arranged on the upper left side wall of a portable telephone 1.

[0015] As already known from EP 0 901 262 A2, in addition to the generation of scrolling signals a first function activation signal can be generated by pressing or clicking the scrolling means 2 inwardly on its middle portion 6. This first function activation signal may be used for selecting a piece of information displayed on the display means 4, as e.g. a character, a menu function, a name, a telephone number or the like. Alternatively, the displayed piece of information may also be selected by pressing the enter or menu key 18.

[0016] According to the present invention, a second and a third function activation signal can additionally be generated upon actuation of the left end portion 7 or the right end portion 8 of the scrolling means 2. These two additional function activation signals may have different functionality depending on the information displayed on the display means 4. For example, if there is a two-dimensional array displayed on the display means 4, the second and the third function activation signal may be used for generating navigation signals for a horizontal movement of a cursor. Therefore, using only a single input device a user is able to navigate through a two-dimensional array and to activate the desired function. However, if there are only three options displayed in a line on the display means 4, the second and the third function activation signal may also be used for activating the option shown on the left side or the option shown on the right side, respectively.

[0017] As already mentioned, an actuation of the left and right end portions of the scrolling means 2 may take place in different ways. Figure 3 shows a first embodiment of the scrolling means 2 wherein the left and right end portions are actuated upon pressing down the end portions. In this embodiment, two switches 9 and 10 are arranged under the left and right end portions of the scrolling means 2. If one of the two end portions of the scrolling means 2 is depressed in order to generate a second or third function activation signal one of the two switches 9 and 10 is activated. On the other hand, if the scrolling means 2 is pressed down in its middle part in order to generate the first function activation signal, both

switches 9 and 10 are activated simultaneously. This simultaneous activation of both switches 9 and 10 is recognised by software or by electronic means and the desired first function activation signal is generated.

[0018] As also shown in figure 3, the first embodiment of the scrolling means 2 has a curved shape in order to provide a tactile feedback for the user. The essentially cylindrical scrolling means 2 has at its middle portion a smaller diameter than at its end portions. Such a curved shape allows the finger of the user to rest securely in the middle of the scrolling means giving a guidance during rolling the scrolling means 2 and a clear feeling when pressing down the scrolling means 2 on its middle portion or on its two end portions. Therefore, an improved handling of the scrolling means 2 is achieved in particular during operations without looking at the scrolling means 2 since the finger of the user can stay all the time on the surface of the scrolling means 2. This allows a very fast navigation, both up or down by rotating the cylinder, and generation of the three different function activation signals. Also, the user can watch the display means during the operation because the finger does not have to move between different keys. Further, because only one finger is needed for the operation, the other fingers can hold the portable telephone secure in the hand.

[0019] In the second embodiment of the input device according to the present invention which is shown in figure 4, the second and the third function activation signals are generated upon shifting the scrolling means 2 to the left or to the right. As can be seen from figure 4, in this case the input device contains three switches 11, 12 and 13, the first switch 11 being arranged under the middle portion of the scrolling means 2 and the second and the third switch 12 and 13 being arranged besides the left or right end portion of the scrolling means, respectively. Upon depressing the middle portion of the scrolling means, only the first switch 11 is activated in order to generate the first function activation signal. Upon shifting the scrolling means 2 to the left or to the right either the left switch 12 or the right switch 13 is activated in order to generate the second or third function activation signal. Like in the first embodiments shown in figure 3, the scrolling means 2 shown in figure 4 also has a curved shape with a smaller diameter at its middle portion in order to provide a tactile feedback for the user.

[0020] In the third embodiment of the input device shown in figure 5, the cylindrical scrolling means 2 has the same diameter over its whole length. Since the scrolling means 2 is not curved like in the first and second embodiment, a ring of small pads 14 is arranged on the surface of the scrolling means 2 in order to provide a tactile feedback when the user's finger rests on the middle portion of the scrolling means 2. Here, the second and the third function activation signals are again generated upon depressing the left or right end portions of the scrolling means 2. Therefore, again only two switches 9 and 10 are necessary for generating the three different function activation signals; both switches 9 and 10 being activated simultaneously upon depressing the middle portion of the scrolling means 2 and either the left switch 9 or the right switch 10 being actuated upon depressing the left or right end portions.

[0021] In the fourth embodiment of the input device according to the present invention shown in figure 6, the scrolling means again has the form of a cylinder. In contrast to the embodiment shown in figure 5 two ring-shaped projections 15 are provided on the surface of the scrolling means 2 on its left and right end portion. Again, the user gets a clear feedback of the position of its finger on the scrolling means 2.

[0022] The additional marks shown in figure 5 and figure 6 providing a tactile feedback may also be used with the two first embodiments. However, the curved shape of these two first embodiments alone provides a reasonable clear feedback. Further, in both embodiments shown in figure 5 and 6 three switches may be provided like in figure 4 and the second and third function activation signal may be generated upon shifting the scrolling means 2 instead of pressing it down.

[0023] Finally, a fifth embodiment of the input device according to the present invention is shown in figure 7. Again, the scrolling means 2 has a curved shape, but in contrast to the embodiments of the figures 3 and 4 the scrolling means 2 has now a larger diameter at its middle portion than at its end portions. The curved shape of the scrolling means 2 again gives a tactile feedback for a user so that he intuitively knows the position of his finger without lodging the scrolling means 2.

[0024] The input device according to the present invention therefore provides the opportunity of generating a plurality of different control signals for operating a portable communication device by using only a single scrolling means. This allows a very fast navigation through different menus or lists and two-dimensional arrays shown on the display of the communication device. By providing additional marks on the surface of the scrolling means or by choosing a curved shape a tactile feedback is provided which improves the handling since a user intuitively knows the position of its finger without watching the input device.

Claims

1. Input device for entering control signals to a portable communication device (1) of a wireless communication system,
said input device comprising an elongated scrolling means (2) which can be rotated around its axis for generating scrolling signals, and which can be depressed on its middle portion (6) for generating a first function activation signal,
characterized in,
that the scrolling means (2) further comprises switching means (9, 10; 12, 13) for generating a

second and a third function activation signal upon actuation of its left or right end portion (7, 8), respectively.

2. Input device according to claim 1, **characterized in, that** the switching means (9, 10) for generating the second and the third function activation signal are actuated upon depression of the left or right end portion (7, 8) of the scrolling means (2).

3. Input device according to claim 2, **characterized in, that** said input device comprises two switches (9, 10) which are arranged under the left and right end portions (7, 8) of the scrolling means (2).

4. Input device according to claim 3, **characterized in, that** the two switches (9, 10) are actuated simultaneously upon depression of the middle portion of the scrolling means (2) for generating the first function activation signal.

5. Input device according to claim 1, **characterized in, that** the switching means (12, 13) for generating the second and the third function activation signal are actuated upon shifting the scrolling means (2) to the left or to the right.

6. Input device according to claim 5, **characterized in, that** said input device comprises three switches (11-13), the first switch (11) being arranged under the middle portion (6) of the scrolling means (2) and the second and third switch (12, 13) being arranged besides the left or right end portion (7, 8) of the scrolling means (2), respectively.

7. Input device according to one of the claims 1 to 6, **characterized in, that** said scrolling means (2) provides a tactile feedback for the position of a finger.

8. Input device according to claim 7, **characterized in, that** said scrolling means (2) has at its middle portion a smaller diameter than in its end portions.

9. Input device according to claim 7, **characterized in, that** said scrolling means (2) has at its middle portion a larger diameter than at its end portions.

10. Input device according to one of the claims 7 to 9, **characterized in, that** marks are arranged on the surface of the scrolling means (2).

11. Portable communication device (1) of a wireless communication system, comprising an input device for entering control signals according to one of the claims 1 to 10.

12. Portable communication device (1) of a wireless communication system according to claim 11, **characterized in, that** the communication device (1) is a portable telephone.

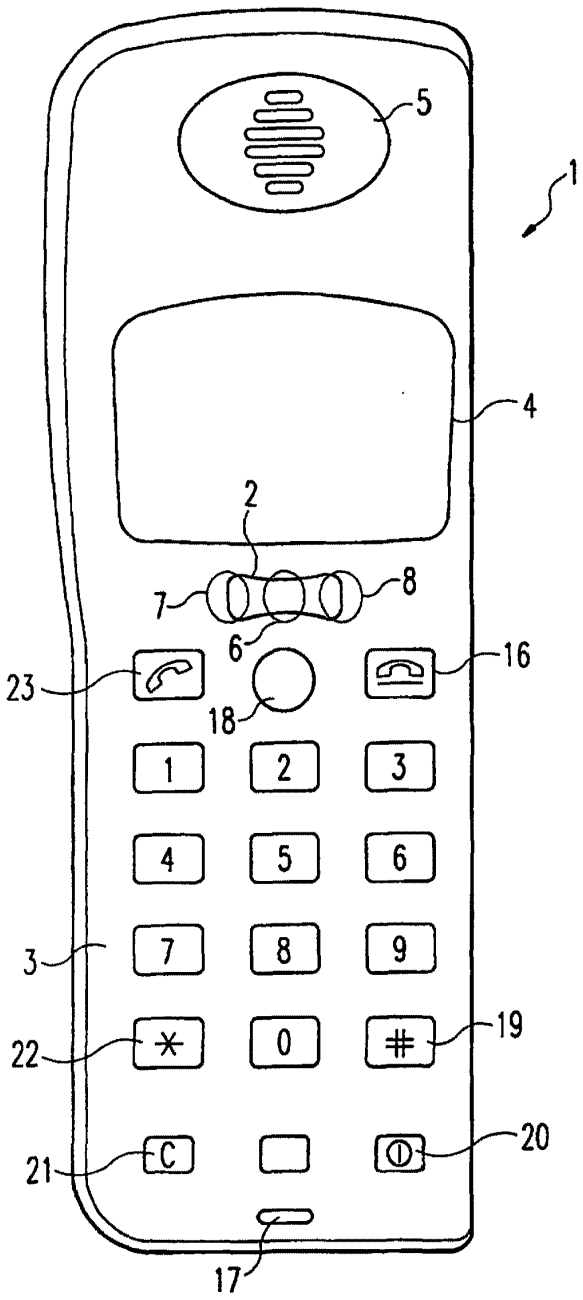


Fig. 1

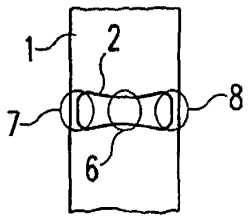


Fig. 2

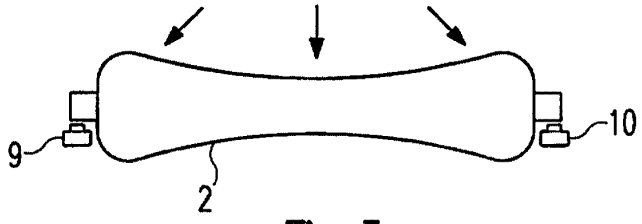


Fig. 3

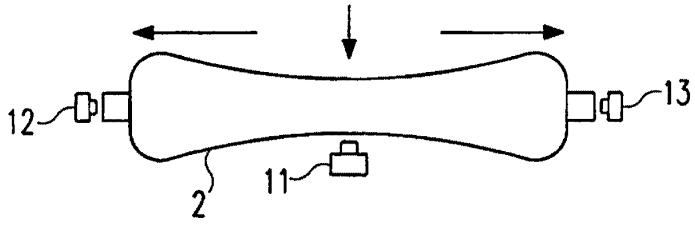


Fig. 4

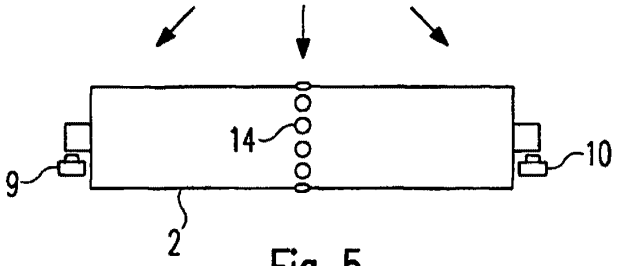


Fig. 5

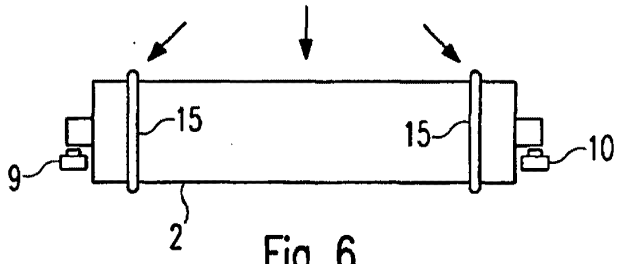


Fig. 6

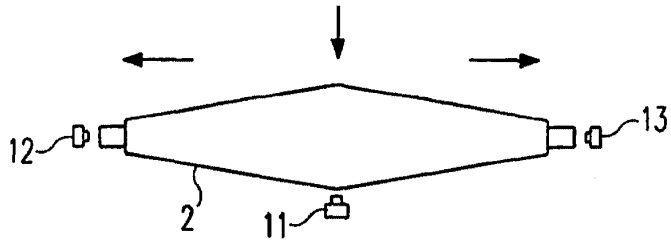


Fig. 7

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 11 8400

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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Y A	US 6 094 586 A (YANAGISAWA ET AL) 25 July 2000 (2000-07-25) * abstract * * column 1, line 63 - column 2, line 45 * * column 3, line 60 - column 4, line 31 * * column 8, line 16 - column 9, line 12 * * figure 8 *	1,11,12 5	
Y	EP 0 946 028 A (NOKIA MOBILE PHONES LTD) 29 September 1999 (1999-09-29) * abstract * * page 3, line 47 - page 4, line 14 * * page 4, line 40 - page 5, line 8 * * page 5, line 32 - line 36 * * page 7, line 31 - line 34 * * figures 1,3,6 *	1,11,12	TECHNICAL FIELDS SEARCHED (Int.Cl.7) H04M H01H G06K
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	30 January 2001	Fragua, M

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
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

(12) NACH DEM VERTRAG ÜBER DIE INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES PATENTWESENS (PCT) VERÖFFENTLICHTE INTERNATIONALE ANMELDUNG

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(81) Bestimmungsstaaten *(national)*: CN, JP, US.

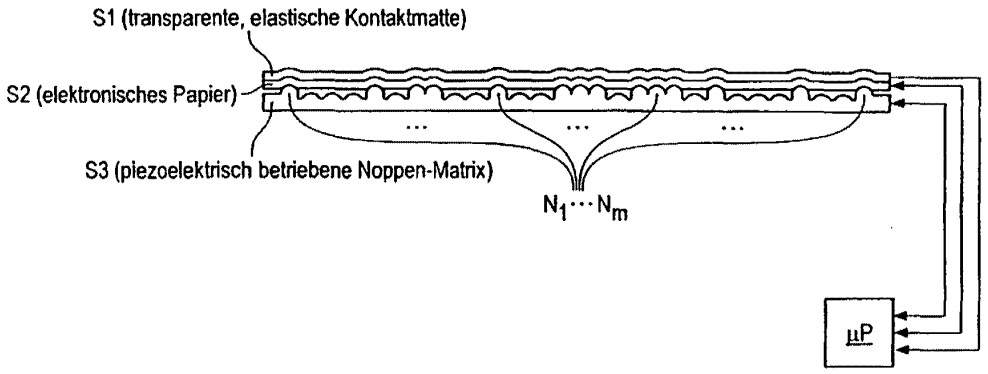
(84) Bestimmungsstaaten *(regional)*: europäisches Patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR).

[Fortsetzung auf der nächsten Seite]

(54) Title: TOUCH-SENSITIVE DISPLAY WITH TACTILE FEEDBACK

(54) Bezeichnung: BERÜHRUNGSSENSITIVE ANZEIGE MIT TAKTILER RÜCKKOPPLUNG

Application No.: 10/723,778
Filing Date: 11/26/2003
Docket Number: IMM174 (51851-279589)



S1 (TRANSPARENT, ELASTIC CONTACT MAT)
S2 (ELECTRONIC PAPER)
S3 (PIEZOELECTRIC KNOB MATRIX)

(57) **Abstract:** The invention relates to a touch-sensitive display with tactile feedback, comprising a first layer S_1, a mechanically flexible display medium, a second layer S_2 with at least one receptor, and a third layer S_3 with at least one controllable actuator. The second layer S_2 is disposed in such a way that the receptor detects a contact in at least one section of the first layer S_1 and generates at least one first signal. The third layer S_3 is disposed in such a way that the controllable actuator mechanically manipulates the first layer S_1 at least in some points of the section. The display is further provided with a control device µP that is designed and contacted with the second layer S_2 and the third layer S_3 to generate in an initial state at least one second signal for controlling the actuator, at least one modified second signal being generated on the basis of the first signal.

(57) **Zusammenfassung:** Berührungssensitive Anzeige mit taktiler Rückkopplung mit ei-ner ersten Schicht S1, mit einem mechanisch flexiblen Anzeigemedium, einer zweite Schicht S2 mit mindestens einem Rezeptor, einer dritte Schicht S3 mit mindestens einem steuerbaren Aktor, wobei die zweite Schicht S2 derart angeordnet ist, dass der Rezeptor eine Berührung in zumindest einem Teilbereich der ersten Schicht S1 unter Erzeugung mindestens eines ersten Signals erfasst und

[Fortsetzung auf der nächsten Seite]

WO 02/27645 A1

Erklärungen gemäß Regel 4.17:

— *hinsichtlich der Berechtigung des Anmelders, ein Patent zu beantragen und zu erhalten (Regel 4.17 Ziffer ii) für die folgenden Bestimmungsstaaten CN, JP, europäisches Patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR)*

— *Erfindererklärung (Regel 4.17 Ziffer iv) nur für US*

Veröffentlicht:

— *mit internationalem Recherchenbericht*

Zur Erklärung der Zweibuchstaben-Codes und der anderen Abkürzungen wird auf die Erklärungen ("Guidance Notes on Codes and Abbreviations") am Anfang jeder regulären Ausgabe der PCT-Gazette verwiesen.

wobei die dritte Schicht S3 derart angeordnet ist, dass der steuerbare Aktor die erste Schicht S1 zumindest in dem Teilbereich punktuell mechanisch manipuliert, sowie eine Steuereinrichtung mP, die mit der zweiten Schicht S2 und dritten Schicht S3 derart ausgestaltet und verbunden ist, dass in einem Ausgangszustand mindestens ein zweites Signal zur Ansteuerung des Aktors erzeugt wird, wobei auf Grundlage des ersten Signals mindestens ein geändertes zweites Signal erzeugt wird.

Beschreibung

Berührungssensitive Anzeige mit taktiler Rückkopplung

Die Erfindung betrifft eine berührungssensitive Anzeige mit taktiler Rückkopplung.

Berührungssensitive Anzeigen "Touchscreens" kommen überwiegend in sogenannten Touchscreen-Terminals zu Einsatz, die mittels Fingerberührung des Bildschirms durch einen Benutzer bedient werden, wobei die vom PC bekannte Tastatur und Maus meist entfallen.

Eine Bestätigung, dass eine von einem Benutzer getätigten Eingaben erfolgt ist, wird im Allgemeinen durch audiovisuelle Rückkopplung erreicht, beispielsweise durch einen Piepton oder Farbwechsel des Anzeigebereichs beim Berühren der Anzeige.

Touchscreen-Terminals werden auf Messen, Präsentationen oder im Empfangsbereich eines Unternehmens zum Dialog mit Kunden aufgestellt. Ebenso finden Touchscreen-Terminals auch Anwendung auf Flughäfen, in Stadtzentren als Informations-Terminals für Touristen und in Produktionsstätten zur Erfassung und Steuerung von Produktionsabläufen.

Ein Nachteil bei den zuletzt genannten Anwendungen sind laute und unregelmäßig auftretende Umgebungsgeräusche, die an Flughäfen, Straßen bzw. Produktionsstätten gegeben, so das die Gefahr besteht, dass eine auditive Rückkopplung durch die Umgebungsgeräusche überlagert werden und vom Benutzer unbemerkt bleiben.

Eine visuelle Rückkopplung ist ebenfalls von Umgebungseinflüssen abhängig. Beispielsweise können direkte oder reflektierte Sonnenstrahlen zu Irritationen führen, so dass eine visuelle Rückkopplung nicht ihre Wirkung erzielt. Zudem kommt

es auch vor, dass der Benutzer für die visuelle Rückkopplung vorgesehenen Bereiche der Anzeige durch die Hand verdeckt.

Aus der US 4,885,565 ist dazu ein berührungssensitiver Monitor bekannt, bei dem bei einer durch Berührung erfolgten Eingabe eines Benutzers eine taktile Rückkopplung ausgelöst wird, wobei dazu eine Schwingspule durch einen Mikroprozessor derart angesteuert wird, dass sie einen mechanischen Impuls auslöst, der das Gehäuse des Monitors in Schwingung versetzt, so dass zusätzlich zur audiovisuellen Rückkopplung der Benutzer auch spürt, dass seine Eingabe detektiert wurde.

Nachteilig bei dieser Lösung ist, dass egal welche Eingabe durch Berührung erfolgt ist, stets die gleiche taktile Rückkopplung erfolgt und erst durch die Verbindung mit der nach wie vor vorhandenen audiovisuellen Rückkopplung eine Differenzierung möglich ist.

Die der Erfindung zugrundeliegende Aufgabe ist es eine berührungsempfindliche Anzeige mit taktiler Rückkopplung anzugeben, die die Nachteile des Standes der Technik löst.

Diese Aufgabe wird durch die Merkmale des Patentanspruches 1 gelöst.

Erfindungsgemäß weist eine berührungssensitive Anzeige mit taktiler Rückkopplung eine erste mechanisch flexible Schicht, derart ausgestaltet, dass sie als Anzeige funktioniert beispielsweise eine als elektronisches Papier bekannte Folie, eine zweite Schicht aufweisend mindestens einen Rezeptor, eine dritte Schicht aufweisend mindestens einen steuerbaren Aktor, wobei die zweite Schicht derart angeordnet ist, dass der Rezeptor eine Berührung in zumindest einem Teilbereich der ersten Schicht unter Erzeugung mindestens eines ersten Signals erfasst und wobei die dritte Schicht derart angeordnet ist, dass der steuerbare Aktor die erste Schicht zumindest in dem Teilbereich punktuell mechanisch manipuliert sowie eine

Steuereinrichtung, die mit der zweiten und dritten Schicht derart ausgestaltet und verbunden ist, dass in einem Ausgangszustand mindestens ein zweites Signal zur Ansteuerung des Aktors erzeugt wird, wobei auf Grundlage des ersten Signals mindestens ein geändertes zweites Signal erzeugt wird.

Die erfindungsgemäße Anzeige ermöglicht ein Erfassen einer Berührung der Anzeige durch den Rezeptor, wobei unmittelbar am Ort der Berührung ein taktiles Feedback gegeben wird, in dem beispielsweise bei einem auf der Anzeige dargestellten virtuellen Tastenblock, der durch Druck auf die entsprechende Stelle der Anzeige bedient werden kann, für jede der dargestellten Tasten des Tastenblocks durch den Aktor eine fühlbare Begrenzung und/oder eine Tastaturbeschriftung, die insbesondere auch für die Realisierung eines Terminals für Sehbehinderte bzw. Blinde hilfreich ist - realisiert wird. Beispielsweise ist es denkbar, das Tastatur und Beschriftung für Sehende dargestellt werden, während gleichzeitig durch den Aktor eine Ausgabe in Blindenschrift "Brailleschrift" unterhalb der dargestellten Taste erzeugt wird.

Durch geeignete Steuerung (Software) kann, um den Eindruck einer wirklichen Tastatur näher zu kommen, ein Nachgeben bzw. Einrasten der virtuellen Taste erzeugt werden und es ist sogar möglich, einen Schieberegler zu simulieren, in dem eine einen Regler darstellende virtuelle Taste der Berührung bzw. dem Ziehen der Taste folgt, wobei dazu evtl. die Oberfläche eines solchen Reglers insbesondere rau und griffig erzeugt wird. Durch die erfindungsgemäße Anzeige erhält der Benutzer eine intuitive Rückkopplung, die dem Benutzer eine höhere Sicherheit im Umgang mit einer berührungssensitiven Anzeige gewährt und den Einfluss störender Geräusche und Lichtegegebenheiten minimiert bzw. neutralisiert.

Als erste Schicht besonders geeignet sind Anzeigemedien, die gemäß der Technologie des "elektronischen Papiers", "mikroge-

kapselten elektrophoretischen Anzeige" oder "organischen Elektro-Lumineszenz" ausgestaltet sind, da diese sehr dünn und ausgestaltet als flexible Folie mechanischen Kräften, die insbesondere punktuell auf die Folienfläche wirken, wie sie der Aktor erzeugt, nachgibt. Dabei ist die Folie derart elastisch ausgestaltet, dass sie in den Ausgangszustand vor der mechanischen Krafteinwirkung zurückkehrt, sobald die Krafteinwirkung beendet ist.

Eine Ausgestaltung des Rezeptors als Lichtgitter, erlaubt das indirekte Detektieren von Berührungen, da ein solches knapp über der ersten Schicht angebrachte Lichtgitter lediglich den Ort erfasst an dem ein Benutzer beispielsweise mit dem Finger das Licht des Gitters unterbricht, um eine virtuelle Taste zu berühren. Des Weiteren hat diese Ausgestaltung den Vorteil, dass die zweite Schicht aus dem Luft gebildet wird, welches nur durch die das Lichtgitter realisierende Einrichtungen begrenzt ist, so dass der Aktor keinen zusätzlichen Widerstand zur punktuellen mechanischen Manipulation erfährt und wenig Antriebsenergie benötigt.

Die Ausgestaltung des Aktors als Matrixanordnung von elektrisch und/oder magnetisch angetriebenen Stiften erlaubt die Erzeugung einer Rauheit bzw. Griffigkeit der virtuellen Tasten und ist insbesondere für die Realisierung der Ausgabe einer Blindenschrift besonders geeignet.

Eine Matrix von senkrecht zur Anzeige gelagerten beweglichen Stiften als Rezeptor ist geeignet, um das Einrasten bzw. Nachgeben auf einen Tastendruck zu simulieren. Auch das Erfassen eines virtuellen Schiebereglers ist mit dieser Ausgestaltung einfach zu realisieren, da für die Ermittlung der Schieberichtung lediglich der Zustand benachbarter Stifte geprüft werden muss.

Stifte von Aktor-Matrix und der Rezeptor-Matrix nebeneinander abwechselnd in der gleichen Ebene (Schicht) anzuordnen spart Raum.

Noch vorteilhafter ist es die Stifte derart auszugestalten, dass sie sowohl die Aktor als auch Rezeptor-Funktion erfüllen. Dadurch lässt sich auch effektive und platzsparende Art die Begrenzung bzw. Beschriftung einer virtuellen Taste erzeugen (herausfahren der Stifte), wobei ein (hinein-)drücken der Stifte zum einen das Detektieren der Berührung ermöglicht und zum anderen das Nachgeben bzw. Einrasten. Zudem ist die durch die Ortsübereinstimmung von Rezeptor und Aktorfunktion eine präzisere Zuordnung von ermitteltem Druckpunkt und dargestellter virtueller Information möglich.

Piezoelektrische Elemente eignen sich besonders für den Antrieb bzw. das Detektieren von Berührungen da sie, beispielsweise durch Mikroprozessoren erzeugte, Spannungen (Signale) in Druck bzw. Bewegung direkt umsetzen können und umgekehrt Druck in sofort, durch Mikroprozessoren, weiterverarbeitbare Spannungen (Signale) erzeugen.

Elektromagnetische Elemente werden, ebenso wie die piezoelektrischen Elemente, für die Realisierung von Blindenschrift Terminals, Braillezeile, bekannt und daher leicht zu erwerben.

Eine Sensormatte als Rezeptor vorzusehen, hat unter anderem den Vorteil, dass die Sensormatte als Massenprodukt günstig in der Anschaffung ist.

Ist die zweite Schicht als transparente Sensormatte ausgestaltet, die zudem unmittelbar oberhalb der ersten Schicht zu liegen kommt, wird das mechanisch flexible Anzeigemedium geschützt da es nicht mehr direkt der Berührung durch einen Nutzer ausgesetzt ist. Die Lebensdauer des, sicherlich im

Vergleich zur Sensormatte mit höheren (Anschaffungs-)Kosten verbundenen Anzeigemediums wird erhöht.

Ein Ausführungsbeispiel der Erfindung wird anhand der einzigen Figur dargestellt. Diese zeigt:

Seitenansicht des Schichtaufbaus einer berührungssensitiven Anzeige mit taktilem Feedback.

In der Figur ist eine in drei Schicht S_1, S_2 und S_3 gegliederte Anzeige in Seitenansicht dargestellt, wobei in der ersten Schicht S_1 eine transparente, flexible Sensormatte zu liegen kommt.

Diese Sensormatte ist derart ausgestaltet, dass sie Berührungen detektiert und mindestens ein erstes Signal erzeugt, das zumindest den Ort (kartesische Koordinaten) der Berührung bestimmt.

Unmittelbar oberhalb dieser ersten Schicht S_1 ist die zweite Schicht S_2 angeordnet, die durch eine flexible elastische Folie gebildet wird, welche nach der Technologie des sogenannten elektronischen Papiers ausgestaltet ist.

Unter einem elektronischem Papier wird in der Fachwelt ein eine Technologie verstanden, bei der die Vorteile von Flachbildschirmen und Druckerfarbe auf Papier vereint werden, indem kleinste Farbkapseln mit mindestens zwei Farben - etwa Schwarz und Weiß - auf einer Papierfläche je nach elektrischer Ladung an einer einzelnen Stelle mit der einen oder der anderen Seite nach oben zeigen. Für die Ansteuerung des dafür notwendigen elektrischen Feldes sind sogenannte Plastik Transistoren gedacht.

Alternative der Fachwelt bekannte Technologien sind "organische Elektro-Lumineszenz Folien" oder "mikrogekapselte e-

lektrophoretische Anzeigen", die ebenfalls eine Ausgestaltung als flexible sehr dünne Anzeigemedien erlauben.

Für die erfindungsgemäße Anordnung ist die Anwendung dieser Technologie auf eine Folie gedacht, die mechanisch flexibel und elastisch ausgestaltet ist, so dass sie punktuell mechanisch manipuliert werden kann, um Auswuchtungen auf der Oberfläche der Folie zu erzeugen, die sich nach Beenden der mechanischen Manipulation selbständig zurückbilden.

Unterhalb der zweiten Schicht S_2 kommt die dritte Schicht S_3 zu liegen, die durch eine flächendeckende Matrix aus senkrecht zur Folienfläche beweglich gelagerten piezoelektrisch betriebenen als Nylon- oder Metallstift ausgestaltete "Noppen" $N_1..N_m$ gebildet wird.

Die drei Schichten S_1, S_2 und S_3 sind dabei derart angeordnet, dass die piezoelektrisch betriebenen Noppen $N_1..N_m$ die ersten beiden Schichten S_1 und S_2 punktuell mechanisch manipulieren können, so dass durch nebeneinander angeordnete Noppen $N_1..N_m$ in einem Ausgangszustand Tastaturbegrenzungungen und/oder -beschriftungen eines virtuellen Tastenblock auf der Oberfläche der zweiten Schicht erzeugt und dort zu ertasten sind. Hierbei kann die Beschriftung in der Brailleschrift verfasst sein, so dass sehende Nutzer die Möglichkeit haben eine vom Anzeigenmedium dargestellte virtuelle Tastatur und ihre Funktion zu sehen, wobei sie die Tastaturbegrenzung fühlen können, und gleichzeitig sehbehinderte Nutzer die Möglichkeit haben die Tastaturfunktion durch die von den Noppen $N_1..N_m$ erzeugte Brailleschrift zu ertasten.

Zumindest die zweite Schicht S_2 und die dritte Schicht S_3 sind mit einer Steuereinheit µP verbunden, die derart ausgestaltet ist, dass sie in einem Ausgangszustand, d.h. ein Zustand in dem (noch) keine Eingabe durch Berührung erfolgt ist, beispielsweise einen virtueller Tastaturblock und/oder eine virtuelle Menüleiste durch Erzeugung mindestens eines

zweiten Signals, zur Ansteuerung der Noppen-Matrix $N_1..N_m$, realisiert wird. Des Weiteren ist die Steuereinheit µP derart ausgestaltet, dass sie das aufgrund einer Berührung von der Sensormatte erzeugtes erstes Signal ein mindestens ein neues zweites Signal erzeugt, wobei die Berührung in einem zulässigen Bereich, das heißt ein Bereich in dem ein virtuelles Bedienelement dargestellt ist, erfolgt sein muss.

Die Steuereinheit µP ist dazu außerdem noch mit einer die Anzeige steuernden Einheit verbunden oder bildet mit ihr eine Einheit, so dass auch Steuersignale zur Erzeugung bedienungsbedingter Veränderungen der virtuellen Bedienelemente erzeugt werden.

Als Alternative zu der Sensormatte kann in der zweiten Schicht S_2 auch ein Lichtgitter zu liegen kommen.

Lichtgitter bestehen im Allgemeinen aus zwei senkrecht zueinander angeordneten Senderleisten, die jeweils mehrere Lichtstrahlen emittieren sowie gegenüber jeder Senderleiste angeordnete Empfängerleisten, die die Lichtstrahlen detektiert. Die Lichtstrahlen der senkrecht angeordneten Senderleisten kreuzen sich dabei und erzeugen ein Lichtgitter. Bei einem Durchdringen des Lichtgitters werden auf den senkrecht zueinander angeordneten Empfängerleisten, das Ausbleiben jeweils mindestens eines Lichtstrahls detektiert, so dass sich Koordinatenpaare bilden lassen, mit denen eine genau Bestimmung des Durchdringungsortes erfolgt. Die ermittelten Koordinaten können dann als erstes Signal an die Steuereinheit µP geleitet werden.

Das Lichtgitter ist dabei derart oberhalb der ersten Schicht S_1 angeordnet, dass die durch die Noppen-Matrix $N_1..N_2$ punktuellen Ausbuchtungen der Anzeigenoberfläche keine Lichtstrahlen unterbrechen.

Patentansprüche

1. Berührungssensitive Anzeige mit taktiler Rückkopplung gekennzeichnet durch
   a) eine erste Schicht S_1 , mit einem mechanisch flexiblen Anzeigemedium,
   b) eine zweite Schicht S_2 mit mindestens einem Rezeptor,
   c) eine dritte Schicht S_3 mit mindestens einem steuerbaren Aktor,
   d) die zweite Schicht S_2 derart angeordnet ist, dass der Rezeptor eine Berührung in zumindest einem Teilbereich der ersten Schicht S_1 unter Erzeugung mindestens eines ersten Signals erfasst,
   e) die dritte Schicht S_3 derart angeordnet ist, dass der steuerbare Aktor die erste Schicht S_1 zumindest in dem Teilbereich punktuell mechanisch manipuliert,
   f) eine Steuereinrichtung µP, die mit der zweiten Schicht S_2 und dritten Schicht S_3 derart ausgestaltet und verbunden ist, dass in einem Ausgangszustand mindestens ein zweites Signal zur Ansteuerung des Aktors erzeugt wird, wobei auf Grundlage des ersten Signals mindestens ein geändertes zweites Signal erzeugt wird.

2. Anzeige nach Anspruch 1, dadurch gekennzeichnet, dass das Anzeigemedium eine gemäß der Technologie des "elektronischen Papiers", "mikrogekapselten elektrophoretischen Anzeige" oder "organischen Elektro-Lumineszenz", ausgestaltete Folie ist.

3. Anzeige nach Anspruch 1 oder 2, dadurch gekennzeichnet, dass der Rezeptor als "Lichtgitter" ausgestaltet ist.

4. Anzeige nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, dass
   a) der Aktor eine erste Matrixanordnung beweglich gelagerter elektrisch und/oder magnetisch angetriebener Stifte $N_1..N_m$ ist,

b) die Stifte $N_1..N_m$ senkrecht zur Fläche der ersten Schicht S_1 bewegbar sind.

5. Anzeige nach einem der Ansprüche 2 bis 4, dadurch gekennzeichnet, dass
   a) der Rezeptor eine zweite Matrixanordnung beweglich gelagerter Stifte $N_1..N_m$ ist,
   b) die Stifte $N_1..N_m$ senkrecht zur Fläche der ersten Schicht S_1 bewegbar sind.

6. Anzeige nach Anspruch 5, dadurch gekennzeichnet, dass die zweite Schicht S_2 und dritte Schicht S_3 eine gemeinsame Schicht bilden, wobei die Stifte $N_1..N_m$ der ersten Matrixanordnung und die Stifte $N_1..N_m$ der zweiten Matrixanordnung nebeneinander angeordnet sind.

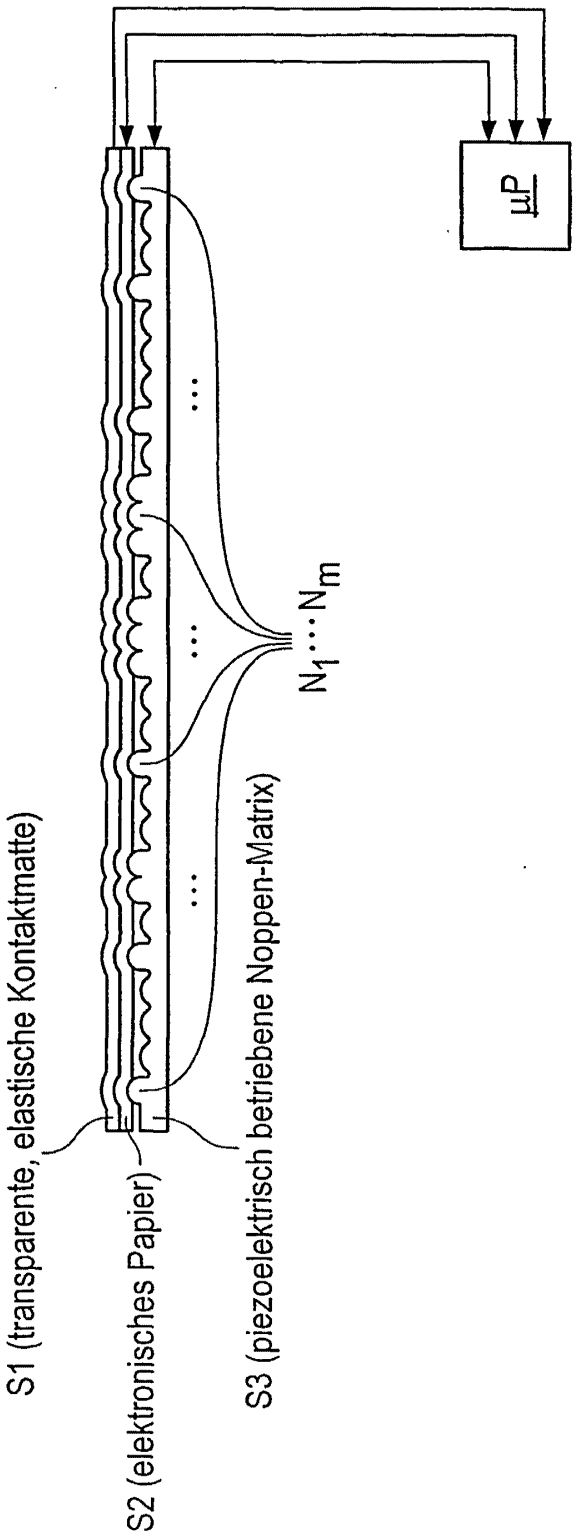
7. Anzeige nach Anspruch 6, dadurch gekennzeichnet, dass die Stifte $N_1..N_m$ als Aktor und zugleich Rezeptor ausgestaltet sind.

8. Anzeige nach einem der Ansprüche 4 bis 6, dadurch gekennzeichnet, dass die Stifte $N_1..N_m$ piezoelektrische Elemente sind.

9. Anzeige nach einem der Ansprüche 4 bis 6, dadurch gekennzeichnet, dass die Stifte $N_1..N_m$ elektromagnetische Elemente sind.

10. Anzeige nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass die zweite Schicht S_2 eine Sensormatte ist.

11. Anzeige nach Anspruch 10, dadurch gekennzeichnet, dass
   a) die erste Schicht S_1 unterhalb der zweiten Schicht S_2 zu liegen kommt,
   b) die zweite Schicht S_2 transparent und flexibel ist.


µP
S1 (transparente, elastische Kontaktmatte)
S2 (elektronisches Papier)
S3 (piezoelektrisch betriebene Noppen-Matrix)
N1 ··· Nm

EX1021 - 624

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G06K11/06 G06K11/08 G06K11/16

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 7 G06K

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

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

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6 118 435 A (KAWAKAMI MASAHIKO ET AL) 12 September 2000 (2000-09-12) column 3, line 63 -column 9, line 5; figures 1,2	1
A	US 5 977 867 A (BLOUIN FRANCOIS) 2 November 1999 (1999-11-02) the whole document	1
A	US 5 412 189 A (CRAGUN BRIAN J) 2 May 1995 (1995-05-02) abstract	1

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

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

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Date of the actual completion of the international search	Date of mailing of the international search report
12 December 2001	20/12/2001

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Schmidt, R

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

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6118435 A	12-09-2000	JP 10289061 A	27-10-1998
		JP 10293644 A	04-11-1998
US 5977867 A	02-11-1999	NONE	
US 5412189 A	02-05-1995	NONE	

A. KLASSIFIZIERUNG DES ANMELDUNGSGEGENSTANDES
IPK.7 G06K11/06 G06K11/08 G06K11/16

Nach der Internationalen Patentklassifikation (IPK) oder nach der nationalen Klassifikation und der IPK

B. RECHERCHIERTE GEBIETE

Recherchierter Mindestprüfstoff (Klassifikationssystem und Klassifikationssymbole)
IPK 7 G06K

Recherchierte aber nicht zum Mindestprüfstoff gehörende Veröffentlichungen, soweit diese unter die recherchierten Gebiete fallen

Während der internationalen Recherche konsultierte elektronische Datenbank (Name der Datenbank und evtl. verwendete Suchbegriffe)
EPO-Internal, WPI Data, PAJ

C. ALS WESENTLICH ANGESEHENE UNTERLAGEN

Kategorie°	Bezeichnung der Veröffentlichung, soweit erforderlich unter Angabe der in Betracht kommenden Teile	Betr. Anspruch Nr.
A	US 6 118 435 A (KAWAKAMI MASAHIKO ET AL) 12. September 2000 (2000-09-12) Spalte 3, Zeile 63 -Spalte 9, Zeile 5; Abbildungen 1,2	1
A	US 5 977 867 A (BLOUIN FRANCOIS) 2. November 1999 (1999-11-02) das ganze Dokument	1
A	US 5 412 189 A (CRAGUN BRIAN J) 2. Mai 1995 (1995-05-02) Zusammenfassung	1

☐ Weitere Veröffentlichungen sind der Fortsetzung von Feld C zu entnehmen

☒ Siehe Anhang Patentfamilie

° Besondere Kategorien von angegebenen Veröffentlichungen :
"A" Veröffentlichung, die den allgemeinen Stand der Technik definiert, aber nicht als besonders bedeutsam anzusehen ist
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"&" Veröffentlichung, die Mitglied derselben Patentfamilie ist

Datum des Abschlusses der internationalen Recherche	Absendedatum des internationalen Recherchenberichts
12. Dezember 2001	20/12/2001

Name und Postanschrift der Internationalen Recherchenbehörde	Bevollmächtigter Bediensteter
Europäisches Patentamt, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Schmidt, R

Formblatt PCT/ISA/210 (Blatt 2) (Juli 1992)

Im Recherchenbericht angeführtes Patentdokument		Datum der Veröffentlichung	Mitglied(er) der Patentfamilie		Datum der Veröffentlichung
US 6118435	A	12-09-2000	JP	10289061 A	27-10-1998
			JP	10293644 A	04-11-1998
US 5977867	A	02-11-1999	KEINE		
US 5412189	A	02-05-1995	KEINE		

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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WO 02/31807 A1

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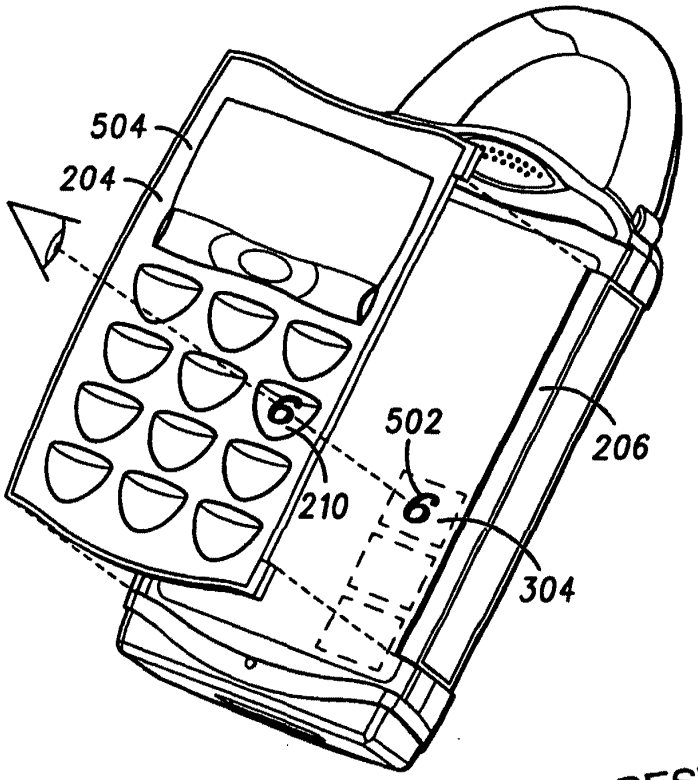
(74) Agents: **VAAS, Randall S.**, et al.; MOTOROLA, INC., 600 North U.S. Highway 45, Libertyville, IL 60048 (US).

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.

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[Continued on next page]

(54) Title: DATA ENTRY DEVICE



(57) Abstract: A data entry device (Fig. 7) having a touch screen display (214) with software definable images, or soft keys, and a movable keypad (208) that covers the touch screen display in a closed position (200). The keypad has at least one transparent key (210) which further comprises an actuator (408) on a second side (404) and a substantially smooth surface, or lens on a second side (402). When the keypad is in the closed position the software definable images are projected through the transparent keys to the user. The user may then depress the transparent key associated with a corresponding image, causing the actuator to contact the touch screen display and thereby select the desired function. Each transparent key provides tactile feedback to the user indicating the transparent key has been sufficiently depressed. The device therefore retains tactile feedback of traditional keypads, while allowing each key to be dynamically labeled to in accordance with the mode of operation.

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WO 02/31807 A1

Published:
— *with international search report*
— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Data Entry Device

BACKGROUND OF THE INVENTION

The invention relates generally to a configurable data entry device and more particularly an apparatus providing tactile feedback to the configurable data entry device while maintaining configurability of the data entry device.

Portable electronic devices are becoming more and more popular as size, weight and functionality improve. Some of these portable devices function as wireless communication devices and traditionally include such devices as cellular telephones, two-way radio services, or cordless phone services just to name a few. Other portable devices do not incorporate wireless connectivity but are carried extensively by the user. For example, Personal Digital Assistants (PDAs) can be used for many functions including personal information management or games. These devices are currently available to the consumer, largely as separate products. However, devices have begun to emerge enclosing two or more devices within one housing. For example, the combination of a cellular radiotelephone and a personal digital assistant (PDA), or a radio transceiver and a PDA, allowing wireless communication. Convergence of these devices into one unit or multifunctional device, is the result of the desire to have internet access at all times as well as the increase in popularity of personal information devices, such as PDAs and the like. These types of devices are limited in number and have just begun to surface in the market place.

Short messaging devices having short messaging service (SMS) or similar capability are also popular allowing users to communicate with text messages as an alternative to voice communication. Devices with this capability are commonly used in meetings as they allow meeting participants to communicate with others not in the meeting on a real time basis. The user can type and send a message with the device without disrupting the meeting, whereas this is not the case with voice communication. More and more devices are becoming multifunction in nature and there for have user interfaces to accommodate the

multiple modes. However, most of these devices use software definable touch screen displays or similar devices, which do not provide the user with tactile feedback. As a result of the transition to portable multifunctional devices, the need to improve the user interface has become apparent.

Current single function devices such as a cellular radiotelephones generally have one or two functions assigned to each individual button on the user interface. For example very simple low cost radiotelephones include an alphanumeric keypad having only a numeral and the typical three or four letters assigned to an individual key. If the user is dialing a number, the keys associated with the desired numbers are depressed. If the user is entering a name, when storing a phone number for example, the user must cycle through the key having the desired letter until the letter appears on the output device or display because each key represents more than one letter. In more advanced cellular radiotelephones, the device may have other functions or options the user must access. This requires either more keys, further requiring more space and a larger device which is less conducive to portability, or adding more functions to the existing keys, increasing the complexity. In some cases the device size is not important and additional keys may not be an issue. However, in the growing portable wireless device market, small size and light weight is important as it allows the device to be easily transported. The device is more apt to be used, providing more billable usage to the service provider, if it is carried on the user at all times; small size and light weight promote this behavior. Adding another function to a key increases the complexity of operation as well as clutters the key with a plurality of indicia identifying the keys functions making the device more difficult to operate. As a result, this reduces the user inclination to use the device as all three deficiencies: complexity, size and weight discourage use and therefore billable time is reduced.

One method of providing more functions without increasing the complexity of device operation and yet maintain a portably favorable size and weight is to use a touch screen display. The touch screen is a combination input/output (I/O) device comprised of an input layer place on top of an output

layer. The output layer displays images which correspond with a designated input portion of the input layer. Software that controls the display defines or displays icons, which may for example resemble buttons or keys, on the display. Touching the icon of the output layer activates the designated input portion of the input layer, activating the desired function. This is commonly known as software defined keys or soft keys.

Use of a touch screen display, however, has several downfalls. First, it is not always viable for the user to look directly at the data entry portion of the device when entering or selecting functions. The tactile feedback of traditional keys, which allows the user to blindly select the keys while still entering the desired information, is not present.

Second it is desirable for the user in general to have tactile feedback when depressing a key. This acknowledges to the user that the key has been sufficiently depressed and the desired function has been activated. This is not available on current touch screen devices. Some devices may provide buttons over the touch screen device to provide a tactile feel however the buttons cover the touch screen, such as described in U.S. Patent 5,742, 894 assigned to Motorola Inc., the assignee of the present invention, and only act as an actuator, actuating the touch screen, therefore limiting the user to the functions indicated on the buttons.

Some devices incorporate an audible feedback tone alerting the user that the desired function has been activated and even further, other devices combine the audible feedback with the tactile feedback. Audible feedback alone however, may not be appropriate in all environments or user modes. For instance, audible keypad tones are not desired when the user is in a meeting yet desires to receive feedback when a key has been depressed. For example, a cellular radiotelephone having only audible feedback will not provide any feedback to the user if the audible feedback is turned off.

The use of additional keys also poses a problem as this requires more space within the device and cost reduction is almost always desired. Touch screen displays may add flexibility to the input output device however this

renders the device without tactile feedback to the user. The current methods are deficient in these areas by creating larger more complex devices that are less user friendly than predecessors. Touch screen displays without any feedback or audible feedback only limit the user's options and functionality to the user. Therefore, there is a need to improve the means and method of providing data input and output capability for portable electronic devices.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram of the wireless communication device in accordance with the preferred embodiment of the present invention;

FIG. 2 is a front view of the wireless communication device with the second housing portion in the closed position in accordance with the preferred embodiment of the present invention;

FIG. 3 is a front view of the wireless communication device with the second housing portion in the open position in accordance with the preferred embodiment of the present invention;

FIG. 4 is a cross section view of one transparent key in a relaxed state in accordance with the preferred embodiment of the present invention;

FIG. 5 is a cross section view of one transparent key in a depressed state in accordance with the preferred embodiment of the present invention;

FIG. 6 is a cross section view of one transparent key in a relaxed state in accordance with an alternative embodiment of the present invention;

FIG. 7 is an exploded view of the wireless communication device in accordance with the preferred embodiment of the present invention;

FIG. 8 is a top view of the wireless communication device in accordance with the preferred embodiment of the present invention; and

FIG. 9 is FIG. 2 rotated 90° degrees showing the touch screen display in accordance with the preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention relates to a user interface and more particularly to the data entry portion of the user interface. The preferred embodiment of the present invention is a portable wireless communication device that combines a radiotelephone with personal information management capability. The user interface of the preferred embodiment of the present invention combines a touch screen display having a movable keypad incorporating transparent keys so that the touch screen display is visible through the transparent keys. The keypad is movable from a closed position, which allows the user to use the device as a phone and more voice-centric activity, using the keypad to enter telephone numbers, to an open position where the keypad moves away from the touch screen display, thereby fully uncovering the touch screen display for data-centric oriented operation. In the open position, using the keys of the keypad in conjunction with the soft keys of the touch screen display gives the user tactile feed back when entering data, yet allows the image of the soft key, which is displayed on the touch screen display, to be projected through the transparent keypad maintaining configurable soft key capability.

The block diagram in FIG. 1 shows a wireless communication device 100 in accordance with the preferred embodiment of the present invention. This device is a multifunctional wireless communication device incorporating the present invention. One function of the device is to operate as a radiotelephone in a cellular telephone system or the like. In the preferred embodiment a frame generator ASIC 102, such as a CMOS ASIC available from Motorola, Inc. and a microprocessor 104, such as a 68HC11 microprocessor also available from Motorola, Inc., combine to generate the necessary communication protocol for operating in a cellular radiotelephone system. Microprocessor 104 uses memory 106 comprising RAM 108, EEPROM 110, and ROM 112, preferably consolidated in one package 114, to execute the steps necessary to generate the protocol and to perform other functions for the wireless communication device, such as

accepting information from writing to a touch screen display 116, or controlling a frequency synthesizer 130, and receiving in a signal from a keypad sensor 136. ASIC 102 processes audio transformed by audio circuitry 124 from a microphone 122 and to a speaker 126.

A transceiver processes the radio frequency signals. In particular, a transmitter 128 transmits through an antenna 134 using carrier frequencies produced by a frequency synthesizer 130. Information received by the communication device's antenna 134 enters the receiver 132 that demodulates the symbols using the carrier frequencies from frequency synthesizer 130. The communication device may optionally include a message receiver and storage device 131 including digital signal processing means. The message receiver and storage device could be, for example, a digital answering machine or a paging receiver.

FIG. 2 shows the preferred embodiment of the present invention comprised of a first housing portion 202 coupled to a second housing portion 204 by a double hinge 206. The second housing portion 204 has a fixed transparent member or a lens 212 adjacent to a keypad 208. The keypad 208 is comprised of a plurality of transparent keys 210 either connected together as one piece or as individual keys. The keypad 208 is disposed in the second housing portion such that each transparent key 210 is accessible from both a front side 218 and a backside 302 of the second housing portion 204 as shown later. The plurality of transparent keys 210 of the preferred embodiment of the present invention, are arranged in a radiotelephone keypad array having keys operative to typical radiotelephone functions. These functions include dialing, entering personal information data, web browsing and other similar functions. When the second housing portion 204 is in the second housing portion first position or closed position 200, the transparent keys 210 of the keypad 208 partially cover the touch screen display 214 which is mounted in the first housing portion 202. The exposed portion of the touch screen display 216 visible through the lens 212 of the second housing portion displays information to the user and works in conjunction with the keypad 208 while the second housing portion is in the

closed position 200. While in the closed position, the sensor 136, either a magnetic reed switch as in the preferred embodiment, or by other detecting means is activated, signaling the microprocessor 104 that the second housing portion is in the closed position 200.

Turning to FIG. 3, the device is shown in the second housing portion second position or open position 300. In the open position 300, the touch screen display 214 is fully accessible to the user. The user can input data and view the touch screen display 214 directly and not through the transparent keys 210 or lens 212 of the second housing portion 202. This allows for the unlimited display and entry options as the touch screen display is configurable by software and can be programmed in accordance with the desired mode of operation. For example, the device may advantageously be used as a personal organizer having the capability to display a calendar, a to do list, personal contact information and other personal management data and the like. Even further, the device is intended to be used with internet browsing software that conform to such standards as the wireless application protocol (WAP) or iMode and the like to gain access to the internet in a wireless fashion. The device may also be used as a writing or drawing tablet wherein the touch screen display 214 is adapted for handwriting recognition or to receive drawing input respectively. The adaptability of a software definable touch screen display is only limited by microprocessor 104 capability and the amount of memory 106 necessary to store the given information, therefore allowing unlimited modes of operation.

FIG. 4 shows a cross section view of the first and second housing portions (202, 204), respectively, with the transparent key 210 in its relaxed, non-depressed state. The transparent keys 210 shown in combination with the touch screen display 214, advantageously give the user tactile feedback. Physically, the transparent keys 210 have a front side 402 and a back side 404. The front side 402 is accessible from the front side 218 of the second housing portion 204 and acts as a lens showing the image 310. This front side 402 may be a magnifying lens, magnifying the image 310 displayed on the touch screen display 214. The back side 404 of the transparent key 210 is accessible from the back side 302 of the

second housing portion 204. The back side 404 of the transparent key 210 has an actuator 408 protruding therefrom which makes contact with the touch screen display 214 when the transparent key 210 is depressed. Tactile feedback is provided in two ways. First the presence of a physical key as opposed to a soft key on a touch screen display 214, allows the user to advantageously locate and recognize the desired key through feel. The user does not need to look at the device to determine where the desired key is. In addition, when the transparent key 210 of the keypad 208 is depressed, tactile feedback is advantageously provided by the movement of the transparent key 210 as it is depressed toward the touch screen display 214.

FIG. 5 shows the same cross section as in FIG. 4 however the transparent key 210 is now in a depressed state. The transparent key 210 is integrally coupled to a webbed material 410 usually made of plastic, and elastomer, or PVC as in the preferred embodiment. The webbed material 410 generally forms the keypad 208, having a plurality of transparent keys 210 protruding therefrom. The webbed material 410 of the keypad 208 is located between the front side 402 and the back side 404 of the second housing portion 204. The front side 402 and the back side 404 of the transparent key 210, hold the keypad 208 in place by sandwiching the webbed material 410 therebetween. The transparent key 210 is accessible through the second housing portion 204 through an aperture in the front side 218 and the back side 302. The aperture in the backside 302 of the second housing portion 204 has a geometry larger than the transparent key 210 and the aperture in the front side 218, allowing the transparent button 210 to move downward towards the back side 318 when depressed. In the depressed state, the actuator 408 contacts a corresponding selectively active portion 304 of the touch screen display 214 closing the circuit and activating the desired function.

In an alternative embodiment of the present invention, shown in FIG. 6, the tactile feedback is provided by a poppel dome 612 of the poppel dome layer 610, mounted to the back side 404 of the second housing portion 204, placed in between the transparent keys 210 and the touch screen display 214. The actuator

408 contacts the poppel dome 612 when the transparent key 210 is depressed, and the poppel dome 612 in turn contacts the corresponding selectively active portion 304 of the touch screen display 214 thereby sending the desired input signal.

The tactile feedback is beneficial for three reasons. First, the tactile feel associated with the depression of the transparent key 210 beneficially compliments other feedback, such as an audible tone, the combination of which provide comprehensive feedback. Secondly, the tactile feedback advantageously allows the user to blindly enter data or dial the device as it allows the user to locate the transparent keys 210 without looking at the device. Lastly, the tactile feedback is further advantageous as hearing impaired users will not here the audible feedback tone and must rely on the tactile feedback provided by the transparent key 210. Yet in other device modes where a writing or drawing tablet is necessary, the keypad 208 can be moved out of the way of the touch screen allowing the user full access to the touch screen display to enter data accordingly. The key indicia or image of the preferred embodiment of the present invention, indicating the function of the transparent key 210, are provided by the touch screen display 214. Dynamic labeling, or software programability of the indicia, in conjunction with the tactile feel of the transparent key 210, maintains both the soft key configurability and tactile feedback of the data entry device.

The touch screen display 214, displays the appropriate indicia, visible through the transparent key 210 when the second housing portion 204 is in the closed position 200. Turning to FIG. 7, a first image 702 displayed by the touch screen display 214 is projected through the corresponding transparent key 210 to the user 506, shown by path 504, indicating to the user 506 which function will be carried out when the transparent key 210 is depressed. In the preferred embodiment of the present invention when the device is operating in a cellular radiotelephone mode, the touch screen display 214 would display an array of numbers corresponding in location to the array of transparent keys 210 of keypad 208 in a first touch screen display mode. In a second touch screen

display mode letters are displayed in the same manner as number, for the entry of words. In a third touch screen mode, a full text keyboard is displayed and the user may move the keypad 208 aside and enter the text directly via the full text keyboard. Each number or letter is displayed though its corresponding transparent key 210. This advantageously allows for a larger font to be used as the transparent key 210 is not displaying as much information at one time as an alphanumeric key would. This is beneficial as the transparent key 210 is easier to ready as a result of the larger font size. This is further beneficial as the transparent key is less cluttered with numerous indicia or images therefore reducing the complexity of the data entry device and the operation of the device in general.

The double hinge 206 has two joints, a first joint 306 coupling the second housing portion 204 to the hinge 206 and a second joint 308 coupling the hinge 206 to the first housing portion 202. This allows the second housing portion 204 to move freely about the first housing portion 202 as shown in FIG. 8, rotating from the closed position 200 wherein the keypad 208 mounted therein is planarly adjacent and effectively coupled thereto for interaction with the touch screen display 214 to an open position 300 wherein the keypad 208 is planarly adjacent to the back side of the first housing portion 202. In the second housing portion second position the second housing portion 204, and therefore the keypad 208, is out of the way of the user such that the touch screen display 214 can be used in any device orientation without the hindrance of the second housing portion 204. The free rotation capability of the second housing portion 204 allows the second housing portion to act as a stand, propping the device up into either a portrait configuration for speaker phone mode for one example or in a landscape orientation for viewing video or graphics of similar nature.

Depending on the operation mode of the device, the device will display the appropriate indicia on the touch screen display 214. The indicia that is displayed is projected through the transparent key 210 and the indicia is changed based on the mode of the device. In a first operation mode, a first icon is displayed, and the user can depress the transparent key 210, activating the touch

screen display 214 in the location corresponding to the first indicia which selects the first desired function. In a second operation mode the device software would display a second indicia representing a different function and the user would select the second desired function. For example, in cellular telephone operation mode, the software would display a numeric telephone keypad for dialing phone numbers. A second mode may be entering an individuals name when storing a phone number in the device's memory. In this case, as show in FIG. 9, the software would display a full text alphabetic keyboard 902 or a QWERTY keyboard for easy entry of the name by the user.

The previous description of the preferred embodiments are provided to enable any person skilled in the art to use the method of or making data entry devices. It is understood that this description is by way of example only and that numerous changes and modifications can be made by those skilled in the art without departing from the true spirit and scope of the invention. For example, although the present method and apparatus is for a cellular radiotelephone, it may also apply to other types of portable electronic devices such as personal digital assistants, digital cameras and the like. Further, other means of employing a tactile feedback may also be incorporated. The display, displaying the image that is projected through the transparent key does not have to be a touch screen display. Other displays such as a LED display or an organo-emissive display or the like may be incorporated into the invention.

We claim:

CLAIMS

1. A data entry device comprising:

a first housing portion having electronic circuitry disposed therein;

a user interface mounted in said first housing portion and having at least one input portion, said input portion sending a signal to said electronic circuitry in response to user input;

an image displayed on said user interface wherein a location of said image on said user interface corresponds to said at least one input portion of said user interface; and

a tactile keypad coupled to said first housing portion and having at least one transparent tactile key, said at least one transparent tactile key transmitting said image displayed on said user interface to a user when said at least one transparent tactile key is aligned therewith, wherein said at least one transparent tactile key has a lens portion and an actuator portion,

wherein said actuator portion is adjacent to said user interface and makes contact with said at least one input portion of said user interface when said transparent tactile key is depressed, and

wherein said transparent tactile key provides a tactile feedback to said user when said at least one transparent tactile key is depressed.

2. The data entry device of claim 1 wherein said tactile keypad is coupled to said first housing portion by a hinge.

3. The data entry device of claim 1 wherein said user interface is a touch screen display.

4. The data entry device of claim 1 wherein said user interface is a plurality of switches.

5. The data entry device of claim 1 wherein said at least one image of said user interface is software definable.

6. The data entry device of claim 1 wherein said at least one image has a geometry substantially the same geometry as said at least one transparent tactile key of said tactile keypad.

7. A wireless communication device comprising:

a first housing portion having a front outer surface, and a back outer surface;

a touch screen display mounted in said first housing and accessible from said front outer surface thereof, said touch screen display having an output portion and an input portion to display user information and receive user input, respectfully, wherein said output portion of said touch screen display is planarly adjacent to said input portion of said touch screen display, said input portion being transparent such that said display portion is clearly visible through said input portion, and wherein said input portion has at least one selectively active portion for receiving user input, and wherein said output display portion displays at least one image aligned with said selectively active portion;

a hinge coupled to said first housing portion, said hinge having a first axis;

a second housing portion having a first surface and a second surface, said second housing portion coupled to said first housing portion by said hinge wherein said second housing portion rotates about said first axis such that in a second housing portion first position, said second housing portion is planarly adjacent to said front outer surface and covers a portion of said touch screen display; and

a tactile keypad mounted in said second housing portion having at least one transparent key, said at least one transparent key having a front side and a back side,

wherein said at least one transparent key transmits said at least one image of said touch screen display to the user looking at said front side of said transparent key when said second housing portion is in said second housing portion first position,

wherein said at least one transparent key has an actuator portion protruding from said back side such that when said second housing portion is in said second housing portion first position said actuator is accessible from said second surface and is adjacent to said touch screen display such that when said at least one transparent key is depressed, said actuator activates said at least one selectively active portion of said touch screen display, activating a first desired function, and

wherein said at least one transparent key provides tactile feedback to the user when said at least one transparent key is depressed.

8. The wireless communication device of claim 7 wherein said at least one transparent key aligns with both said at least one selectively active portion of said input portion of said touch screen display and said at least one image of said output portion of said touch screen display in said second housing portion first position, such that said at least one image is visible to the user through said at least one transparent key.

9. The wireless communication device of claim 7 wherein said at least one image of said output portion is a software definable image.

10. The wireless communication device of claim 9 wherein said at least one software definable image has a geometry which is substantially the same geometry as a

corresponding said at least one transparent key such that said at least one software definable image is completely visible through said at least one transparent key when said second housing portion is in said second housing portion first position.

11. The wireless communication device of claim 7 wherein said hinge further comprises a second axis, wherein said second axis is substantially parallel to said first axis and wherein said first axis and said second axis are separated by a distance equal to half the distance separating said first surface of said first housing portion to said second surface of said housing portion and wherein said second housing portion rotates about said first axis and said first housing portion rotates about said second axis allowing said second housing portion to rotate from said second housing portion first position to a second housing portion second position wherein said second housing portion is planarly adjacent to said back outer surface of said first housing portion.

12. The wireless communication device of claim 7 wherein said touch screen display in a first operation mode displays a plurality of soft keys arranged in a radiotelephone configuration.

13. The wireless communication device of claim 12 wherein said tactile keypad having a plurality of transparent keys aligns with said plurality of soft keys arranged in a radiotelephone configuration.

14. The wireless communication device of claim 7 wherein said touch screen display in a second operation mode displays a plurality of soft keys arranged as a full text keyboard, and wherein said touch screen display in a third operation mode operates as a handwriting recognition device.

15. The wireless communication device of claim 7 wherein said touch screen display displays a plurality of software definable images including icons, buttons, or text.

16. The wireless communication device of claim 7 wherein said touch screen display in a fourth operation mode operates as a drawing tablet.

17. The wireless communication device of claim 7 wherein said touch screen display has an illumination means for backlighting said touch screen display.

18. The wireless communication device of claim 7 wherein said second housing portion in a second housing portion third position forms an angle between said first housing portion and said second housing portion between 90° degrees and 360° degrees.

19. The wireless communication device of claim 7 wherein said front side of said transparent key is a magnifying lens, magnifying said image of said touch screen display.

20. The wireless communication device of claim 7 wherein a transceiver is disposed in said first housing portion.

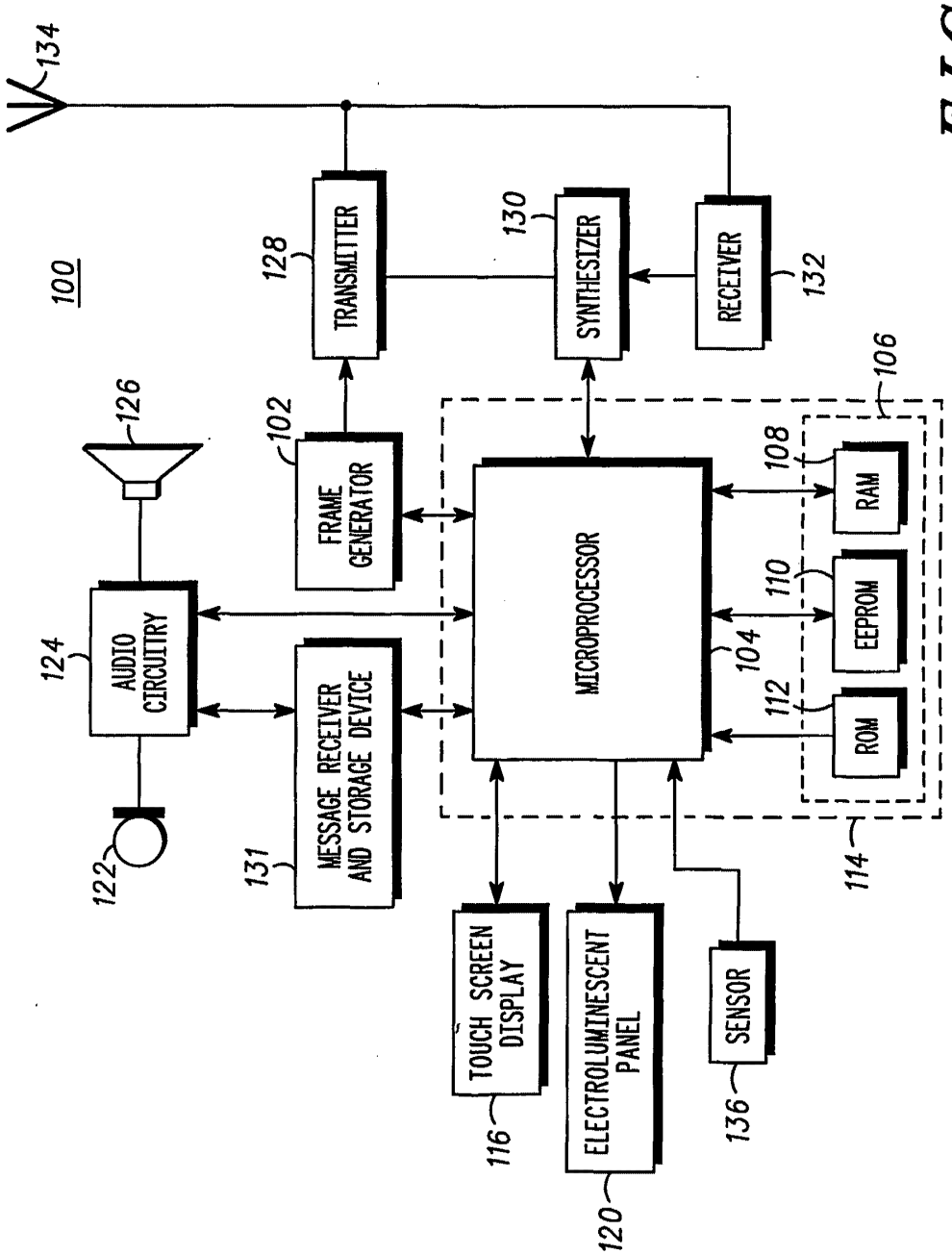


FIG. 1

EX1021 - 647

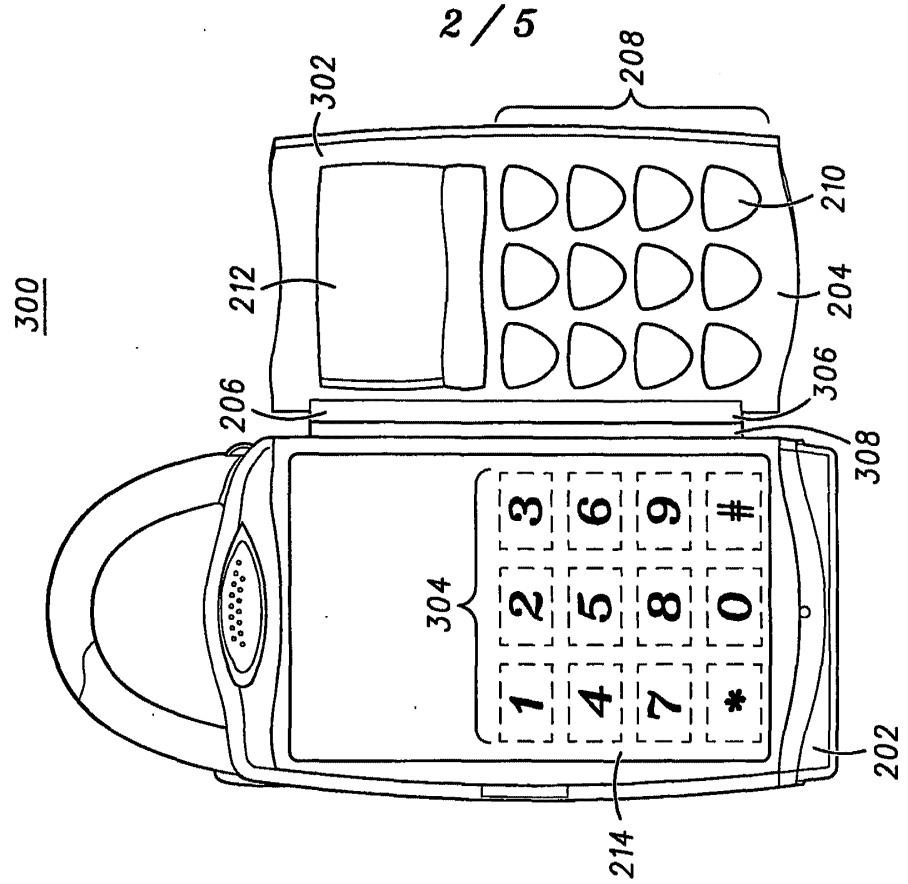


FIG. 3

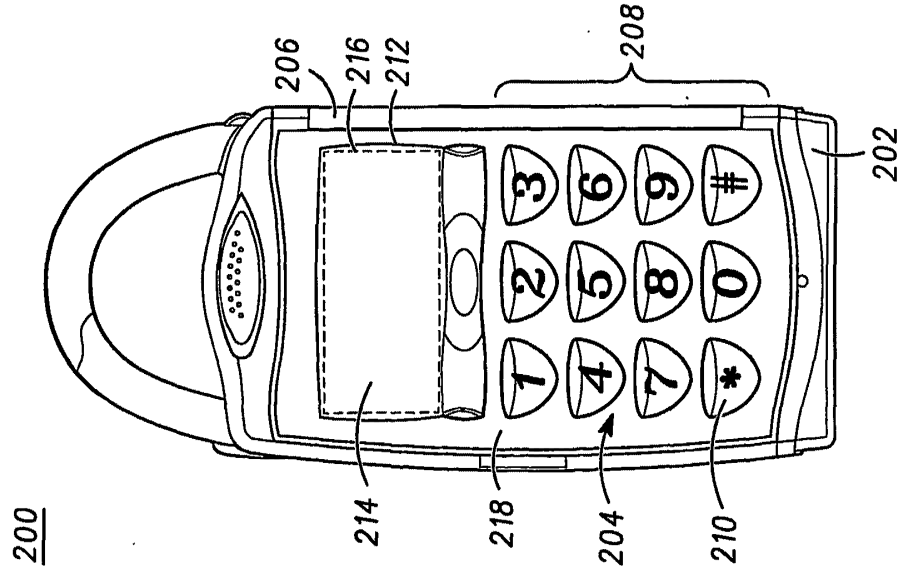


FIG. 2

EX1021 - 648

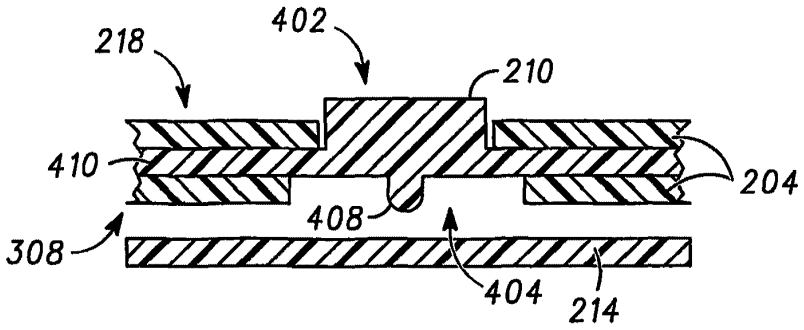

218
402
210
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204
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308
404
214

FIG. 4

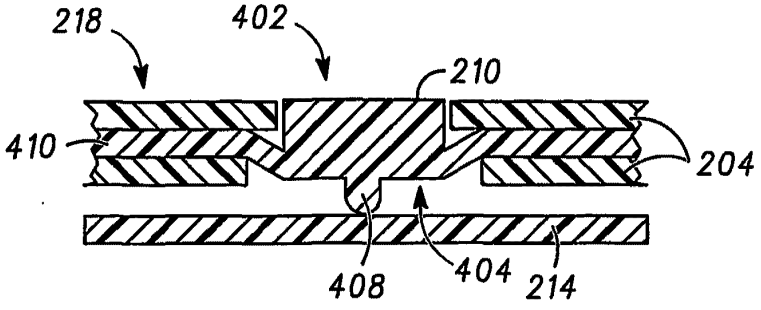
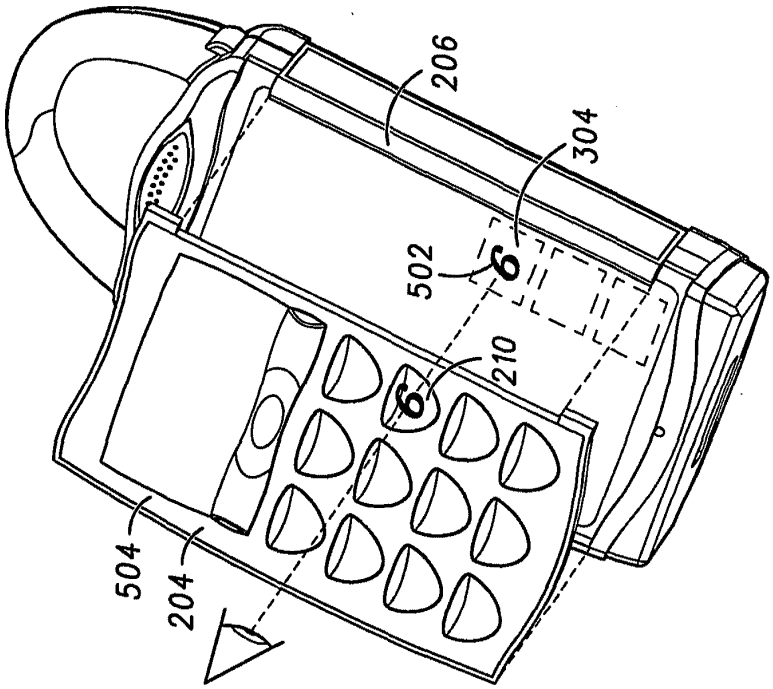

218
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FIG. 5

FIG.7



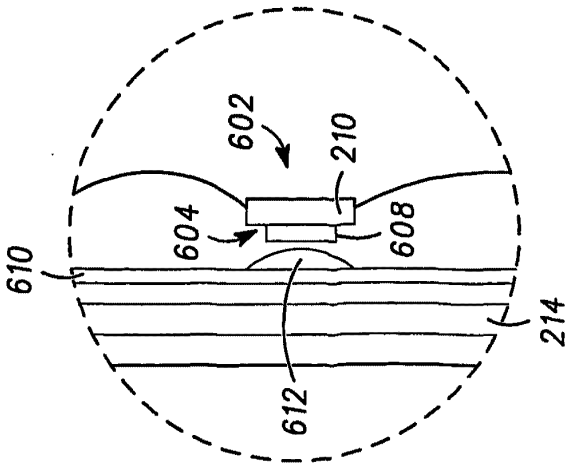


FIG.6

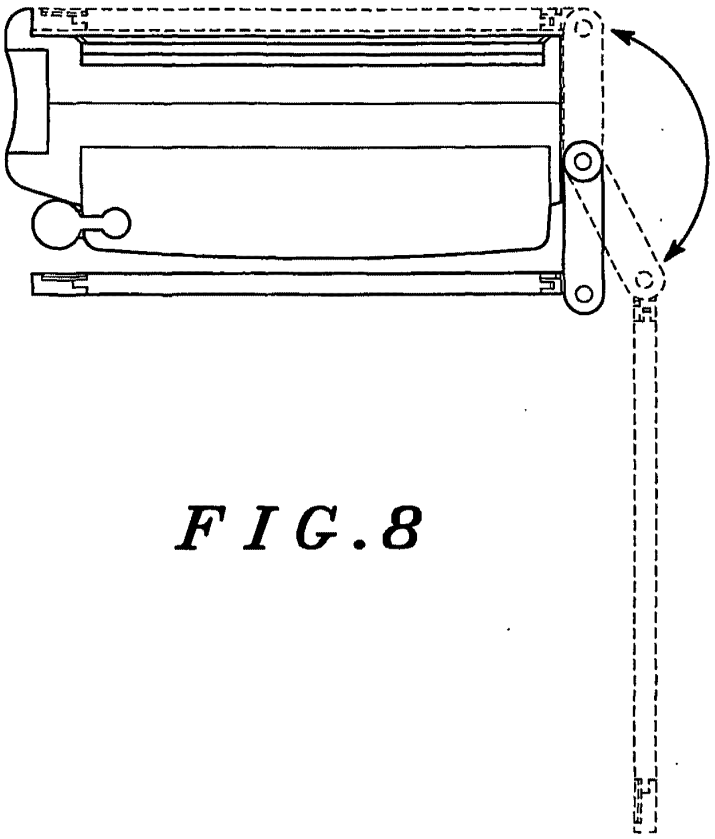


FIG. 8

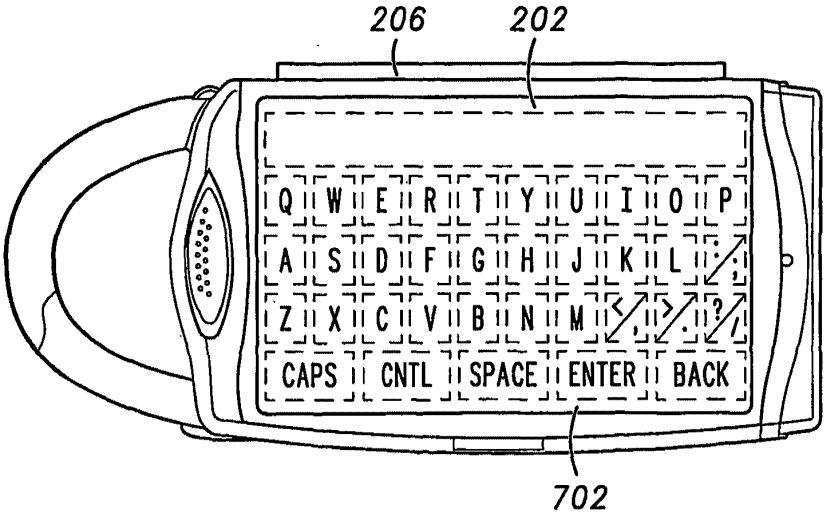

206
202
Q W E R T Y U I O P
A S D F G H J K L
Z X C V B N M
CAPS CNTL SPACE ENTER BACK
702

FIG. 9

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US01/31077

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) :G09G 5/08
US CL :345/173; 455/90,556,566
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)

U.S. : 345/173; 455/90,556,566

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)

EAST

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,584,054 A (TYNESKY et al) 10 December 1996, col. 1, line 38-col. 2, line 65.	1-20
Y	US 6,130,665 A (ERICSSON) 10 October 2000, col. 4, lines 38-50.	1-20

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

*	Special categories of cited documents:	"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
"A"	document defining the general state of the art which is not considered to be of particular relevance	"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
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"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		

Date of the actual completion of the international search 24 JANUARY 2002	Date of mailing of the international search report 13 FEB 2002
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer RICARDO OSORIO For Eugenia Zagan Telephone No. (703) 305-4248

Form PCT/ISA/210 (second sheet) (July 1998)★

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Application No.: 10/723,778
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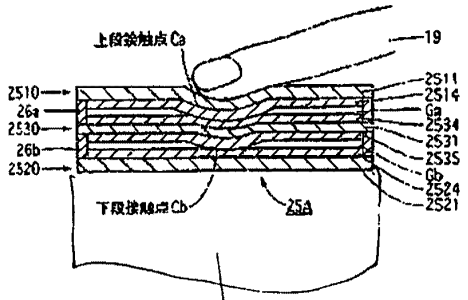
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最終頁に続く

(54)【発明の名称】　入力装置

(57)【要約】
【課題】　使用者が入力操作を行う場合に混乱を来すことなく確実に入力でき、しかも複雑な機能に対しても、簡単な操作、少ない指動作によって入力でき、また、使用者の指の触覚に力覚による帰還を可能にした入力装置を提供すること。
【解決手段】　本発明の入力装置1に組み込まれている第1実施形態の2段型タッチパネル25Aは、両面に透明電極2534．2535が成膜されている透明な可撓性のある中間電極シート2530を挟んで、前記両透明電極からそれぞれ所定の均一な間隙Ga、Gbを開けて．入力操作側に透明電極2534に対面した透明電極2514が成膜された透明な可撓性のある上側電極シート2510が．そして表示装置24側の透明電極2535に対面した透明電極2524が成膜された透明な下側電極シート2520がそれぞれ積層されて構成されている。



1

【特許請求の範囲】

【請求項１】　平面座標系において、同一座標軸上に少なくとも２つの接点が形成されているタッチパネルを備えた入力装置。

【請求項２】　前記少なくとも２つの接点のそれぞれに厚み方向に間隙が形成されているタッチパネルであることを特徴とする請求項１に記載の入力装置。

【請求項３】　前記タッチパネルはその少なくとも被入力領域が透明で、表示装置の表示面に重ね合わされていることを特徴とする請求項１または請求項２に記載の入力装置。

【請求項４】　前記各接点の少なくとも１つの接点の通電に連動して作動するアクチュエータ及びそのドライバ回路を備えていることを特徴とする請求項１乃至請求項３に記載の入力装置。

【請求項５】　前記アクチュエータは同一座標上の各接点の動作に応答して動作態様が変化する力覚を帰還させることを特徴とする請求項４に記載の入力装置。

【請求項６】　両面に透明電極が成膜されている所定の厚みの透明な可撓性のある中間電極シートを挟んで、前記両透明電極からそれぞれ所定の均一な間隙を開けて、入力操作側に前記一方の透明電極に対面した透明電極が成膜された透明な可撓性のある上側電極シートが、そして表示装置側に前記他方の透明電極に対面した透明電極が成膜された透明な下側電極シートがそれぞれ積層されて構成されているタッチパネルを備えた入力装置。

【請求項７】　前記中間電極シートが複数枚、所定の間隙を開けて配設されているタッチパネルであることを特徴とする請求項６に記載の入力装置。

【請求項８】　前記中間電極シートと前記前記上側電極シートとで１段目タッチパネルが、前記中間電極シートと前記下側電極シートとで最終段目タッチパネルが構成されているタッチパネルであることを特徴とする請求項６に記載の入力装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、入力装置に係り、特に押圧による入力操作が確実に行われたことを使用者が実感できる入力装置に関するものである。

【０００２】

【従来の技術】先ず、図１３乃至図２０を参照しながら、従来技術の入力装置を説明する。

【０００３】図１３は入力装置の正面図、図１４は図１３に示した入力装置の一部拡大正面図、図１５は図１３に示した入力装置の表示部の分解斜視図、図１６は図１３に示した入力装置の表示部の断面側面図、図１７は図１６に示した表示部を構成する従来技術の１段タッチパネルの分解斜視図、図１８は図１６に示した１段タッチパネルの断面側面図、図１９は図１７に示した１段タッチパネルの動作を説明するための図１６に示した表示部

2

の断面側面図、そして図２０は図１６に示した従来技術の１段タッチパネルの押圧力Ｐ－変位δ特性曲線である。

【０００４】図１３において、符号１は従来技術の入力装置を指す。この入力装置１は、情報端末等の小型携帯型情報入力装置、カーナビゲーションシステム、コンピュータ等に用いられている。

【０００５】この入力装置１は、扁平な直方体状をなす外匡１０を備えるとともに、外匡１０の両側壁にはそれぞれフレーム１１が結合されて補強されている。そして外匡１０の上面にはタッチパネルを兼用する表示部１２が設けられている。この表示部１２の下側には入力パネル１３が設けられると共に、入力パネル１３の下方に複数の操作釦１４が配されている。

【０００６】入力装置１はその表示部１２上にタッチパネル機能を具備し、表示部１２の表示によって映出された釦、スイッチ、メニュー、アイコンなどと座標系が１対１で対応しており、図１４、図１６に示したように、使用者が選択したい項目の箇所のタッチパネル（後記）を指示具１８または指１９などで押圧することによって入力イベントを受付けるようになっている。

【０００７】表示部１２は、図１５及び図１６に示すように、下から表示パネル２４、タッチパネル２５から構成されている。その表示パネル２４は所定の表示を行なうようになされており、液晶ディスプレイ、有機ＥＬディスプレイ、ＣＲＴ（Ｃａｔｈｏｄｅ Ｒａｙ Ｔｕｂｅ）ディスプレイ等、平面ディスプレイや曲面ディスプレイ等がある。タッチパネル２５は入力操作を伴ってスイッチング動作を行なうように構成されており、抵抗膜式、その他の方式がある。このような表示パネル２４及びタッチパネル２５は、図１６に示したように、重ね合わされ、外匡１０に収められて使用される。

【０００８】なお、表示パネル２４には、配線引き出しの為の、例えば、フレキシブル配線板、ディスプレイを駆動する為のドライバ回路、更に、特にＬＣＤパネルに関しては、発光部、導光板、拡散板、昇圧回路などのバックライト部が接続されるが、ここでは、それらの図示を省略した。

【０００９】従来技術のタッチパネル２５は１段階の入力機能のみしか備えていない。即ち、抵抗膜式タッチパネルを例に挙げて、その構造を説明すると、図１７及び図１８に示したように、上側電極シート２５１０と下側電極シート２５２０とがスペーサ２６（図１９）により均一に僅かな間隙Ｇを開けて構成されている。

【００１０】上側電極シート２５１０は可撓性を持った透明プラスティック製のシート基材２５１１の外側、内側両面に反射防止膜２５１２、２５１３が成膜されており、その内の内側反射防止膜２５１３の表面に透明電極２５１４が成膜されている。この透明電極２５１４としては、例えば、ＩＴＯ（Ｉｎｄｉｕｍ Ｔｉｎ Ｏｘｉ

ｄｅ：インジウム錫酸化物）薄膜などが好ましい。同様に、下側電極シート２５２０も可撓性を持った透明プラスティック製のシート基材２５２１の外側、内側両面に反射防止膜２５２２、２５２３が成膜されており、その内の内側反射防止膜２５２３の表面に透明電極２５２４が成膜されている。なお、反射防止膜２５１２、２５１３、２５２２、２５２３は透過光の反射を抑制するための膜である。それぞれの透明電極２５１４、２５２４にはそれぞれ引出線２５１５、２５２５が導出されている（図１７）。そして前記タッチパネル２５は両透明電極２５１４、２５２４を向き合わせ、前記のように、スペーサ２６を用いて僅かな間隙Ｇを開けて上側電極シート２５１０と下側電極シート２５２０とを配置した構造のものである。

【００１１】次に、このタッチパネル２５の動作及びその特性を図１９及び図２０を用いて説明する。

【００１２】前記のように、使用者が指示具１８または指１９で表示パネル２４で表示部１２に表示された項目、ファイルなどを選択、押圧することにより入力される。即ち、この入力操作によって、タッチパネル２５の特定位置の上側電極シート２５１０は押圧されて、その透明電極２５１４が下側電極シート２５２０の透明電極２５２４に接触する。この両者の接触点Ｐまでの抵抗値を測定することで入力位置座標を特定することができる。

【００１３】

【発明が解決しようとする課題】ところが、このような入力操作の際に、従来技術のタッチパネル２５では、そのタッチパネル２５自体の押下げ力Ｐに対する上側電極シート２５１０の変位δをグラフで示すと、図２０に示すようなＰ－δ曲線１になる。即ち、押し始めの際、先ず上側電極シート２５１０の弾性により、曲線の傾きが小さい１を辿り、屈折点２において双方のシート２５１０、２５２０が接触する。更に押し込むと、下側電極シート２５２０を押すことになり、直線３のように曲線１の傾きがより大きくなる。しかし、このような入力操作の場合に、使用者にはどの時点でタッチパネル２５がＯＮになって入力イベントが発生したか判り難い。

【００１４】また、このような１段階の入力装置を用いる限り、前記のように項目やファイルなどを選択することはできるが、これに実行などの指示を与えたり、異なった操作を加える時には、時系列的な入力の組み合わせ、例えば、或る一定時間以上押し続けたり、或いは或る一定時間内に同一箇所を２回以上連続して押す操作が必要であった。

【００１５】このような方法は、小型携帯機器における小さな表示画面上では難しく、また、一定の実時間を費するため、素早い操作が難しくなる。また、実時間を測定するタイマーからの割り込み処理が信号処理作業に負荷を掛けることになる。

【００１６】更にまた、タッチパネル２５には入力操作を行なう使用者の指１９などに対して、反力を帰還（フィードバック）させる機能が無く、音声出力から出力される音であったり、表示部１２の一部の表示を変化させることで、入力操作受付の帰還を行なっていた。しかし、使用者が表示部１２を見ないで行なう入力操作や素早い入力操作に対し、操作自体が機器側に受け入れられたのかどうかが、使用者には判りづらかった。

【００１７】本発明はこのような問題点に鑑みてなされたものであって、使用者の入力操作に対して、使用者が入力操作を行う場合に混乱を来すことなく確実に入力でき、しかも複雑な機能に対しても、簡単な操作、少ない指動作によって入力でき、また、使用者の指の触覚に力覚による帰還を可能にした入力装置を提供することを目的とする。

【００１８】

【課題を解決するための手段】従って、本願の主発明の入力装置は、平面座標系において、同一座標軸上に少なくとも２つの接点が形成されているタッチパネルを備えた入力装置に関するものである。

【００１９】そのタッチパネルには、２つの接点のそれぞれに厚み方向に間隙が形成されており、そして、そのタッチパネルはその少なくとも被入力領域が透明で、表示装置の表示面に重ね合わせて用いて好適である。

【００２０】また、本願の他の主発明の入力装置では、前記タッチパネルが前記各接点の通電に連動して作動するアクチュエータ及びそのドライバ回路を備えており、更にまた、前記アクチュエータは同一座標上の各接点毎に応じて動作態様が変化する力覚を帰還させることである。

【００２１】更にまた、本願に含まれる発明の好ましい実施態様の入力装置は、両面に透明電極が成膜されている所定の厚みの透明な可撓性のある中間電極シートを挟んで、前記両透明電極からそれぞれ所定の均一な間隙を開けて、入力操作側に前記一方の透明電極に対面した透明電極が成膜された透明な可撓性のある上側電極シートが、そして表示装置側に前記他方の透明電極に対面した透明電極が成膜された透明な下側電極シートがそれぞれ積層されて構成されているタッチパネルを備えており、その中間電極シートは複数枚、所定の間隙を開けて配設されて多段のタッチパネルとしてもよい。また、この多段タッチパネルは前記中間電極シートと前記上側電極シートとで１段目タッチパネルが、前記中間電極シートと前記下側電極シートとで最終段目タッチパネルが構成されるものである。

【００２２】従って、本発明によれば、指示具或いは指が接触する表面の電極シートを指示具或いは指で押圧すると、先ず、その表面の電極シートが押し込まれて直下の間隙を潰し、対面する両透明電極が接触し、更に押圧すること中間の電極シートも押し込まれて、その直下の

間隙も潰され、対面する中間電極シートの透明電極と対向する下側電極シートの透明電極とが接触する。中間電極シートが多層積層されておれば、以下同様に多段にわたって間隙を潰し、対向する両透明電極を接触させることができ、同一座標上で透明電極を複数接触させることができる。

【００２３】このような多段タッチパネルに構成すれば、各段の接点に力覚帰還機構を具備させることができ、従って、各段点毎に動作感様を異ならせることもできる。

【００２４】

【発明の実施の形態】以下、本発明の入力装置の実施形態を図を用いて説明する。

【００２５】図１は本発明に用いて好適な第１実施形態の２段型タッチパネルの分解斜視図、図２は図１に示した２段型タッチパネルの一部の断面側面図、図３は図１に示した２段型タッチパネルを組み立てた状態で、指で最初の段階の入力を行った状態を示す断面側面図、図４は図３の状態から指で更に押圧した状態の２段型タッチパネルの断面側面図、図５は図１に示した第１実施形態の２段型タッチパネルの押圧力特性曲線、図６は第２実施形態の力覚帰還機構を付加した２段型タッチパネルの断面側面図、図７は図６に示した第２実施形態の２段型タッチパネルの押圧力特性曲線、図８は図６に示した第２実施形態の２段型タッチパネルの他の押圧力特性曲線、図１０は２段型タッチパネルで入力した場合のフローチャート、図１０は本実施形態の２段型タッチパネルと力覚帰還も含めた使用者への帰還を行うための処理回路のブロック図、図１１は図１０に示した処理回路の変形を示した他の処理回路のブロック図、そして図１２は図１１に示した処理回路の動作を説明するためのタイムチャートである。

【００２６】先ず、図１乃至図３を用いて、本発明の入力装置に用いて好適な一実施形態の多段タッチパネルを説明する。

【００２７】なお、以下の実施形態においては、多段タッチパネルの一形態として２段型タッチパネルを例示して説明する。そして、従来技術の１段タッチパネルの構成部分と同一の構成部分には同一の符号を付して説明する。

【００２８】また、本多段タッチパネルも【従来の技術】の項で説明したように、情報端末等の小型携帯型情報入力装置、カーナビゲーションシステム、コンピュータ等に用いられる入力装置であって、その装置の一例は図１３に示したものと同様である。従って、以下の説明では、図１３、図１４、図１５に相当する図面は省略する。

【００２９】図１において、符号２５Ａは全体として２段型タッチパネルを指す。この２段型タッチパネル２５Ａは、上側電極シート２５１０、下側電極シート２５２０、中間電極シート２５３０、及び上段スペーサ２６ａと下段スペーサ２６ｂとからなる。なお、上側電極シート２５１０と下側電極シート２５２０の構造は従来技術のものと同一であるので、それらの説明は省略する。

【００３０】中間電極シート２５３０は、これも可撓性を持った透明プラスティック製のものであって、シート基材２５３１の外側、内側両面に反射防止膜２５３２、２５３３が成膜されており、更に、それらの反射防止膜２５３２、２５３３の表面に透明電極２５３４、２５３５が成膜されている。そしてそれぞれの透明電極２５３４、２５３５にはそれぞれ引出線２５３６、２５３７が導出されている。なお、反射防止膜２５２２、２５２３は反射防止膜２５１２、２５１３、２５２２、２５２３と同様に透過光の反射を抑制するための膜である。

【００３１】シート基材２５１１、２５２１、２５３１の透明プラスティックとしては、ＰＥＴ（ポリエチレンテレフタレート）、ＰＭＭＡ（アクリル：ポリメタクリル酸メチル）、ＰＩ（ポリイミド）、ＰＥ（ポリエチレン）、ポリウレタンのような軟質のプラスチックを用いることができる。また、下側のシート基材２５２１にはガラスなどの透明な材料を用いてもよい。更にまた、透明電極２５３４、２５３５としては、透明電極２５１４、２５２４と同様に、例えば、ＩＴＯ（Ｉｎｄｉｕｍ Ｔｉｎ Ｏｘｉｄｅ：インジウム錫酸化物）薄膜などを用いることができる。

【００３２】このような３枚の上側電極シート２５１０、下側電極シート２５２０及び中間電極シート２５３０は、図３に示したように、下側電極シート２５２０の上に下段スペーサ２６ｂを用いて中間電極シート２５３０を支持し、両者間に所定の間隙を形成し、同様に中間電極シート２５３０の上に上段スペーサ２６ａを用いて上側電極シート２５１０を支持し、両者間に所定の間隙を形成して組み立てることにより２段型タッチパネル２５Ａを構成することができる。上側電極シート２５１０と中間電極シート２５３０とギャップＧａで１段目タッチパネルを構成し、中間電極シート２５３０と下側電極シート２５２０とギャップＧｂとで２段目タッチパネルを構成し、従って、透明電極２５１４と透明電極２５３４とが１段目タッチパネルの接点であり、透明電極２５３５と透明電極２５２４とが２段目タッチパネルの接点となる。なお、図３では全ての反射防止膜２５１２、２５１３、２５２２、２５２３、２５３２、２５３３の図示を省略した。

【００３３】次に、図３乃至図５を用いて、本実施形態の２段型タッチパネル２５Ａの動作機構を説明する。

【００３４】先ず、使用者が、例えば、指１９による入力に際して、入力箇所近傍を中心に上側電極シート２５１０の表面を押圧することにより、その押圧部分が押下げられて撓み、上側電極シート２５１０の透明電極２５１４が中間電極シート２５３０の上側の透明電極２５３

４に接触する（上段接触点Ｃａ）。更に、押し込むと、図４に示したように、中間電極シート２５３０が上側電極シート２５１０に押されて屈曲し、その透明電極２５３５が下側電極シート２５２０の透明電極２５２４に接触する（下段接触点Ｃｂ）。

【００３５】この第１実施形態の２段型タッチパネル２５Ａは、使用者が指１９で押下すると、図５に示したような押圧力特性曲線２を持つ。符号２の時点では、上側電極シート２５１０の透明電極２５１４が中間電極シート２５３０の透明電極２５３４に接触して通電が起こり、更に、上側電極シート２５１０を押圧すると、符号４で示す過程で、中間電極シート２５３０が押圧され、符号５で示す時点で、その下側の透明電極２５３５が下側電極シート２５２０の透明電極２５２４に接触し、通電する。ここから更に押し込むと、符号６で示した過程で大きな傾きを持たせることで、使用者に２段面が接触したことを知らせることができる。なお、図５には、参考までに、図２０に示した従来技術の１段型タッチパネル２５の押圧力特性曲線１を点線で併せて示した。

【００３６】この２段型タッチパネル２５Ａは、従来技術の１段型タッチパネル２５と異なり、同一の座標軸上に２つの接点を設けた構造のものであって、使用者は入力操作に混乱を来すことなく入力操作を行うことができるなど、優れた効果が得られるものではあるがるが、押圧力特性曲線２における符号２及び符号５の接触時点が使用者には感覚的に明確に判然としない。この課題を解消するために、視覚的作用、聴覚的作用、或いは力覚的作用を使用者に帰還させれば一層効果的になる。中でも力覚的作用を使用者の指などに帰還させれば、視覚や聴覚と異なり、使用者に入力が確かに行われたことを伝えることができる。

【００３７】その力感帰還機構を備えた第２実施形態の２段型タッチパネル２５Ｂを図６に示した。その２段型タッチパネル２５Ｂの構造を図６を用いて説明する。

【００３８】この２段型タッチパネル２５Ｂは前記の２段型タッチパネル２５Ａが筐体１０（平面が長方形）の一部分の表面に固定されており、その下方の筐体１０内部に表示パネル２４が収容、固定され、そして筐体１０の外周面にアクチュエータの一つである角形ボビンに巻回されたボビンコイル３５Ａがはめ込まれている。なお、本図においても、２段型タッチパネル２５Ａには反射防止膜２５１２、２５１３、２５２２、２５２３、２５３２、２５３３の図示を省略した。

【００３９】ボビンコイル３５Ａは１段目タッチパネルを構成する透明電極２５１４と透明電極２５３４とからなる接点及び２段目タッチパネルを構成する透明電極２５３４と透明電極２５２４とからなる接点の通電に連動して作動するように接続されており（後記の図１０、図１１）、２段型タッチパネル２５Ｂに組み込まれている。

【００４０】２段型タッチパネル２５Ｂをこのように構成することにより、使用者に力覚感覚が伝えられる。その力覚感覚を図７を用いて説明すると、使用者が、例えば、図３に示したように、指１９で１段目タッチパネルである上側電極シート２５１０を押圧すると、その押圧した当初は上側電極シート２５１０の弾性により、曲線の傾きが小さい符号１を辿り、屈折点２において上側電極シート２５１０の透明電極２５１４と中間電極シート２５３０の透明電極２５３４とが接触すると、力覚機構であるボビンコイル３５Ａが作動し、使用者の指１９は使用者側に押し戻され、この押し戻し力に抗して、図４に示したように、更に押し込むと、屈折点４において２段目タッチパネルである中間電極シート２５３０の透明電極２５３５と下側電極シート２５２０の透明電極２５２４と接触し、同時にボビンコイル３５Ａが更に作動して、符号５で示したように、使用者の指１９は使用者側に押し戻され、使用者は入力されたことを力覚として知覚できる。そして、この押し戻し力に抗して更に押し続けると、符号６で示した大きな傾きの過程を辿って２つの入力が終了したことを知らせることができる。

【００４１】図６及び図７に示した２段型タッチパネル２５Ｂ例では、１段目及び２段目のタッチパネルの各段に力覚帰還機構（ボビンコイル３５Ａなど）を付加して力覚帰還応答があるように構成したが、この力覚帰還機構は何れか一方のタッチパネルに付加してもよい。図８は１段目タッチパネルには力覚帰還機構を付加せず、２段目タッチパネルに力覚帰還機構を付加した場合の押圧力特性曲線である。このような構成の場合は、使用者が指１９で上側電極シート２５１０を押圧して１段目タッチパネルの接点が接触しても、ボビンコイル３５Ａは作動せず、更に押圧して１段タッチパネルの前記接点が接触した場合に、ボビンコイル３５Ａが作動し、指１９に符号５で示したような押し戻し力が発生するようにしたものである。

【００４２】前記１段目タッチパネルと２段目タッチパネルの力覚帰還応答の種類としては、振動周波数、振幅、波形及び波形プロファイルの異なる振動を帰還させる方がよい。このようにすると、各段が確実に入力されたことがより一層知覚し易くなる。

【００４３】これら２段型タッチパネル２５Ａ、２５Ｂからの入力情報として、ＯＮ・ＯＦＦ及び座標情報を取得するサブルーチンにおけるフローチャートを図１０に示した。機構上、必ず上側電極シート２５１０から入力信号が入るため、先ず、上側電極シート２５１０の入力信号待ちを行なう（Ｓ１）。１段目タッチパネル（上側電極シート２５１０と中間電極シート２５３０との組合せ）から入力信号が入ると、先ず、その抵抗値から座標の特定を行ない（Ｓ２）、座標情報をRAM（Ｒａｎｄｏｍ Ａｃｃｅｓｓ Ｍｅｍｏｒｙ：読み書き可能な記録素子）に書き込む。更に、２段目タッチパネル（中間電

極シート２５３０と下側電極シート２５２０との組合せ）からの入力待機を開始し（Ｓ３）．ここに入力があった場合、その抵抗値から入力座標を特定し（Ｓ４）、ＲＡＭ内の１段目座標データを２段目座標データに書き換える。また．現在、メモリー上に書き込まれている座標が２段目の入力であることを表すために、フラグを書きこむ（Ｓ５）．

【００４４】次に、図１０を用いて．前記のサブルーチンワークを含めて第２実施形態の２段型タッチパネル２５Ｂと力覚も含めた使用者への帰還を行なうための処理回路を説明する．

【００４５】この処理回路３０Ａは．前記の２段型タッチパネル２５Ｂ及び駆動用ドライバ回路３１、３２に加え．例えば、マイクロコンピュータなどを含む中央処理装置３３及びデータを格納するためのＲＡＭ、ＲＯＭと言ったメモリー３４、出力装置３５から構成されている。出力装置３５は聴覚的出力としての、例えば．スピーカ．視覚的出力としての．例えば．ディスプレイ、そして力覚的出力としてのアクチュエータ、例えば．ボビンコイル３５Ａから構成されている。これらの出力は入力された操作項目に応じて．適切な出力装置３５を選択しながら、使用者に対し帰還を行なうシステムとなっている．

【００４６】図１０では．各段のタッチパネルに対してそれぞれドライバ回路３１．３２が必要であるが．図１１に示したように、２段型タッチパネル２５Ｂと共通のドライバ回路３７の間に切替器３６を配し、中央処理装置３３によって２段型タッチパネル２５Ｂの１段目タッチパネルと２段目タッチパネルの切替を制御することによって、ドライバ回路３７が１つで済む。この切替器３６は．中央処理装置３３のベースクロックを元に．或る一定周期で切替信号を出力するトリガー回路３８からの切替信号を受け．時系列的な切替を行なうことができる。この時の各段階でのタイムチャートを図１２に示した。トリガー回路３８の出力電圧がＶＨの時は．例えば．１段目タッチパネルがドライバ回路３７と接続される。逆に、トリガー回路３８の出力電圧がＶＬの時は、２段目タッチパネルがドライバ回路３７と接続される。これらの接続状態が比較的短い時間．例えば、数ｍ秒の周期で繰り返されるため．使用者には．実時間上．支障無く２段型タッチパネル２５Ｂを使用することができる。

【００４７】この２段型タッチパネル２５Ａ（或いは２５Ｂ）を使用して、各段のタッチパネルがＯＮ及びＯＦＦとなったそれぞれの時点に対し、特定のイベントを割り当てることで．使用者はより直感的な操作により機器を扱うことができる。表１に各ＯＮ／ＯＦＦ時点でのイベント割り当ての例を列挙した。これらの機能はディスプレイ画面上のＧＵＩ（Ｇｒａｐｈｉｃａｌ Ｕｓｅｒ Ｉｎｔａｅｒｆａｃｅの略）環境と組み合わせて用いるとより効果的である。ここで挙げた機能の組合せはあくまでも一例であり、これ以外の機能も付加することが可能である。また、アプリケーションソフトウェア上では．プログラム作成者がソフトウェアの形態、ツール、機能項目に合わせて機能を割り当てることができる。

【表１】

	１段目の割り当て機能		２段目の割り当て機能	
操作	押下	解放	押下	解放
電気的状態	OFF →ON	ON →OFF	OFF →ON	ON →OFF
	座標指定、選択	選択解除	−	指定された座標が指し示すプログラムを実行
	座標指定、選択	選択解除	指定された座標が指し示す項目の一覧を表示	一覧表示の解除、選択項目の実行
	座標指定、選択	選択解除	ドラッグ操作	ドロップ操作
	前方スクロール	前方スクロール解除	後方スクロール	後方スクロール解除
	画像の連続拡大	画像の連続拡大終了	画像の連続縮小	画像の連続縮小終了
	音量の連続増大	音量の連続増大終了	音量の連続縮小	音量の連続縮小終了
	項目の連続順送り	項目の連続順送り終了	項目の連続逆送り	項目の連続逆送り終了
	文字順列の連続順送り	文字順列の連続順送り終了	音量の連続逆送り	文字順列の連続逆送り終了
	メモリーアドレス番地の連続インクリメント	メモリーアドレス番地の連続インクリメント終了	メモリーアドレス番地の連続デクリメント	メモリーアドレス番地の連続デクリメント終了
	メモリー値の連続インクリメント	メモリー値の連続インクリメント終了	メモリー値の連続デクリメント	メモリー値の連続デクリメント終了

以上．本発明を図示の複数の実施形態によって説明したが．本発明はこれらの実施形態のみに限定されるものではなく、本願に含まれる発明の技術的思想の範囲内で各種の変更が可能である。例えば、前記の各実施形態では．同一の座標軸上に２つの接点を設けた構造のものであるが、中間電極シート２５３０の枚数を増やすことに

より．３以上の接点を形成できる多段タッチパネルを構成できることが容易に理解されよう．

【００４８】また、アクチュエータはボビンコイルのみに限定されるものではなく．ソレノイド、圧電素子、モータなどであってもよい。

【００４９】更にまた、前記第２実施形態の２段型タッチパネル２５Ｂにおいては．力覚帰還機構を各段に設けたが．どちらかの段のタッチパネルのみに設けるだけでもよい。

【００５０】

【発明の効果】本願の主要な発明は．既存の機器の形態を保ち、１段目タッチパネルをこれまでの入力手順に埋没させることで．使用者は入力操作に混乱をきたすことがなくなる。更に、２段タッチパネルに表１の機能を割り当てることによって、使用者は複雑な機能に対しても．簡単な操作．少ない指動作によって指示することができる。

【００５１】これら２点により、使用者は素早い入力操作ができるようになり、ストレスを感じることが少なくなる．また、力覚による帰還機構と組み合わせることにより．使用者は画面の確認が少なくなり、特に手馴れた一連の操作に関しては、各段に素早い入力操作を行うことができるようになる。

【００５２】また、本願の他の主要な発明では．力覚帰還機構は処理装置の指令により制御されている．従って．ソフトウエアドライバーにより画一化することで、オペレーションシステム及びアプリケーションソフトウエアからの制御が可能となる。よって．ソフトウェア製作者は既存の聴覚及び視覚による出力機構に加え．力覚機構を活用したソフトウェアを作成することができ、より広い表現力を持ったソフトウェアを提供することができる．また、使用者は機器に対し、より友好的な感覚でソフトウェアを使用することができる。

【図面の簡単な説明】

【図１】　本発明に用いて好適な第１実施形態の２段型タッチパネルの分解斜視図である。

【図２】　図１に示した２段型タッチパネルの一部の断面側面図である。

【図３】　図１に示した２段型タッチパネルを組み立てた状態で、指で最初の段階の入力を行った状態を示す断面側面図である。

【図４】　図３の状態から指で更に押圧した状態の２段型タッチパネルの断面側面図である。

【図５】　図１に示した第１実施形態の２段型タッチパネルの押圧力特性曲線である。

【図６】　第２実施形態の力覚帰還機構を付加した２段型タッチパネルの断面側面図である。

【図７】　図６に示した第２実施形態の２段型タッチパネルの押圧力特性曲線である。

【図８】　図６に示した第２実施形態の２段型タッチパネルの他の押圧力特性曲線である。

【図９】　２段型タッチパネルで入力した場合のフローチャートである。

【図１０】　本実施形態の２段型タッチパネルと力覚帰還も含めた使用者への帰還を行うための処理回路のブロック図である。

【図１１】　図１０に示した処理回路の変形を示した他の処理回路のブロック図である。

【図１２】　図１１に示した処理回路の動作を説明するためのタイムチャートである。

【図１３】　一般的な入力装置の正面図である。

【図１４】　図１３に示した入力装置の一部拡大正面図である。

【図１５】　図１３に示した入力装置の表示部の分解斜視図である

【図１６】　図１３に示した入力装置の表示部の断面側面図である。

【図１７】　図１６に示した表示部を構成する従来技術の１段タッチパネルの分解斜視図である。

【図１８】　図１６に示した１段タッチパネルの断面側面図である。

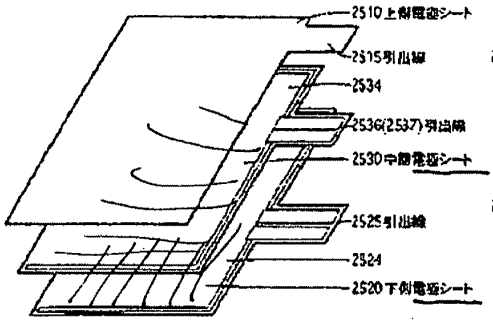
【図１９】　図１７に示した１段タッチパネルの動作を説明するための図１６に示した表示部の断面側面図である。

【図２０】　図１６に示した従来技術の１段タッチパネルの押圧力Ｐ－変位δ特性曲線である。

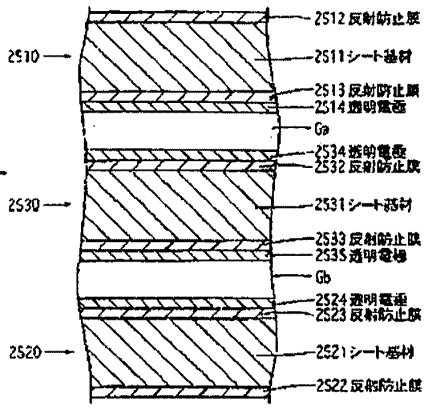
【符号の説明】

１０…筐体、１１…フレーム、１２…表示部、１３…入力パネル、１４…操作釦．１８…支持具、１９…指、２４…表示パネル．２５Ａ…本発明の第１実施形態の２段型タッチパネル．２５１０…上側電極シート、２５１１．２５２１．２５３１…シート基材．２５２０…下側電極シート、２５３０…中間電極シート、２６ａ…上段スペーサ、２６ｂ…下段スペーサ、２５１４，２５１５．２５２４．２５２５．２５３４．２５３５…透明電極．２５Ｂ…本発明の第２実施形態の２段型タッチパネル．３３…処理部，３４…メモリー．３５…出力装置，３５Ａ…ボビンコイル、３６…切換器．Ｇａ，Ｇｂ…ギャップ

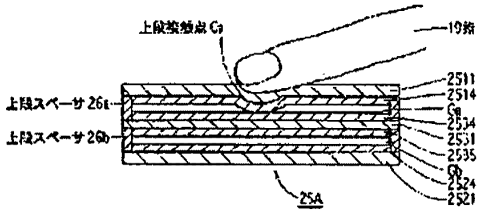
【図1】



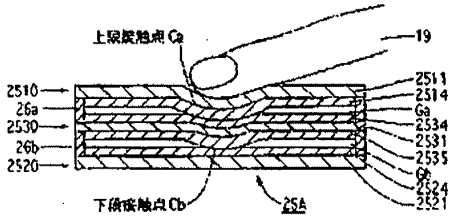
【図2】



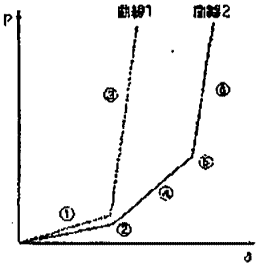
【図3】



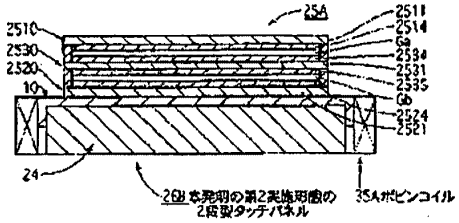
【図4】



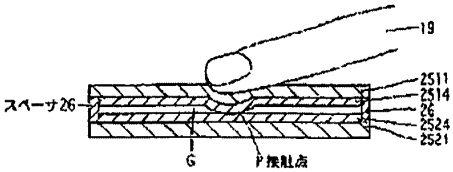
【図5】



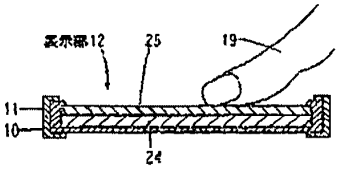
【図6】



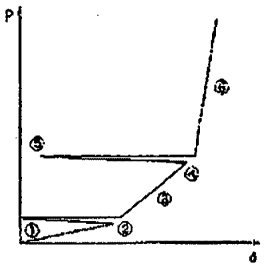
【図19】



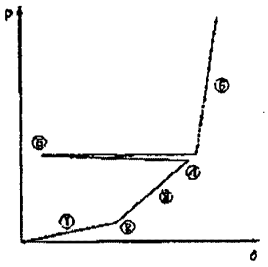
【図16】



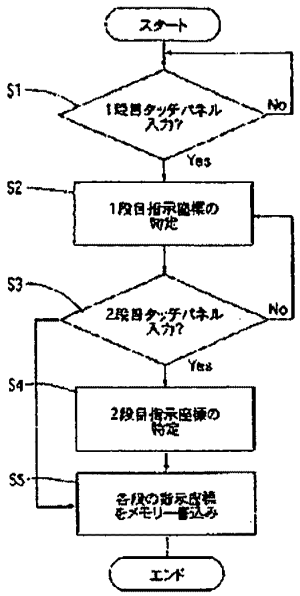
【図7】



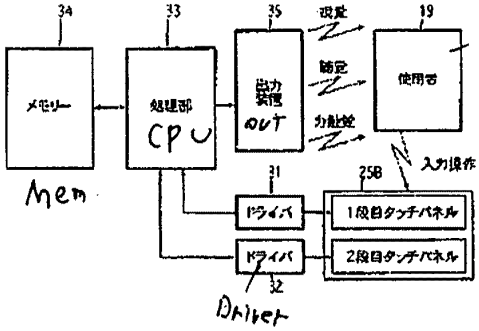
【図8】



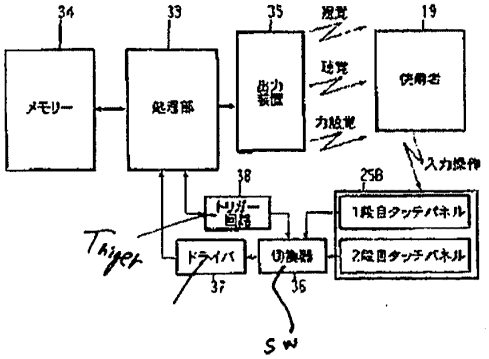
【図9】



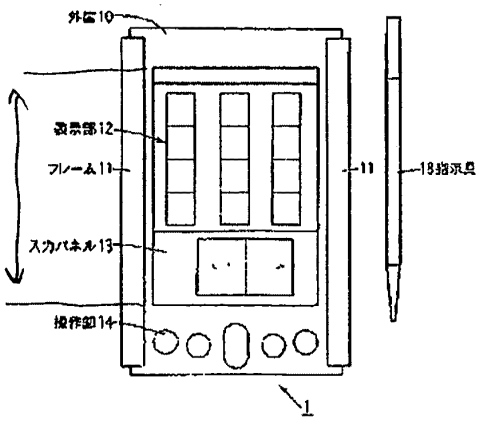
【図10】



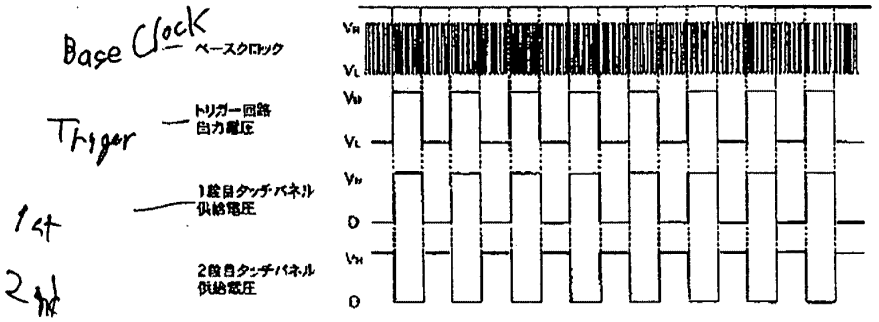
【図11】



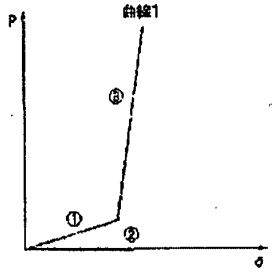
【図13】



【図１２】

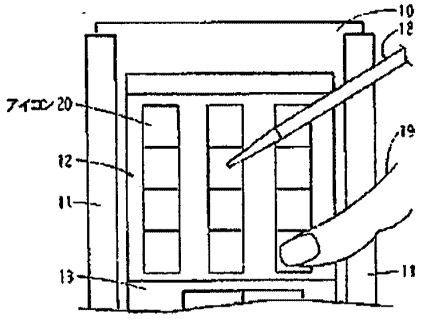


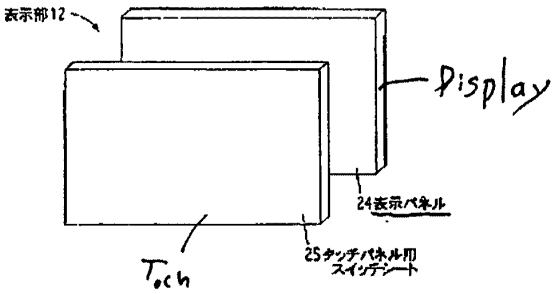
【図２０】



【図１４】

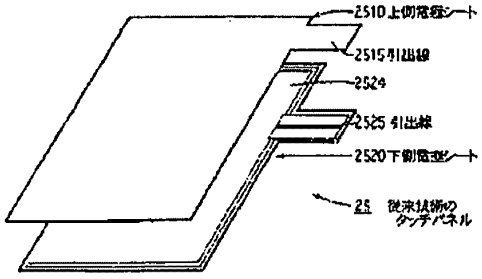
【図１５】

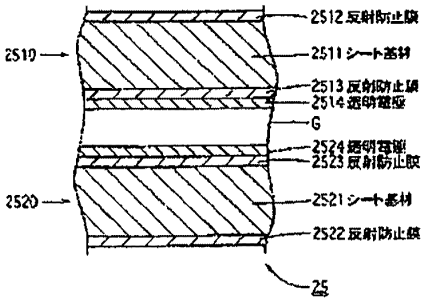


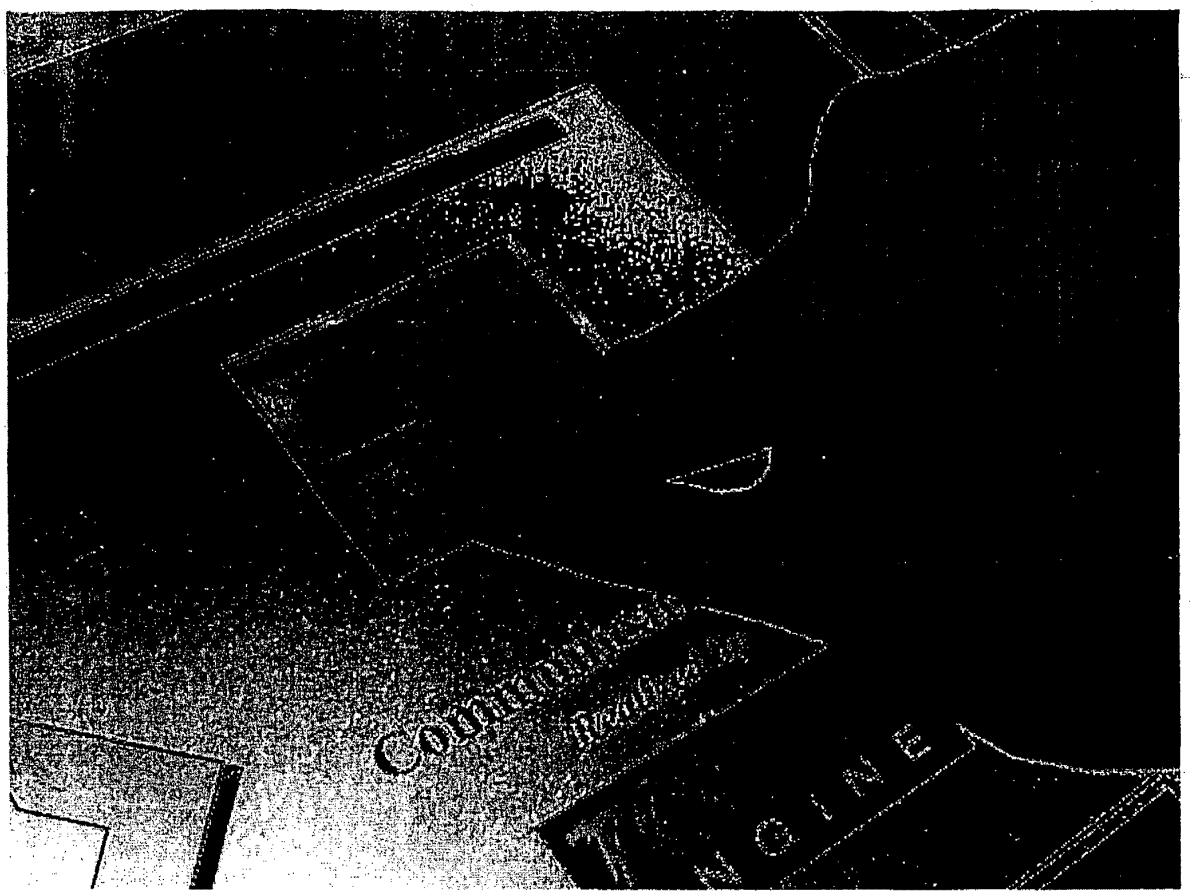


【図１７】

【図１８】







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3.In the drawings, any words are not translated.

TECHNICAL FIELD

[The technical field to which invention belongs] this invention relates to the input unit with which a user can realize that started the input unit, especially alter operation by press was performed certainly.

[Translation done.]

JP Patent Application

P2002-259044

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to the input unit with which a user can realize that started the input unit, especially alter operation by press was performed certainly.
[0002]
[Description of the Prior Art] First, the input unit of the conventional technology is explained, referring to drawing 13 or drawing 20 .
[0003] The input unit which showed drawing 13 in the front view of an input unit, and showed drawing 14 to drawing 13 a part Expansion front view, The decomposition perspective diagram of the display of the input unit which showed drawing 15 to drawing 13 , the cross-section side elevation of the display of the input unit which showed drawing 16 to drawing 13 , The decomposition perspective diagram of the one-step touch panel of the conventional technology which constitutes the display which showed drawing 17 to drawing 16 , The cross-section side elevation of a display shown in drawing 16 for the cross-section side elevation of the one-step touch panel which showed drawing 18 to drawing 16 , and drawing 19 explaining operation of the one-step touch panel shown in drawing 17 , and drawing 20 are the press force P-displacement delta characteristic curves of the one-step touch panel of the conventional technology shown in drawing 16 .
[0004] In drawing 13 , a sign 1 points out the input unit of the conventional technology. This input unit 1 is used for small carrying type information input units, such as an information terminal, the car-navigation system, the computer, etc.
[0005] A frame 11 is combined by the both-sides edge of outside ** 10, and this input unit 1 is reinforced at it, respectively, while it is equipped with outside ** 10 which makes the shape of a flat rectangular parallelepiped. And the display 12 which makes a touch panel serve a double purpose is formed in the upper surface of outside ** 10. While the input panel 13 is formed in this display 12 bottom, two or more operating buttons 14 are allotted under the input panel 13.
[0006] A touch-panel function is provided on the display 12, **, the switch, the menu, the icon, etc. and system of coordinates which the display of a display 12 projected correspond by 1 to 1, and an input unit 1 receives an input event by pressing the touch panel (postscript) of the part of the item which a user wants to choose with the directions implement 18 or a finger 19, as shown in drawing 14 and drawing 16 .
[0007] The display 12 consists of a lower shell display panel 24 and a touch panel 25, as shown in drawing 15 and drawing 16 . The display panel 24 is made as [perform / a predetermined display], and has flat-surface displays, such as a liquid crystal display, an organic EL display, and a CRT (Cathode Ray Tube) display, a curved-surface display, etc. The touch panel 25 is constituted so that switching operation may be performed with alter operation, and it has a resistance film type and other methods. As shown in drawing 16 , such a display panel 24 and a touch panel 25 are piled up, and are used, being stored in outside ** 10.
[0008] in addition, the driver circuit for driving the flexible patchboard for a wiring drawer, and a

display to a display panel 24 -- although the pack light sections, such as the luminescence section, a light guide plate, a diffusion board, and a booster circuit, were connected further especially about the LCD panel, those illustration was omitted here

[0009] The touch panel 25 of the conventional technology is equipped only with one step of input functions. That is, if a resistance film type touch panel is mentioned as an example and the structure is explained, as shown in drawing 17 and drawing 18 , the top electrode sheet 2510 and the bottom electrode sheet 2520 open few [uniformly] gaps G with a spacer 26 (drawing 19), and are constituted.

[0010] Antireflection films 2512 and 2513 are formed by the outside of the sheet base material 2511 made of a transparent plastic in which the top electrode sheet 2510 had flexibility, and inside both sides, and the transparent electrode 2514 is formed by the front face of the inside antireflection film 2513 of them. As this transparent electrode 2514, an ITO (Indium Tin Oxide:indium stannic-acid ghost) thin film etc. is desirable, for example. Similarly, antireflection films 2522 and 2523 are formed by the outside of the sheet base material 2521 made of a transparent plastic in which the bottom electrode sheet 2520 also had flexibility, and inside both sides, and the transparent electrode 2524 is formed by the front face of the inside antireflection film 2523 of them. In addition, antireflection films 2512, 2513, 2522, and 2523 are films for suppressing reflection of the transmitted light. Leader lines 2515 and 2525 are drawn by each transparent electrode 2514 and 2524, respectively (drawing 17). And the aforementioned touch panel 25 is the thing of the structure which both the transparent electrodes 2514 and 2524 were opposed, opened few gaps G as mentioned above using the spacer 26, and has arranged the top electrode sheet 2510 and the bottom electrode sheet 2520.

[0011] Next, operation of this touch panel 25 and its property are explained using drawing 19 and drawing 20 .

[0012] As mentioned above, it is inputted when a user chooses and presses an item, a file, etc. which were displayed on the display 12 by the display panel 24 with the directions implement 18 or a finger 19. That is, the top electrode sheet 2510 of the specific position of a touch panel 25 is pressed by this alter operation, and the transparent electrode 2514 contacts the transparent electrode 2524 of the bottom electrode sheet 2520 by it. An input position coordinate can be specified by measuring the resistance to these both point of contact P.

[0013]

[Problem(s) to be Solved by the Invention] However, in the case of such alter operation, by the touch panel 25 of the conventional technology, if a graph shows the displacement delta of the top electrode sheet 2510 to the push-down force P of the touch-panel 25 very thing, it will become the P-delta curve 1 as shown in drawing 20 . That is, in case beginning pushes, first, with the elasticity of the top electrode sheet 2510, 1 with a curved small inclination is followed and both sheets 2510 and 2520 contact in an inflection point 2. Furthermore, if it pushes in, the bottom electrode sheet 2520 will be pushed and the inclination of a curve 1 will become larger like a straight line 3. However, it is unclear in whether in the case of such alter operation, the touch panel 25 was turned on [it] at the user at which time, and the input event occurred.

[0014] Moreover, the operation which continues pushing beyond the combination of a serial input, for example, a certain fixed time, when giving this directions of execution etc. or adding different operation, or continues the same part twice or more within a certain fixed time, and is pushed although an item, a file, etc. can be chosen as mentioned above as long as one step of such input units are used was required.

[0015] Quick operation becomes difficult in order for such a method to require the fixed real time difficultly on the small display screen in a small pocket device. Moreover, the interruption processing from the timer which measures the real time will apply a load to signal-processing work.

[0016] Furthermore, there was no function to return reaction force to a touch panel 25 to the finger 19 of the user who performs alter operation etc. again (feedback), it was the sound outputted from a voice output, and the alter operation receptionist was returned by changing the display of a part of display 12. However, it was unclear for the user whether it was that the operation itself was accepted in the device side to the alter operation and the quick alter operation which are performed without a user's looking at a

display 12.
[0017] this invention can be inputted certainly, without causing derangement, when it is made in view of such a trouble and a user performs alter operation to a user's alter operation, and, moreover, it can input by easy operation and few finger operation also to a complicated function, and aims at offering the input unit which enabled feedback by the inner force sense to the tactile sense of a user's finger.
[0018]
[Means for Solving the Problem] Therefore, the input unit of the main patent of this application is related with the input unit equipped with the touch panel with which at least two contacts are formed on the same axis of coordinates in a plane-coordinates system.
[0019] two contacts resemble the touch panel, respectively, and a gap forms in the thickness direction -- having -- **** -- and the touch panel -- the -- at least, an input area-ed is transparent, and suitable for the screen of display [pile up, use and]
[0020] Moreover, it has the actuator with which the aforementioned touch panel is interlocked with energization of each aforementioned contact, and operates in the input unit of other main patents of this application, and its driver circuit, and the aforementioned actuator is returning the inner force sense from which it responds for every contact on the same coordinate, and a mode of operation changes further again.
[0021] Furthermore, the input unit of the desirable embodiment of invention included in this application again A bipolar-electrode sheet with flexibility with the transparent predetermined thickness by which the transparent electrode is formed by both sides is inserted. The transparent top electrode sheet with flexibility with which the transparent electrode which opened the uniform predetermined gap from both the aforementioned transparent electrodes, respectively, and met the alter operation side at aforementioned one transparent electrode was formed And the transparent bottom electrode sheet with which the transparent electrode which met the transparent electrode of aforementioned another side was formed equips the display side with the touch panel which a laminating is carried out, respectively and is constituted, and the bipolar-electrode sheet opens two or more sheets and a predetermined gap, is arranged, and is good also as a multi-stage touch panel. Moreover, the 1st step touch panel consists of an aforementioned bipolar-electrode sheet and an aforementioned top electrode sheet, and, as for this multi-stage touch panel, the last stage touch panel consists of an aforementioned bipolar-electrode sheet and an aforementioned bottom electrode sheet.
[0022] Therefore, if the electrode sheet of the front face where a directions implement or a finger contacts is pressed with a directions implement or a finger according to this invention, the electrode sheet of the front face will be pushed in first, a gap [directly under] is crushed, both the transparent electrodes that meet contact, the electrode sheet of pressing-further middle is also pushed in, the gap of it is also crushed, and the transparent electrode of the bipolar-electrode sheet which meets, and the transparent electrode of the bottom electrode sheet which counters contact. If the multilayer laminating of the bipolar-electrode sheet is carried out, a gap can be crushed covering multi-stage like the following, both the transparent electrodes that counter can be contacted, and two or more transparent electrodes can be contacted on the same coordinate.
[0023] If constituted on such a multi-stage touch panel, the contact of each stage can be made to be able to possess an inner-force-sense feedback mechanism, therefore a mode of operation can also be changed for every contact.
[0024]
[Embodiments of the Invention] Hereafter, the operation gestalt of the input unit of this invention is explained using drawing.
[0025] Some cross-section side elevations of the two-step type touch panel which used drawing 1 for this invention and showed the suitable decomposition perspective diagram of the two-step type touch panel of the 1st operation gestalt and drawing 2 to drawing 1 , and drawing 3 are in the state which assembled the two-step type touch panel shown in drawing 1 . The cross-section side elevation showing the state where the first stage was inputted with the finger, the cross-section side elevation of the two-step type touch panel in the state where drawing 4 was further pressed with the finger from the state of

drawing 3 , The press force characteristic curve of the two-step type touch panel of the 1st operation gestalt which showed drawing 5 to drawing 1 , The cross-section side elevation of the two-step type touch panel with which drawing 6 added the inner-force-sense feedback mechanism of the 2nd operation gestalt, The press force characteristic curve of the two-step type touch panel of the 2nd operation gestalt which showed drawing 7 to drawing 6 , Other press force characteristic curves of the two-step type touch panel of the 2nd operation gestalt which showed drawing 8 to drawing 6 , The block diagram of the processing circuit for the flow chart at the time of inputting drawing 10 by the two-step type touch panel and drawing 10 performing feedback to a user also including the two-step type touch panel of this operation gestalt, and inner-force-sense feedback, The block diagram of other processing circuits having shown deformation of the processing circuit which showed drawing 11 to drawing 10 , and drawing 12 are the timing diagrams for explaining operation of the processing circuit shown in drawing 11 .

[0026] First, using drawing 1 or drawing 3 , it uses for the input unit of this invention, and the multi-stage touch panel of 1 suitable operation gestalt is explained.

[0027] In addition, in the following operation gestalten, a two-step type touch panel is illustrated and explained as one gestalt of a multi-stage touch panel. And the same sign is attached and explained to the same component as the component of the one-step touch panel of the conventional technology.

[0028] Moreover, as the term of [Description of the Prior Art] also explained this multi-stage touch panel, it is the input unit used for small carrying type information input units, such as an information terminal, a car-navigation system, a computer, etc., and an example of the equipment is the same as that of what was shown in drawing 13 . Therefore, in the following explanation, the drawing equivalent to drawing 13 , drawing 14 , and drawing 15 is omitted.

[0029] In drawing 1 , sign 25A points out a two-step type touch panel as a whole. This two-step type touch-panel 25A consists of the top electrode sheet 2510, the bottom electrode sheet 2520, the bipolar-electrode sheet 2530 and upper case spacer 26a, and lower-berth spacer 26b. In addition, since the structure of the top electrode sheet 2510 and the bottom electrode sheet 2520 is the same as that of the thing of the conventional technology, those explanation is omitted.

[0030] The bipolar-electrode sheet 2530 is the thing made of a transparent plastic in which this also had flexibility, antireflection films 2532 and 2533 are formed by the outside of the sheet base material 2531, and inside both sides, and transparent electrodes 2534 and 2535 are further formed by the front face of those antireflection films 2532 and 2533. And leader lines 2536 and 2537 are drawn by each transparent electrode 2534 and 2535, respectively. In addition, antireflection films 2522 and 2523 are films for suppressing reflection of the transmitted light like antireflection films 2512, 2513, 2522, and 2523.

[0031] As a transparent plastic of the sheet base materials 2511, 2521, and 2531, elastic plastics like PET (polyethylene terephthalate), PMMA (acrylic : polymethyl methacrylate), PI (polyimide), PE (polyethylene), and polyurethane can be used. Moreover, you may use transparent material, such as glass, for the lower sheet base material 2521. Furthermore, as transparent electrodes 2534 and 2535, an ITO (Indium Tin Oxide:indium stannic-acid ghost) thin film etc. can be used like transparent electrodes 2514 and 2524 again.

[0032] Such a top electrode sheet 2510 of three sheets, the bottom electrode sheet 2520, and the bipolar-electrode sheet 2530 As shown in drawing 3 , use lower-berth spacer 26b on the bottom electrode sheet 2520, and the bipolar-electrode sheet 2530 is supported. A predetermined gap is formed among both, upper case spacer 26a can be similarly used on the bipolar-electrode sheet 2530, the top electrode sheet 2510 can be supported, and two-step type touch-panel 25A can be constituted by forming and assembling a predetermined gap among both. The 1st step touch panel is constituted from a top electrode sheet 2510, a bipolar-electrode sheet 2530, and a gap Ga, and the 2nd step touch panel is constituted from a bipolar-electrode sheet 2530, a bottom electrode sheet 2520, and a gap Gb, therefore a transparent electrode 2514 and a transparent electrode 2534 are the contacts of the 1st step touch panel, and a transparent electrode 2535 and a transparent electrode 2524 serve as a contact of the 2nd step touch panel. In addition, in drawing 3 , illustration of all the antireflection films 2512, 2513, 2522, 2523, 2532, and 2533 was omitted.

[0033] Next, the mechanism of two-step type touch-panel 25A of this operation gestalt of operation is

explained using drawing 3 or drawing 5 .
[0034] First, when a user presses the front face of the top electrode sheet 2510 centering on near the input part on the occasion of an input with a finger 19, the press portion is depressed, and becomes depressed and the transparent electrode 2514 of the top electrode sheet 2510 contacts the transparent electrode 2534 of the bipolar-electrode sheet 2530 top (upper case point of contact calcium). Furthermore, if it pushes in, as shown in drawing 4 , the bipolar-electrode sheet 2530 will be pushed on the top electrode sheet 2510, and will be crooked, and the transparent electrode 2535 will contact the transparent electrode 2524 of the bottom electrode sheet 2520 (lower-berth point of contact Cb).
[0035] When a user does the depression of the two-step type touch-panel 25A of this 1st operation gestalt with a finger 19, it has the press force characteristic curve 2 as shown in drawing 5 . At the time of a sign 2, the transparent electrode 2514 of the top electrode sheet 2510 contacts the transparent electrode 2534 of the bipolar-electrode sheet 2530, energization takes place, and further, if the top electrode sheet 2510 is pressed, when the bipolar-electrode sheet 2530 is pressed and a sign 5 shows, the transparent electrode 2535 of the bottom will contact the transparent electrode 2524 of the bottom electrode sheet 2520, and will energize in the process shown with a sign 4. If it pushes in further from here, it can tell that the two-step side contacted the user by giving a big inclination in the process shown with the sign 6. In addition, the dotted line showed collectively the press force characteristic curve 1 of the one-step type touch panel 25 of the conventional technology shown in drawing 20 to drawing 5 by reference.
[0036] the contact time of the sign [in / the press force characteristic curve 2 / in **] 2 although the outstanding effect is acquired, and a sign 5 -- this two-step type touch-panel 25A is the thing of structure which established two contacts on the same axis of coordinates unlike the one-step type touch panel 25 of the conventional technology, and a user can perform alter operation, without causing derangement to alter operation -- a user -- sensuous -- clear -- being distinct -- it does not carry out In order to cancel this technical problem, if a visual operation and acoustic-sense-operation or an inner-force-sense-operation is returned to a user, it will become much more effective. If an inner-force-sense-operation is returned to a user's finger etc. especially, unlike a visual sense or an acoustic sense, it can tell that surely the input was given to the user.
[0037] Two-step type touch-panel 25B of the 2nd operation gestalt equipped with the feeling feedback mechanism of the force was shown in drawing 6 . The structure of the two-step type touch-panel 25B is explained using drawing 6 .
[0038] Bobbin coil 35A which the aforementioned two-step type touch-panel 25A was being fixed to some front faces of a case 10 (a flat surface is a rectangle), the display panel 24 was held in the case 10 interior of the lower part, and this two-step type touch-panel 25B was fixed to it, and was wound around the square shape bobbin which is one of the actuators in the periphery side of a case 10 is inserted in. In addition, also in this view, illustration of antireflection films 2512, 2513, 2522, 2523, 2532, and 2533 was omitted to two-step type touch-panel 25A.
[0039] It connects so that energization of the contact which consists of a transparent electrode 2534 which constitutes the contact and the 2nd step touch panel which consist of a transparent electrode 2514 which constitutes the 1st step touch panel, and a transparent electrode 2534, and a transparent electrode 2524 may be interlocked with and it may operate (after-mentioned drawing 10 , drawing 11), and bobbin coil 35A is included in two-step type touch-panel 25B.
[0040] Inner-force-sense feeling is told to a user by constituting two-step type touch-panel 25B in this way. If the inner-force-sense feeling is explained using drawing 7 , as shown in drawing 3 , a user When the top electrode sheet 2510 which is the 1st step touch panel is pressed with a finger 19, at the beginning [the] which was pressed with the elasticity of the top electrode sheet 2510 If the sign 1 with a curved small inclination is followed and the transparent electrode 2514 of the top electrode sheet 2510 and the transparent electrode 2534 of the bipolar-electrode sheet 2530 contact in an inflection point 2 As bobbin coil 35A which is an inner-force-sense mechanism operated, and a user's finger 19 is put back to a user side, resists this putting-back force and was shown in drawing 4 Furthermore, if it pushes in, in an inflection point 4, will contact the transparent electrode 2535 of the bipolar-electrode sheet 2530 and the

transparent electrode 2524 of the bottom electrode sheet 2520 which are the 2nd step touch panel, and bobbin coil 35A will operate further simultaneously. As the sign 5 showed, a user's finger 19 is put back to a user side, and a user can perceive having been inputted as an inner force sense. And it can tell that followed this process of the big inclination shown with the sign 6 when it put back, the force was resisted and it continued pushing further, and two inputs were completed.

[0041] Although it constituted from 2 step mold touch-panel 25B example shown in drawing 6 and drawing 7 as inner-force-sense feedback mechanisms (bobbin coil 35A etc.) were added to each stage of the 1st step and the 2nd step of touch panel and there was an inner-force-sense feedback response, you may add this inner-force-sense feedback mechanism to one of touch panels. Drawing 8 is a press force characteristic curve at the time of not adding an inner-force-sense feedback mechanism to the 1st step touch panel, but adding an inner-force-sense feedback mechanism to the 2nd step touch panel. When it does not operate, but it presses further and the aforementioned contact of an one-step touch panel contacts, bobbin coil 35A operates and it is made for the putting-back force as shown in the finger 19 with the sign 5 to generate bobbin coil 35A, even if, as for the case of such composition, a user presses the top electrode sheet 2510 with a finger 19 and the contact of the 1st step touch panel contacts.

[0042] Make it better for vibration from which oscillation frequency, an amplitude, a wave, and a wave profile differ to return as a kind of inner-force-sense feedback response of the aforementioned 1st step touch panel and the 2nd step touch panel. If it does in this way, it will much more become easy to perceive that each stage was inputted certainly.

[0043] The flow chart in the sub routine which acquires ON-OFF and coordinate information was shown in drawing 10 as input from these two-step type touch panels 25A and 25B. On a mechanism, in order that an input signal may surely enter from the top electrode sheet 2510, input signal waiting of the top electrode sheet 2510 is performed first (S1). If an input signal enters from the 1st step touch panel (put together as the top electrode sheet 2510 and the bipolar-electrode sheet 2530), first, a coordinate will be specified from the resistance (S2), and coordinate information will be written in RAM (Random Access Memory : record element which can be written). Furthermore, when the input standby from the 2nd step touch panel (put together as the bipolar-electrode sheet 2530 and the bottom electrode sheet 2520) is started (S3) and an input is here, an input coordinate is specified from the resistance and (S4) and the 1st step coordinate data in RAM are rewritten to the 2nd step coordinate data. Moreover, since it expresses that the coordinate currently written in on memory is the 2nd step of input now, a flag is written in (S5).

[0044] Next, the processing circuit for performing feedback to the user who also includes two-step type touch-panel 25B of the 2nd operation gestalt and an inner force sense including the aforementioned sub routine work using drawing 10 is explained.

[0045] This processing circuit 30A consists of the memory 34 and the output units 35 which were called RAM for storing the central processing unit 33 and data containing a microcomputer etc. in addition to the aforementioned two-step type touch-panel 25B and the driver circuits 31 and 32 for a drive, and ROM. The output unit 35 consists of, the actuator as a display and an inner-force-sense-output, for example, bobbin coil 35A, as the loudspeaker as an acoustic-sense-output, and a visual output. These outputs serve as a system which returns to a user, choosing the suitable output unit 35 according to the inputted operation item.

[0046] At drawing 10 , although driver circuits 31 and 32 were required respectively, as it was shown in drawing 11 to the touch panel of each stage, a driver circuit 37 can be managed with one by allotting a switcher 36 between two-step type touch-panel 25B and the common driver circuit 37, and controlling 1st step the touch panel of two-step type touch-panel 25B, and the 2nd step switching of a touch panel with a central processing unit 33. This switcher 36 can receive the change information from the trigger circuit 38 which outputs a change signal a certain fixed period based on the base clock of a central processing unit 33, and can perform a serial change. The timing diagram in each stage at this time was shown in drawing 12 . When the output voltage of a trigger circuit 38 is VH, the 1st step touch panel is connected with a driver circuit 37. On the contrary, when the output voltage of a trigger circuit 38 is VL, the 2nd step touch panel is connected with a driver circuit 37. Since these connection states are repeated in comparatively short time, for example, the period of several m seconds, two-step type touch-panel

25B can be used for a user without trouble on the real time.
[0047] This two-step type touch-panel 25A (or 25B) can be used, and a user can treat a device by more nearly intuitive operation by assigning a specific event to each time of the touch panel of each stage serving as ON and OFF. The examples of the event assignment in each ON/OFF time were enumerated to Table 1. If these functions are used combining the GUI (the abbreviation for Graphical User Intaerface) environment on a display screen, they are more effective. The combination of the function mentioned here is an example to the last, and it is possible to also add functions other than this. Moreover, on application software, a programming person can assign a function according to the gestalt of software, a tool, and a functional item.
[Table 1]

	1段目の割り当て機能		2段目の割り当て機能	
操作	押下	解放	押下	解放
電気的状態	OFF →ON	ON →OFF	OFF →ON	ON →OFF
	座標指定、選択	選択解除	−	指定された座標が指し示すプログラムを実行
	座標指定、選択	選択解除	指定された座標が指し示す項目の一覧を表示	一覧表示の解除、選択項目の実行
	座標指定、選択	選択解除	ドラッグ操作	ドロップ操作
	前方スクロール	前方スクロール解除	後方スクロール	後方スクロール解除
	画像の連続拡大	画像の連続拡大終了	画像の連続縮小	画像の連続縮小終了
	音量の連続増大	音量の連続増大終了	音量の連続縮小	音量の連続縮小終了
	項目の連続順送り	項目の連続順送り終了	項目の連続逆送り	項目の連続逆送り終了
	文字順列の連続順送り	文字順列の連続順送り終了	音量の連続逆送り	文字順列の連続逆送り終了
	メモリーアドレス番地の連続インクリメント	メモリーアドレス番地の連続インクリメント終了	メモリーアドレス番地の連続デクリメント	メモリーアドレス番地の連続デクリメント終了
	メモリー値の連続インクリメント	メモリー値の連続インクリメント終了	メモリー値の連続デクリメント	メモリー値の連続デクリメント終了

As mentioned above, although two or more operation gestalten of illustration explained this invention, various kinds of change by within the limits of the technical thought of invention which is not limited only to these operation gestalten and included in this application is possible for this invention. For example, with each aforementioned operation gestalt, although it is the thing of structure which established two contacts on the same axis of coordinates, it will be easily understood by increasing the number of sheets of the bipolar-electrode sheet 2530 that the multi-stage touch panel which can form three or more contacts can be constituted.
[0048] Moreover, an actuator may not be limited only to a bobbin coil and may be a solenoid, a piezoelectric device, a motor, etc.
[0049] Furthermore, although the inner-force-sense feedback mechanism was prepared in each stage in two-step type touch-panel 25B of the aforementioned 2nd operation gestalt, it is also good to prepare only in the touch panel of one of stages again.
[0050]
[Effect of the Invention] It is main invention of this application maintaining the gestalt of the existing device, and making the 1st step touch panel based on an old input procedure, and a user loses causing derangement to alter operation. Furthermore, a user can direct by easy operation and few finger operation also to a complicated function by assigning the function of Table 1 to a two-step touch panel.
[0051] A user coming to be able to do quick alter operation and sensing stress according to these two points, decreases. Moreover, by combining with the feedback mechanism by the inner force sense, a

user's check of a screen decreases and he can perform quick alter operation now in each stage about a series of operations to which it got used especially.
[0052] Moreover, the inner-force-sense feedback mechanism is controlled by main invention of everything but this application by instructions of a processor. Therefore, it becomes controllable from an operation system and application software by forming drawing 1 with a software driver. Therefore, in addition to the output device by an existing acoustic sense and an existing visual sense, a software manufacturer can create the software which utilized the inner-force-sense mechanism, and can offer the software which had latus power of expression more. Moreover, a user can use software with more nearly friendly feeling to a device.

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PRIOR ART

[Description of the Prior Art] First, the input unit of the conventional technology is explained, referring to drawing 13 or drawing 20 .
[0003] The input unit which showed drawing 13 in the front view of an input unit, and showed drawing 14 to drawing 13 a part Expansion front view, The decomposition perspective diagram of the display of the input unit which showed drawing 15 to drawing 13 , the cross-section side elevation of the display of the input unit which showed drawing 16 to drawing 13 , The decomposition perspective diagram of the one-step touch panel of the conventional technology which constitutes the display which showed drawing 17 to drawing 16 , The cross-section side elevation of a display shown in drawing 16 for the cross-section side elevation of the one-step touch panel which showed drawing 18 to drawing 16 , and drawing 19 explaining operation of the one-step touch panel shown in drawing 17 , and drawing 20 are the press force P-displacement delta characteristic curves of the one-step touch panel of the conventional technology shown in drawing 16 .
[0004] In drawing 13 , a sign 1 points out the input unit of the conventional technology. This input unit 1 is used for small carrying type information input units, such as an information terminal, the car-navigation system, the computer, etc.
[0005] A frame 11 is combined by the both-sides edge of outside ** 10, and this input unit 1 is reinforced at it, respectively, while it is equipped with outside ** 10 which makes the shape of a flat rectangular parallelepiped. And the display 12 which makes a touch panel serve a double purpose is formed in the upper surface of outside ** 10. While the input panel 13 is formed in this display 12 bottom, two or more operating buttons 14 are allotted under the input panel 13.
[0006] A touch-panel function is provided on the display 12, **, the switch, the menu, the icon, etc. and system of coordinates which the display of a display 12 projected correspond by 1 to 1, and an input unit 1 receives an input event by pressing the touch panel (postscript) of the part of the item which a user wants to choose with the directions implement 18 or a finger 19, as shown in drawing 14 and drawing 16 .
[0007] The display 12 consists of a lower shell display panel 24 and a touch panel 25, as shown in drawing 15 and drawing 16 . The display panel 24 is made as [perform / a predetermined display], and has flat-surface displays, such as a liquid crystal display, an organic EL display, and a CRT (Cathode Ray Tube) display, a curved-surface display, etc. The touch panel 25 is constituted so that switching operation may be performed with alter operation, and it has a resistance film type and other methods. As shown in drawing 16 , such a display panel 24 and a touch panel 25 are piled up, and are used, being stored in outside ** 10.
[0008] in addition, the driver circuit for driving the flexible patchboard for a wiring drawer, and a display to a display panel 24 -- although the pack light sections, such as the luminescence section, a light guide plate, a diffusion board, and a booster circuit, were connected further especially about the LCD panel, those illustration was omitted here
[0009] The touch panel 25 of the conventional technology is equipped only with one step of input functions. That is, if a resistance film type touch panel is mentioned as an example and the structure is

explained, as shown in drawing 17 and drawing 18 , the top electrode sheet 2510 and the bottom electrode sheet 2520 open few [uniformly] gaps G with a spacer 26 (drawing 19), and are constituted.
[0010] Antireflection films 2512 and 2513 are formed by the outside of the sheet base material 2511 made of a transparent plastic in which the top electrode sheet 2510 had flexibility, and inside both sides, and the transparent electrode 2514 is formed by the front face of the inside antireflection film 2513 of them. As this transparent electrode 2514, an ITO (Indium Tin Oxide:indium stannic-acid ghost) thin film etc. is desirable, for example. Similarly, antireflection films 2522 and 2523 are formed by the outside of the sheet base material 2521 made of a transparent plastic in which the bottom electrode sheet 2520 also had flexibility, and inside both sides, and the transparent electrode 2524 is formed by the front face of the inside antireflection film 2523 of them. In addition, antireflection films 2512, 2513, 2522, and 2523 are films for suppressing reflection of the transmitted light. Leader lines 2515 and 2525 are drawn by each transparent electrode 2514 and 2524, respectively (drawing 17). And the aforementioned touch panel 25 is the thing of the structure which both the transparent electrodes 2514 and 2524 were opposed, opened few gaps G as mentioned above using the spacer 26, and has arranged the top electrode sheet 2510 and the bottom electrode sheet 2520.
[0011] Next, operation of this touch panel 25 and its property are explained using drawing 19 and drawing 20 .
[0012] As mentioned above, it is inputted when a user chooses and presses an item, a file, etc. which were displayed on the display 12 by the display panel 24 with the directions implement 18 or a finger 19. That is, the top electrode sheet 2510 of the specific position of a touch panel 25 is pressed by this alter operation, and the transparent electrode 2514 contacts the transparent electrode 2524 of the bottom electrode sheet 2520 by it. An input position coordinate can be specified by measuring the resistance to these both point of contact P.

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EFFECT OF THE INVENTION

[Effect of the Invention] It is main invention of this application maintaining the form of the existing device, and making the 1st step touch panel based on an old input procedure, and a user loses causing confusion to alter operation. Furthermore, a user can direct by easy operation and few finger operation also to a complicated function by assigning the function of Table 1 to a two-step touch panel.
[0051] A user coming to be able to do quick alter operation and sensing stress according to these two points, decreases. Moreover, by combining with the feedback mechanism by the inner force sense, a user's check of a screen decreases and he can perform quick alter operation now in each stage about a series of operations to which it got used especially.
[0052] Moreover, the inner-force-sense feedback mechanism is controlled by main invention of everything but this application by instructions of a processor. Therefore, it becomes controllable from an operation system and application software by forming drawing 1 with a software driver. Therefore, in addition to the output device by an existing acoustic sense and an existing visual sense, a software manufacturer can create the software which utilized the inner-force-sense mechanism, and can offer software with larger power of expression. Moreover, a user can use software with more nearly friendly feeling to a device.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, in the case of such alter operation, by the touch panel 25 of the conventional technology, if a graph shows the displacement delta of the top electrode sheet 2510 to the push-down force P of the touch-panel 25 very thing, it will become the P-delta curve 1 as shown in drawing 20 . That is, in case beginning pushes, first, with the elasticity of the top electrode sheet 2510, 1 with a curved small inclination is followed and both sheets 2510 and 2520 contact in an inflection point 2. Furthermore, if it pushes in, the bottom electrode sheet 2520 will be pushed and the inclination of a curve 1 will become larger like a straight line 3. However, it is unclear in whether in the case of such alter operation, the touch panel 25 was turned on [it] at the user at which time, and the input event occurred.
[0014] Moreover, the operation which continues pushing beyond the combination of a serial input, for example, a certain fixed time, when giving this directions of execution etc. or adding different operation, or continues the same part twice or more within a certain fixed time, and is pushed although an item, a file, etc. can be chosen as mentioned above as long as one step of such input units are used was required.

[0015] Quick operation becomes difficult in order for such a method to require the fixed real time difficultly on the small display screen in a small pocket device. Moreover, the interruption processing from the timer which measures the real time will apply a load to signal-processing work.
[0016] Furthermore, there was no function to return reaction force to a touch panel 25 to the finger 19 of the user who performs alter operation etc. again (feedback), it was the sound outputted from a voice output, and the alter operation receptionist was returned by changing the display of a part of display 12. However, it was unclear for the user whether it was that the operation itself was accepted in the device side to the alter operation and the quick alter operation which are performed without a user's looking at a display 12.
[0017] this invention can be inputted certainly, without causing derangement, when it is made in view of such a trouble and a user performs alter operation to a user's alter operation, and, moreover, it can input by easy operation and few finger operation also to a complicated function, and aims at offering the input unit which enabled feedback by the inner force sense to the tactile sense of a user's finger.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It uses for this invention and is the decomposition perspective diagram of the two-step type touch panel of the suitable 1st operation gestalt.
[Drawing 2] They are some cross-section side elevations of the two-step type touch panel shown in drawing 1 .
[Drawing 3] It is in the state which assembled the two-step type touch panel shown in drawing 1 , and is the cross-section side elevation showing the state where the first stage was inputted with the finger.
[Drawing 4] It is the cross-section side elevation of the two-step type touch panel in the state where it pressed further with the finger from the state of drawing 3 .
[Drawing 5] It is the press force characteristic curve of the two-step type touch panel of the 1st operation gestalt shown in drawing 1 .
[Drawing 6] It is the cross-section side elevation of the two-step type touch panel which added the inner-force-sense feedback mechanism of the 2nd operation gestalt.
[Drawing 7] It is the press force characteristic curve of the two-step type touch panel of the 2nd operation gestalt shown in drawing 6 .
[Drawing 8] They are other press force characteristic curves of the two-step type touch panel of the 2nd operation gestalt shown in drawing 6 .
[Drawing 9] It is a flow chart at the time of inputting by the two-step type touch panel.
[Drawing 10] It is the block diagram of the processing circuit for performing feedback to a user also including the two-step type touch panel of this operation gestalt, and inner-force-sense feedback.
[Drawing 11] It is the block diagram of other processing circuits having shown deformation of the processing circuit shown in drawing 10 .
[Drawing 12] It is a timing diagram for explaining operation of the processing circuit shown in drawing 11 .
[Drawing 13] It is the front view of a common input unit.
[Drawing 14] some input units shown in drawing 13 -- it is expansion front view
[Drawing 15] It is the decomposition perspective diagram of the display of the input unit shown in drawing 13 .
[Drawing 16] It is the cross-section side elevation of the display of the input unit shown in drawing 13 .
[Drawing 17]

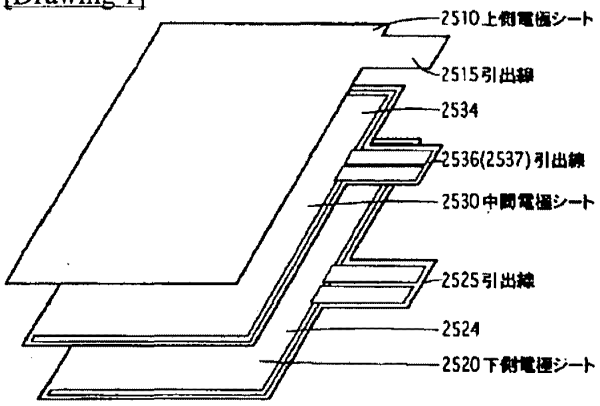
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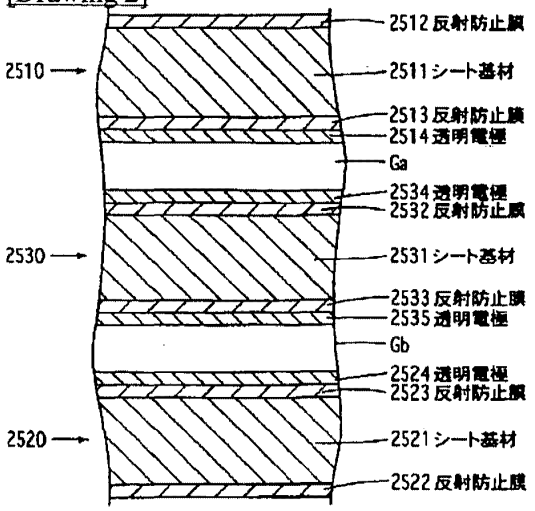
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DRAWINGS

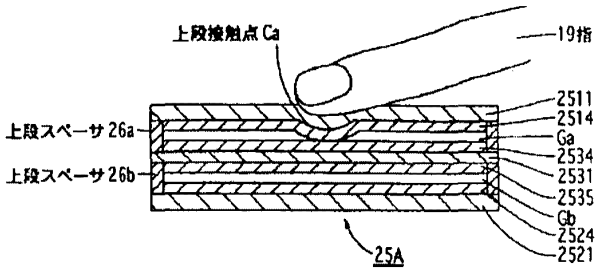
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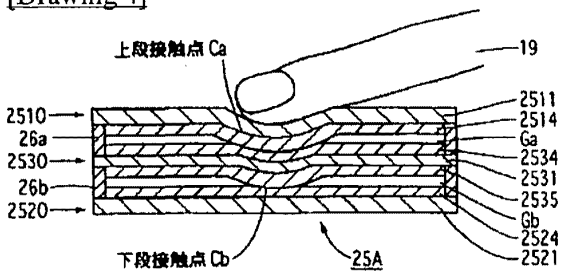
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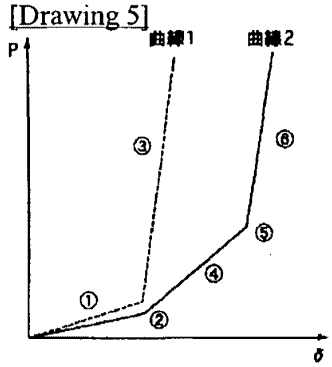
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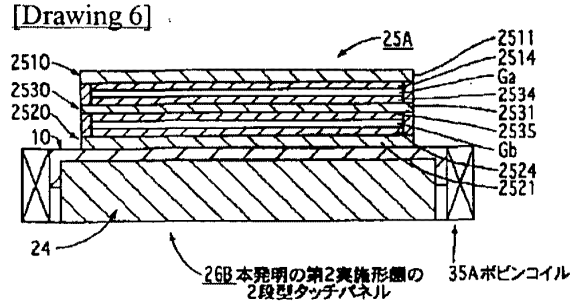
[Drawing 4]



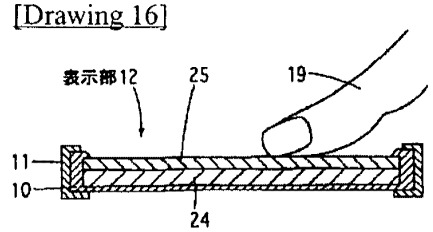
[Drawing 5]



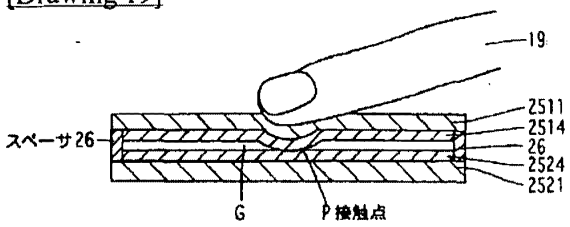
[Drawing 6]



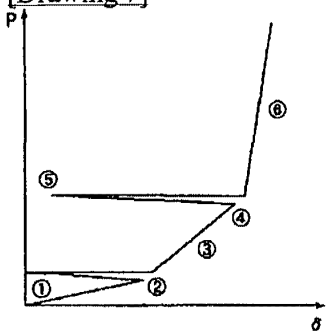
[Drawing 16]



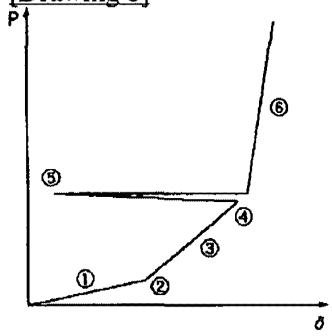
[Drawing 19]



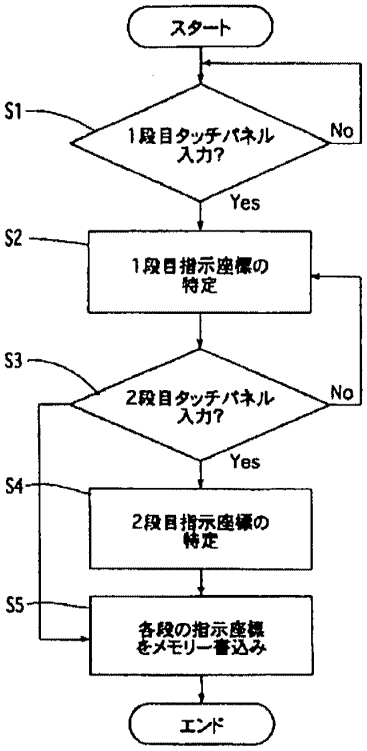
[Drawing 7]



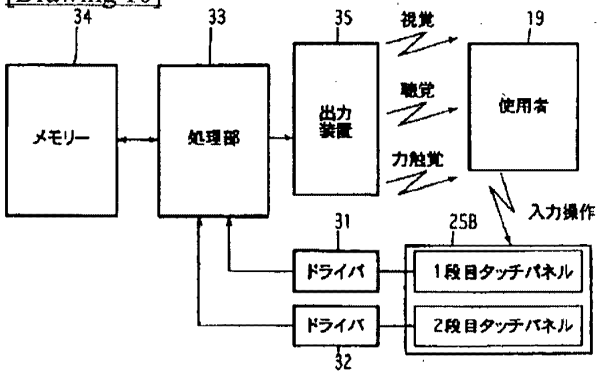
[Drawing 8]



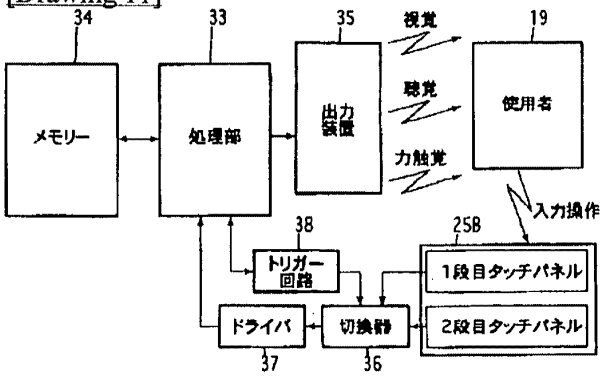
[Drawing 9]



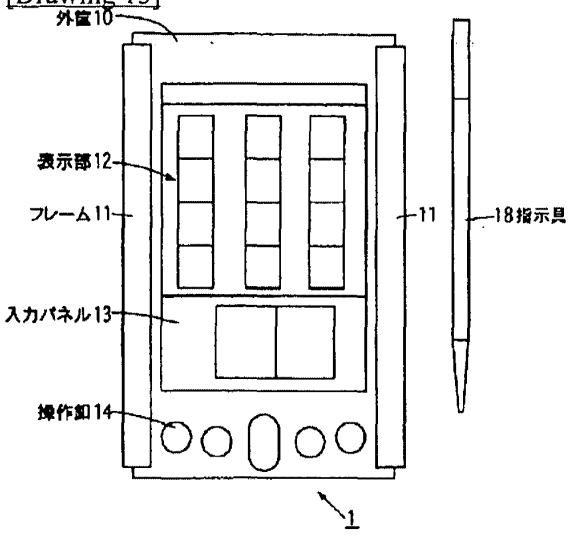
[Drawing 10]



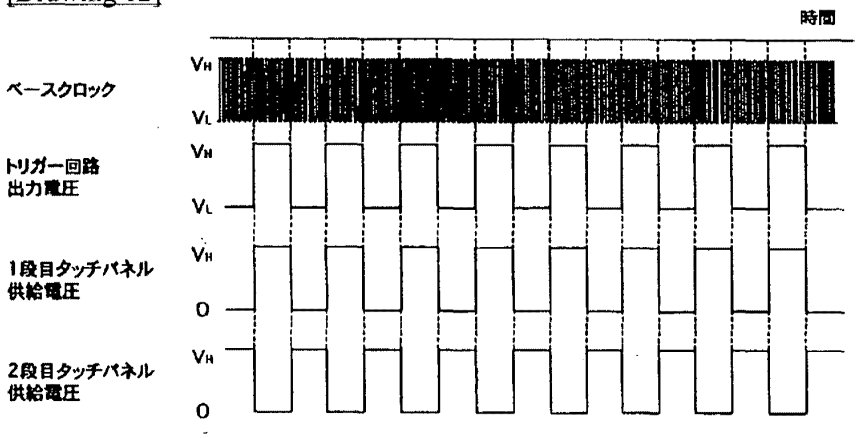
[Drawing 11]



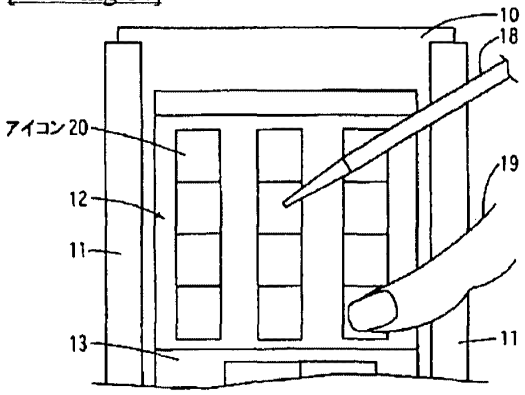
[Drawing 13]



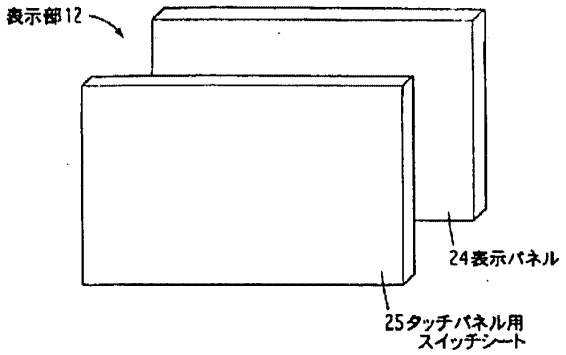
[Drawing 12]



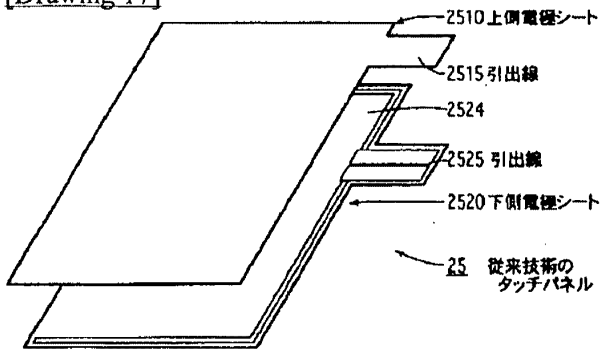
[Drawing 14]



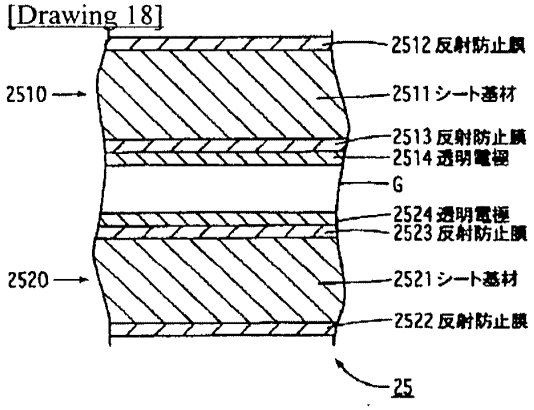
[Drawing 15]



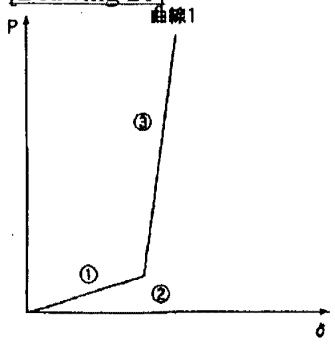
[Drawing 17]



[Drawing 18]



[Drawing 20]



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09-29-06



EXPRESS MAIL CERTIFICATE

"Express Mail" mailing label number	:	EV 740 584 627 US
Date of Deposit	:	September 28, 2006
Type of Document(s)	:	Transmittal **(in duplicate)**;
	:	Amendment and Response to Non-Final Office Action (9 pages); and
	:	Return Postcard
Serial No.	:	10/723,778
Filing Date	:	November 26, 2003

I hereby certify that the documents identified above are being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and are addressed to Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Laura J. Smith

Laura J. Smith

US2000 9511014.1

OIPE
SEP 28 2006
PATENT & TRADEMARK OFFICE

Express Mail No. EV 740 584 627 US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of	:	Henry DaCosta et al.
Application No.	:	10/723,778
For	:	SYSTEMS AND METHODS FOR ADAPTIVE INTERPRETATION OF INPUT FROM A TOUCH-SENSITIVE INPUT DEVICE
Filed	:	November 26, 2003
Examiner	:	Xiao Min Wu
Art Unit	:	2629

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

TRANSMITTAL

Sir:

Transmitted herewith are copies of the following document(s) for filing in the above-identified application:

Express Mail Certificate;
Amendment and Response to Non-Final Office Action (9 pages); and
Return Postcard

Shown below are the fees for the presentation of the amended claims:

	Claims Remaining	Highest # Previously Paid For	Extra	Rate	Fee
TOTAL	28	28	0	$ 50	$ 0
Ind. Cls.	2	2	0	$200	$ 0
Multiple Dependent Claim Added.....					NO
				TOTAL	$ 0

The Commissioner is hereby authorized to charge any deficiency to Deposit Account Number 16-1435. A duplicate of this transmittal is attached for that purpose.

Respectfully submitted,

Date: 9/28/2006

By: _____
Carl E. Sanders (Reg. No. 57,203)

KILPATRICK STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101
(336) 607-7300

US2000 9511015.1



Express Mail No. EV 740 584 627 US
Attorney Docket IMM174

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	DaCosta et al
Application No.	:	10/723,778
For	:	**Systems and Methods for Adaptive Interpretation of Input from a Touch-Sensitive Input Device**
Filed	:	November 26, 2003
Examiner	:	Xiao Min Wu
Art Unit	:	2629

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

AMENDMENT AND RESPONSE TO NON-FINAL OFFICE ACTION

Sir:

The following Amendment and Remarks are submitted in response to the Office Action mailed June 28, 2006.

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 7 of this paper.

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A method comprising:

receiving a pressure signal indicating a pressure from an input device;

comparing the pressure signal to an adaptive pressure threshold value based at least in part on a tick count; and

outputting a signal if the pressure signal is greater than the adaptive pressure threshold value.

2. (Original) The method of claim 1, wherein the adaptive pressure threshold value is associated with an absolute pressure threshold.

3. (Original) The method of claim 1, wherein the adaptive pressure threshold value is associated with a position received from the input device.

4. (Original) The method of claim 1, wherein the adaptive pressure threshold value can vary over time.

5. (Original) The method of claim 1, wherein the adaptive pressure threshold value is associated with a user identifier.

6. (Original) The method of claim 1, wherein the adaptive pressure threshold value comprises a first pressure threshold value, and further comprising:

comparing the pressure signal to a second pressure threshold value; and

outputting the signal if the pressure signal is greater than both the first pressure threshold value and the second pressure threshold value.

7. (Original) The method of claim 1, wherein the pressure signal comprises a pseudo pressure signal.

8. (Original) The method of claim 1, further comprising applying a pressure filter to the pressure signal to create a filtered pressure signal.

9. (Original) The method of claim 8, wherein the pressure filter comprises a first pressure filter comprising a first attribute, and further comprising applying a second pressure filter to the pressure signal, the second pressure filter comprising a second attribute that is different than the first attribute.

10. (Original) The method of claim 9, wherein the first attribute comprises a first frequency value and the second attribute comprises a second frequency value.

11. (Original) The method of claim 10, wherein the second frequency value is lower than the first frequency value.

12. (Original) The method of claim 8, wherein applying the pressure filter comprises applying the pressure filter utilizing a sliding window.

13. (Original) The method of claim 1, wherein the input device comprises one of a touchpad, a touch panel, and a touch screen.

14. (Original) The method of claim 1, further comprising:
calculating a first value associated with the speed of movement across the input device;
comparing the first value to a speed threshold value; and
outputting the signal if the first value is less than the speed threshold value.

15. (Original) The method of claim 14, further comprising applying a speed filter to the first value before comparing the speed to the speed threshold value.

16. (Original) The method of claim 1, wherein the pressure signal comprises a first pressure signal and further comprising:

receiving a second pressure signal indicating a second pressure from the input device;

calculating a difference signal indicative of a difference between the first pressure signal and the second pressure signal;

comparing the difference signal to a difference threshold value; and

outputting the signal if the difference signal is greater than the difference threshold value.

17. (Original) The method of claim 16, further comprising filtering the difference signal to create a filtered difference signal.

18. (Original) The method of claim 1, further comprising outputting a signal associated with a haptic effect, the haptic effect based at least in part on the pressure signal.

19. (Currently Amended) A computer-readable medium on which is encoded programming code, comprising:

program code for receiving a pressure signal indicating a pressure from an input device;

program code for comparing the pressure signal to an adaptive pressure threshold value based at least in part on a tick count; and

program code for outputting a signal if the pressure signal is greater than the adaptive pressure threshold value.

20. (Original) The computer-readable medium of claim 19, wherein the adaptive pressure threshold value comprises a first pressure threshold value, and further comprising:

program code for comparing the pressure signal to a second pressure threshold value; and

program code for outputting the signal if the pressure signal is greater than both the first pressure threshold value and the second pressure threshold value.

21. (Original) The computer-readable medium of claim 19, further comprising program code for applying a pressure filter to the pressure signal to create a filtered pressure signal.

22. (Original) The computer-readable medium of claim 21, wherein the pressure filter comprises a first pressure filter comprising a first attribute, and further comprising program code for applying a second pressure filter to the pressure signal, wherein the second pressure filter comprises a second attribute that is different than the first attribute.

23. (Original) The computer-readable medium of claim 21, wherein program code for applying the pressure filter comprises program code for applying the pressure filter utilizing a sliding window.

24. (Original) The computer-readable medium of claim 19, further comprising:

program code for calculating a first value associated with the speed of movement across the input device;

program code for comparing the first value to a speed threshold value; and

program code for outputting the signal if the first value is less than the speed threshold value.

25. (Original) The computer-readable medium of claim 24, further comprising program code for applying a speed filter to the first value before comparing the speed to the speed threshold value.

26. (Original) The computer-readable medium of claim 19, wherein the pressure signal comprises a first pressure signal and further comprising:

program code for receiving a second pressure signal indicating a second pressure from the input device;

program code for calculating a difference signal indicative of a difference between the first pressure signal and the second pressure signal;

program code for comparing the difference signal to a difference threshold value; and

program code for outputting the signal if the difference signal is greater than the difference threshold value.

27. (Original) The computer-readable medium of claim 26, further comprising program code for filtering the difference signal to create a filtered difference signal.

28. (Original) The computer-readable medium of claim 19, further comprising program code for outputting a signal associated with a haptic effect, the haptic effect based at least in part on the pressure signal.

REMARKS

This paper is filed in response to the Office Action mailed June 28, 2006.

Claims 1-28 are pending in this application. Claims 1-17 and 19-27 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,880,411 to Gillespie et al. (hereinafter referred to as "Gillespie"). Claims 18 and 28 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Gillespie in view of U.S. Patent No. 6,118,435 to Fujita et al (hereinafter referred to as "Fujita"). The Examiner also noted that the Information Disclosure Statements filed on November 26, 2003 and March 10, 2004 did not include a legible copy of each non-patent reference.

Applicant has amended claims 1 and 19. No new matter is added by these amendments, and support may be found in the specification and claims as originally filed.

Reconsideration and allowance of all claims are respectfully requested in view of the amendments above and remarks below.

Information Disclosure Statement

Applicant will re-submit the non-patent references in a further Information Disclosure Statement in compliance with 37 C.F.R. § 1.98(a)(2).

Claims 1-17 and 19-27 – § 102(b) – Gillespie

Applicant respectfully traverses the rejection of claims 1-17 and 19-27 under 35 U.S.C § 102(b) as being anticipated by Gillespie.

To anticipate a claim under 35 U.S.C. § 102(b), the reference must disclose each and every element of the claimed invention. *See* M.P.E.P. § 2131.

Because Gillespie does not disclose "comparing the pressure signal to an adaptive pressure threshold value based at least in part on a tick count" as recited in amended claim 1, Gillespie does not anticipate claim 1. Support for this amendment may be found in the specification and claims as originally filed. For example, in paragraph 35, the specification recites using a tick count to allow the adaptability of the algorithm for determining the threshold

value. Further, paragraphs 31 though 36 describe one embodiment of the invention using the tick count.

Gillespie discloses a calibration mechanism for automatically calibrating a threshold for pressure to indicate the presence of a finger, however, Gillespie does not teach wherein the pressure threshold value is based at least in part on a tick count. Thus, Gillespie does not anticipate claim 1.

Like claim 1, claim 19 recites "comparing the pressure signal to an adaptive pressure threshold value based at least in part on a tick count." Gillespie does not anticipate claim 19 for at least the same reason as claim 1. Applicant respectfully requests the Examiner withdraw the rejection of claims 1 and 19.

Because claims 2-17 and 20-27 depend from and further limit claims 1 and 19, claims 2-17 and 20-27 are patentable over Gillespie for at least the same reason. Applicant respectfully requests the Examiner withdraw the rejection of claims 2-17 and 20-27.

Claims 18 and 28 – § 103(a) – Gillespie in view of Fujita

Applicant respectfully traverses the rejection of claims 18 and 28 under 35 U.S.C. § 103(a) as being unpatentable over Gillespie in view of Fujita.

To reject a claim under 35 U.S.C. § 103(a), the combined reference must teach or suggest each and every element of the claimed invention. *See* M.P.E.P. § 2143.03

Because Gillespie in view of Fujita does not teach or suggest "comparing the pressure signal to an adaptive pressure threshold value based at least in part on a tick count" as recited in claims 1 and 19, from which claims 18 and 28 depend, claims 18 and 28 are patentable over the combined references. As discussed above, Gillespie does not teach or suggest "comparing the pressure signal to an adaptive pressure threshold value based at least in part on a tick count." Fujita does not cure this deficiency. Fujita discloses a touch-sensitive screen, however, Fujita does not teach or suggest "comparing the pressure signal to an adaptive pressure threshold value based at least in part on a tick count." Thus, claims 18 and 28 are patentable over Gillespie in view of Fujita. Applicant respectfully requests the Examiner withdraw the rejection of claims 18 and 28.

Prior Art Made of Record and Not Relied Upon

In the Conclusion, the Office Action lists references which were made of record and not relied upon. Applicant respectfully traverses the characterization and relevance of these references as prior art or otherwise, and respectfully reserves the right to present such arguments and other material should the Examiner maintain rejection of Applicant's claims, based upon the references made of record and not relied upon or otherwise.

CONCLUSION

Applicant respectfully asserts that in view of the amendments and remarks above, all pending claims are allowable and Applicant respectfully requests the allowance of all claims.

Should the Examiner have any comments, questions, or suggestions of a nature necessary to expedite the prosecution of the application, or to place the case in condition for allowance, the Examiner is courteously requested to telephone the undersigned at the number listed below.

Respectfully submitted,

Date: 9/28/2006

Carl Sanders
Reg. No. 57,203

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/723,778	11/26/2003	Henry DaCosta	IMM174	4196

34300 7590 06/28/2006

PATENT DEPARTMENT (51851)
KILPATRICK STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

EXAMINER	
WU, XIAO MIN	

ART UNIT	PAPER NUMBER
2629	

DATE MAILED: 06/28/2006

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

PTO-90C (Rev. 10/03)

Office Action Summary	Application No.	Applicant(s)	
	10/723,778	DACOSTA ET AL.	
	Examiner	Art Unit	
	XIAO M. WU	2629	

-- 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 *26 November 2003*.

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

3)☐ 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

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-28* is/are rejected.

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

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

Application Papers

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

10)☒ The drawing(s) filed on *26 November 2003* 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).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

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).

a)☐ All b)☐ Some * c)☐ None of:

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) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *3/10/04;11/26/03* 2/28/05
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 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 –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-17, 19-27 are rejected under 35 U.S.C. 102(b) as being anticipated by Gillespie et al. (US Patent No. 5,880,411)

As to claims 1, 19, Gillespie discloses a method comprising: receiving a pressure signal (e.g. Z-value, Fig. 1) indicating a pressure from an input device (e.g. finger); comparing the pressure signal to an adaptive pressure threshold value (col. 2, lines 23-32); and outputting a signal if the pressure signal is greater than the adaptive pressure threshold value (col. 24, lines 44-52).

As to claim 2, Gillespie discloses adaptive pressure threshold value (Z_{TH}) is associated with an absolute pressure threshold.

As to claim 3, Gillespie discloses adaptive pressure threshold value is associated with a position received from the input device (e.g. the Z-values is derived from the position signals X and Y).

As to claim 4, Gillespie discloses the adaptive pressure threshold value can vary over time (col. 23, lines 29-31).

As to claim 5, Gillespie discloses the adaptive pressure threshold value is associated with a user identifier (col. 23, lines 31-32).

As to claims 6, 16, 20, 26, Gillespie discloses the adaptive pressure threshold value comprises a first pressure threshold value, and further comprising: comparing the pressure signal to a second pressure threshold value; and outputting the signal if the pressure signal is greater than both the first pressure threshold value and the second pressure threshold value (col. 24, lines 20-60).

As to claim 7, Gillespie discloses the pressure signal comprises a pseudo pressure signal (e.g. the pressure value is varied in accordance with the capacitance value).

As to claim 8, Gillespie discloses supplying a pressure filter (48-1...48-n, Fig. 3) to the pressure signal to create a filtered pressure signal.

As to claims 9-11, 17, 21-22, 27, Gillespie discloses the pressure filter comprises a first pressure filter comprising a first attribute (e.g. high frequency, col. 13, lines 34-44), and further comprising applying a second pressure filter to the pressure signal, the second pressure filter comprising a second attribute (e.g. low frequency, col. 15, line 55) that is different than the first attribute.

As to claims 12, 23, Gillespie discloses applying the pressure filter comprises applying the pressure filter utilizing a sliding window (col. 28, lines 47-58).

As to claim 13, Gillespie discloses the input device comprises a touch pad (10, Fig. 1).

As to claims 14, 24, Gillespie discloses calculating a first value associated with the speed of movement across the input device; comparing the first value to a speed threshold value; and outputting the signal if the first value is less than the speed threshold value (see 362, Fig. 17D).

As to claims 15, 25, Gillespie discloses applying a speed filter to the first value before comparing the speed to the speed threshold value (col. 36, lines 26-47).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 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.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 18 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gillespie et al. (US Patent No. 5,880,411) in view of Fujita et al. (US Patent No. 6,118,435).

As to claims 18 and 28, it is noted that Gillespie does not specifically disclose outputting a signal associated with a haptic effect, the haptic effect based at least in part on the pressure signal.. Fujita is cited to teach a touch panel device similar to Gillespie. Fujita further discloses a signal associated with a haptic effect, the haptic effect based at least in part on the pressure signal (see abstract and Fig. 2). It would have been obvious to one of ordinary skill in the art to have modified Gillespie with the tactile force feedback as taught by Fujita so as to provide an interaction between the user and the computer.

Information Disclosure Statement

6. The information disclosure statements filed 11/26/2003 and 3/10/2004 fail to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The US 6,128,007, 6,492,979, 6,509,847, 6,801,191 are cited to teach a touch panel device.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to XIAO M. WU whose telephone number is 571-272-7761. The examiner can normally be reached on 6:30 am to 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, RICHARD HJERPE, can be reached on 571-272-7691. 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).

x.w.
June 26, 2006

XIAO M. WU
Primary Examiner
Art Unit 2629

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 1 of 7

Complete if Known	
Application Number	10/723,778
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Not yet assigned
Examiner Name	Not yet assigned
Attorney Docket Number	IMM174 (51851/279589)

U.S. PATENT DOCUMENTS

Examiner Initials *	Cite No.[1]	Document Number Number - Kind Code[2] (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
XW	1	2,972,140	2/14/1961	Hirsch	
	2	3,157,853	11/17/1964	Hirsch	
	3	3,220,121	11/30/1965	Cutler	
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	7	3,902,687	6/25/1973	Hightower	
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	9	3,911,416	10/7/1995	Feder	
	10	4,127,752	11/28/1978	Lowthorp	
	11	4,160,508	7/10/1979	Salsbury	
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	14	4,333,070	6/1/1982	Barnes	
	15	4,464,117	8/7/1984	Forest	
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	17	4,513,235	4/23/1985	Acklam et al.	
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Sheet 2 of 7

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First Named Inventor	Henry da Costa, et al.
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Examiner Name	Not yet assigned
Attorney Docket Number	IMM174 (51851/279589)

XW	40	5,212,473	5/18/1993	Louis	
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	42	5,271,290	12/21/1993	Fischer	
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Sheet 3 of 7

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First Named Inventor	Henry da Costa, et al.
Art Unit	Not yet assigned
Examiner Name	Not yet assigned
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Sheet 4 of 7

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Application Number	10/723,778
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Not yet assigned
Examiner Name	Not yet assigned
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Examiner Initials*	Cite No.[1]	Foreign Patent Document: Country Code[3] - Number[4] - Kind Code[5] (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	T[6]
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Examiner Initials *	Cite No.[1]	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.
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Sheet 5 of 7

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Application Number	10/723,778
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Not yet assigned
Examiner Name	Not yet assigned
Attorney Docket Number	IMM174 (51851/279589)

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Sheet 6 of 7

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Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Not yet assigned
Examiner Name	Not yet assigned
Attorney Docket Number	IMM174 (51851/279589)

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Sheet 7 of 7

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Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Not yet assigned
Examiner Name	Not yet assigned
Attorney Docket Number	IMM174 (51851/279589)

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Examiner Signature	/Xiao Wu/	Date Considered	06/19/2006

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 1 of 7

Complete if Known	
Application Number	Unassigned
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Unassigned
Examiner Name	Unassigned
Attorney Docket Number	IMM174 (51851/279589)

U.S. PATENT DOCUMENTS

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XW	1	2,972,140	2/14/1961	Hirsch	
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Sheet 2 of 7

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First Named Inventor	Henry da Costa, et al.
Art Unit	Unassigned
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XW	37	5,271,290	12/21/1993	Fischer	
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Sheet 3 of 7

Complete if Known	
Application Number	Unassigned
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Unassigned
Examiner Name	Unassigned
Attorney Docket Number	IMM174 (51851/279589)

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XW	74	6,429,846	8/6/2002	Rosenberg, et al.	
XW	75	US 2002/0149561 A1	10/17/2002	Fukumoto et al.	
XW	76	6,610,936	8/26/03	Gillespie	
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Examiner Initials*	Cite No.[1]	Foreign Patent Document: Country Code[3]	Number[4]	Kind Code[5] (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
	77	EP	0349086		1/3/1990	Stork Kwant B.V.	√
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Sheet 4 of 7

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Filing Date	August 27, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Unassigned
Examiner Name	Unassigned
Attorney Docket Number	IMM174 (51851/279589)

OTHER DOCUMENTS

Examiner Initials *	Cite No.[1]	Include name of the author (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.	
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Examiner Signature	/Xiao Wu/	Date Considered	06/19/2006

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Examiner Signature	/Xiao Wu/	Date Considered	06/19/2006

*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.

[1] Applicant's unique citation designation number (optional). [2] Applicant is to place a check mark here if English language Translation is attached.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

Sheet 7 of 7

Complete if Known	
Application Number	Unassigned
Filing Date	August 27, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Unassigned
Examiner Name	Unassigned
Attorney Docket Number	IMM174 (51851/279589)

OTHER DOCUMENTS			
Examiner Initials *	Cite No.[1]	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.	
	131	~~Safe Flight Instrument Corporation, "Coaxial Control Shaker," Part No. C-25502, 1 July 1997.~~	
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	133	~~BIMBOA, "Finger Force and Touch Feedback Issues in Dexterous Telemanipulation," Proceedings of Fourth Annual Conference on Intelligent Robotic Systems for Space Exploration, Rensselaer Polytechnic Institute, Sep. 30 - Oct. 1, 1992.~~	
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	136	~~SNOW et al., "Model-X Force-Reflecting-Hand-Controller," NT Control No. MPO-17851, JPL Case No. 5348, pp. 1-4, 06/15/1988.~~	
	137	~~STANLEY et al., "Computer Simulation of Interacting Dynamic Mechanical Systems Using Distributed Memory Parallel Processors," DSC-Vol. 42, Advances in Robotics, pp. 55-61, ASME 1992.~~	
	138	~~TADROS, "Control System Design for a Three Degree of Freedom Virtual Environment Simulator Using Motor/Brake Pair Actuators", MIT Archive © Massachusetts Institute of Technology, pp. 1-88, February 1990.~~	
	139	~~TERRY et al., "Tactile Feedback In A Computer Mouse," Proceedings of Fourteenth Annual Northeast Bioengineering Conference, University of New Hampshire, March 10-11, 1988.~~	
	140	~~WIKER, "Teletouch Display Development: Phase 1 Report," Technical Report 1230, Naval Ocean Systems Center, San Diego, April 17, 1989.~~	
	141	~~Synaptics, Inc., "Synaptics TouchPad Interfacing Guide", Second Edition, Downloaded August 20, 2003.~~	

Examiner Signature	/Xiao Wu/	Date Considered	06/19/2006

*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.

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SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	10/723,778
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	2673
Examiner Name	Not Yet Assigned
Attorney Docket Number	IMM174 (51851/279589)

U.S. PATENT DOCUMENTS

Examiner Initials *	Cite No.[1]	Document Number: Number - Kind Code[2] (*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
XW	1	US - 5,159,159	10/27/1992	Asher	
XW	2	US - 6,610,917	08/26/2003	Ludwig	
XW	3	US - 6,610,936	08/26/2003	Gillespie et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document: Country Code[3] - Number[4] - Kind Code[5] (*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	T[6]

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Examiner Initials *	Cite No.[1]	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.	T[2]
XW	4	PCT Search Report, corresponding to PCT/US04/24358, mailed on February 11, 2005	

Examiner Signature	/Xiao Wu/	Date Considered	06/19/2006

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Notice of References Cited	Application/Control No. 10/723,778	Applicant(s)/Patent Under Reexamination DACOSTA ET AL.	
	Examiner XIAO M. WU	Art Unit 2629	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,128,007	10-2000	Seybold, John L.	345/179
*	B	US-6,492,979	12-2002	Kent et al.	345/173
*	C	US-6,509,847	01-2003	Anderson, Glen J.	341/34
*	D	US-6,801,191	10-2004	Mukai et al.	345/179
	E	US-			
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	G	US-			
	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					
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NON-PATENT DOCUMENTS

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

Index of Claims

Application/Control No.	Applicant(s)/Patent under Reexamination
10/723,778	DACOSTA ET AL.
Examiner	**Art Unit**
XIAO M. WU	2629

√	Rejected	–	(Through numeral) Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

Claim		Date
Final	Original	6/25/06
	1	√
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CONFIRMATION NO. 4196

SERIAL NUMBER	FILING OR 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
10/723,778	11/26/2003 RULE	345	2629	IMM174

APPLICANTS

Henry DaCosta, Montreal, CANADA;
Christophe Ramstein, San Francisco, CA;
Danny Grant, Montreal, CANADA;

** CONTINUING DATA ********** None

** FOREIGN APPLICATIONS ********** None

IF REQUIRED, FOREIGN FILING LICENSE GRANTED **
07/15/2004

Foreign Priority claimed	STATE OR COUNTRY	SHEETS DRAWING	TOTAL CLAIMS	INDEPENDENT CLAIMS
☐ yes ☐ no 35 USC 119 (a-d) conditions met ☐ yes ☐ no ☐ Met after Allowance Verified and Acknowledged _____ Examiner's Signature _____ Initials	CANADA	4	28	2

ADDRESS
34300

TITLE

Systems and methods for adaptive interpretation of input from a touch-sensitive input device

FILING FEE RECEIVED		
1044	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

Search Notes

Application/Control No.	Applicant(s)/Patent under Reexamination
10/723,778	DACOSTA ET AL.
Examiner	**Art Unit**
XIAO M. WU	2629

SEARCHED			
Class	Subclass	Date	Examiner
345	156-163, 168, 169, 173,179	6/19/2006	X.W.
178	18.1 18.01	6/19/2006	X.W.
715	701 702	6/19/2006	X.W.

INTERFERENCE SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES (INCLUDING SEARCH STRATEGY)		
	DATE	EXMR
east and inventor search	6/19/2006	X.W.

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	3	(("5159159") or ("6610936") or ("6641917")).PN.	US-PGPUB; USPAT	OR	OFF	2006/06/19 13:36
L2	3	(("5159159") or ("6610936") or ("6610917")).PN.	US-PGPUB; USPAT	OR	OFF	2006/06/19 13:44
L3	32	pseudo adj pressure	US-PGPUB; USPAT	OR	OFF	2006/06/19 13:45
L4	190281	touch	US-PGPUB; USPAT	OR	OFF	2006/06/19 13:45
L5	2	l3 and l4	US-PGPUB; USPAT	OR	OFF	2006/06/19 13:49
L6	424570	threshold	US-PGPUB; USPAT	OR	OFF	2006/06/19 13:45
L7	1	l5 and l6	US-PGPUB; USPAT	OR	OFF	2006/06/19 13:46
L8	1832927	pressure	US-PGPUB; USPAT	OR	OFF	2006/06/19 13:50
L9	1339515	speed	US-PGPUB; USPAT	OR	OFF	2006/06/19 13:50
L10	23	l8 same l9 same l6 same l4	US-PGPUB; USPAT	OR	OFF	2006/06/19 13:55
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EAST Search History

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EAST Search History

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L30	51	l27 or l28 or l29	US-PGPUB; USPAT	OR	OFF	2006/06/19 15:18
L31	6	l30 and l4 and l6 and l8	US-PGPUB; USPAT	OR	OFF	2006/06/19 15:18

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TRANSMITTAL FORM

PTO JC103 FEB 28 2005 TRADEMARK OFFICE

(to be used for all correspondence after initial filing)

Total Number of Pages in This Submission 5

Application Number	10/723,778
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	2673
Examiner Name	Not Yet Assigned
Attorney Docket Number	IMM174 (51851/279589)

ENCLOSURES *(check all that apply)*

- ☐ Fee Transmittal Form
- ☐ Fee Attached
- ☐ Amendment / Reply
- ☐ After Final
- ☐ Affidavits/declaration(s)
- ☐ Extension of Time Request
- ☐ Express Abandonment Request
- ☒ Supplemental Information Disclosure Statement (in dup.)
- ☐ Certified Copy of Priority Document(s)
- ☐ Reply to Missing Parts/ Incomplete Application
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- ☐ Drawing(s)
- ☐ Licensing-related Papers
- ☐ Petition
- ☐ Petition to Convert to a Provisional Application
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- ☐ Terminal Disclaimer
- ☐ Request for Refund
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Firm	Kilpatrick Stockton LLP		
Signature			
Printed Name	John C. Alemanni		
Date	February 24, 2005	Reg. No.	47,384

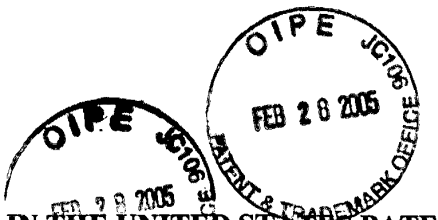
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Henry da Costa, et al.
Application No.	:	10/723,778
Filing Date	:	November 26, 2003
Title	:	System and Method for Adaptive Interpretation of Input From a Touch – Sensitive Input Device
Examiner	:	Not Yet Assigned
Art Unit	:	2673

Mail Stop: **AMENDMENT**
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Alexandria, VA 22313-1450

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

Dear Sir:

Pursuant to 37 C.F.R. §§ 1.56, 1.97, and 1.98, Applicants submit herewith on Form-PTO SB/08a a listing of documents known to the Applicants and their attorneys. Applicants respectfully requests consideration of the cited documents and making the same of record in the prosecution of the above-identified application. In so doing, Applicants do not waive any rights to appropriate action to establish patentability over the listed documents should they be applied as references against the claims of the present application. For the International Search Report, Applicant has listed the mailing date shown on the document. A copy of that International Search Report is enclosed.

This Information Disclosure Statement ("IDS") is being submitted prior to the mailing of a first Office Action on the merits in this application. Accordingly, it is believed that no fees are due for consideration of this IDS. However, should any fees be due, the Commissioner is hereby authorized to charge any additional fees under 37 C.F.R. §1.16 or §1.17 which may be required

during the entire pendency of this application, or to credit any overpayment, to Deposit Account No. 16-1435. A duplicate of this sheet is attached for that purpose.

It is respectfully requested that the references listed on the attached form be expressly considered by the Examiner and be made of record in the application and appear among "References Cited" on any patent to issue therefrom.

Applicants have listed the date that is shown on each document, and make no representation as to the publication date of each document, if any.

Respectfully submitted,

Date: February 24, 2005

John C. Alemanni
Registration No. 47,384

KILPATRICK STOCKTON LLP
1001 West Fourth Street
Winston-Salem, North Carolina 27101
Telephone: 336.607.7300
Facsimile: 336.607.7500

PTO/SB/08a (08-03)
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OIPE JC37 FEB 28 2005 U.S. PATENT & TRADEMARK OFFICE

Substitute for form 1449A/PTO

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	10/723,778
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	2673
Examiner Name	Not Yet Assigned
Attorney Docket Number	IMM174 (51851/279589)

U.S. PATENT DOCUMENTS

Examiner Initials *	Cite No.[1]	Document Number Number - Kind Code[2] (*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
	1	US - 5,159,159	10/27/1992	Asher	
	2	US - 6,610,917	08/26/2003	Ludwig	
	3	US - 6,610,936	08/26/2003	Gillespie et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3] - Number[4] - Kind Code[5] (*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	T[6]

NON PATENT LITERATURE DOCUMENTS

Examiner Initials *	Cite No.[1]	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.	T[2]
	4	PCT Search Report, corresponding to PCT/US04/24358, mailed on February 11, 2005	

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. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

PATENT COOPERATION TREATY

Serial # 10/723,778
Filed November 26, 2003

4

From the INTERNATIONAL SEARCHING AUTHORITY

To:
STEVEN GARDNER
KILPATRICK STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

	Date of mailing *(day/month/year)* 11 FEB 2005
Applicant's or agent's file reference IMM174.PCT	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. PCT/US04/24358	International filing date *(day/month/year)* 29 July 2004 (29.07.2004)
Applicant IMMERSION CORPORATION	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

   Filing of amendments and statement under Article 19:
   The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

   When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

   Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 740 14 35

   For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

   ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

   ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

   Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90*bis*.1 and 90*bis*.3, respectively, before the completion of the technical preparations for international publication.

   The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

   Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

   In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

   See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the ISA/ US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703)305-3230	Authorized officer Prabodh dharia Telephone No. 703-605-1231

Form PCT/ISA/220 (January 2004) *(See notes on accompanying sheet)*

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference IMM174.PCT	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/US04/24358	International filing date (*day/month/year*) 29 July 2004 (29.07.2004)	(Earliest) Priority Date (*day/month/year*) 26 November 2003 (26.11.2003)
Applicant IMMERSION CORPORATION		

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

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

☒ 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, unless otherwise indicated under this item.
      ☐ The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).
   b. ☐ 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(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,
   a. the figure of the **drawings** to be published with the abstract is Figure No. 1
      ☒ 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.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/24358

Box IV TEXT OF THE ABSTRACT (Continuation of Item 5 of the first sheet)

Systems and methods for adaptively intepreting a user's intent based on paramcters supplied by a touch sensitive input device (figure1) are described. In one of the methods described, a processor receives a pressure signal indicating a pressure from an input device, such as a touchpad, compares the pseudo pressure signal to a pressure threshold value, and outputs a signal if the pseudo pressure signal is greater than the pressure threshold value. In another embodiment, the processor also calculates the speed of movement of a conductor, for instance a user's finger, across the input device, and compares the speed to a threshold. If the speed is greater than the threshold, the processor determines that although the pressure may be great enough to signal a press, no press is intended. The various parameters supplied by the input device may be digitally filtered to increase the accuracy of the determination of user intent.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US04/24358

A. CLASSIFICATION OF SUBJECT MATTER
IPC(7) : G09G 05/00
US CL : 345/173, 156-158,162,163,179, 178/18.01-07, 19.05, 422/45, 356/72, 84/726
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)
U.S. : 345/173, 156-158,162,163,179, 178/18.01-07, 19.05, 422/45, 356/72, 84/726

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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,159,159 (Asher) 27 October 1992 (27.10.1992) Column 1, Lines 5-11, Col. 2, Line64 to Col. 4, Line 53, Col. 5, Lines 1-67, Col. 9, Lines 15-49, Col. 10, Lines 50-66, Col. 14, Line 44 to Col. 16, Line 6, Col. 17, Line 1 to Col. 19, Line 59, Col. 20, Line 63 to Col. 21, Line 3, Col. 21, Lines 12-20, Col. 22, Lines 6-13	1-30
Y	US 6,610,936 B2 (Gillespie et al. 26 August 2003 (26.08.2003) Col. 4, Line 59-62, Col. 5, Lines 39-52, Col. 8, Lines 53-65, Col. 9, Line 6 to Col. 10, line20, Col. 11, Lines 21-57, Col. 13, Line 6to Col. 14, Line 42, Col. 20, Lines 21 to Col. 21, Line 65, Col. 22, Lines 54-59, Col. 23, lines 32-65, Col. 26, Lines 45 to Col. 27, Line39, Col. 32, Lines 39-56, Col. 33, Lines 55 to Col. 34, Line 3, Col. 35, Lines 32-67	1-30
Y	US 6,610,917 (Ludwig) 26 August 2003 (26.08.2003) Col. 19, line 9 to Col. 24, Line 5, Col. 24, lines 63-65Col. 30, line65 to Col. 31, line 22, Col. 38, lines 24-39, Col. 73, Line 10 to Col. 74, Line 67, Col. 75, Line 1 to Col. 76, Line 43	1-30

☐ 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 published on or after the international filing date

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

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

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

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

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

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

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
17 January 2005 (17.01.2005)	11 FEB 2005
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703)305-3230	Authorized officer Prabodh Dharia Telephone No. 703-605-1231

Form PCT/ISA/210 (second sheet) (January 2004)

OIPE JC181 SEP 30 2004 PATENT & TRADEMARK OFFICE

Express Mail No. EV 367 779 453 US

PTO/SB/21 (04-04)
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U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
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TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	10/723,778
Filing Date	November 26, 2003
First Named Inventor	Henry DaCosta
Art Unit	2673
Examiner Name	Not yet assigned
Total Number of Pages in This Submission	
Attorney Docket Number	IMM174

ENCLOSURES *(check all that apply)*

- ☒ Fee Transmittal Form
  - ☒ Fee Attached
- ☐ Amendment / Reply
  - ☐ After Final
  - ☐ Affidavits/declaration(s)
- ☐ Extension of Time Request
- ☐ Express Abandonment Request
- ☐ Information Disclosure Statement
- ☐ Certified Copy of Priority Document(s)
- ☒ Response to Missing Parts/ Incomplete Application
  - ☒ Response to Missing Parts under 37 CFR 1.52 or 1.53
- ☐ Drawing(s)
- ☐ Licensing-related Papers
- ☐ Petition
- ☐ Petition to Convert to a Provisional Application
- ☐ Power of Attorney
- ☐ Terminal Disclaimer
- ☐ Request for Refund
- ☐ CD, Number of CD(s) ____
- ☐ After Allowance Communication to Technology Center (TC)
- ☐ Appeal Communication to Board of Appeals and Interferences
- ☐ Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
- ☐ Proprietary Information
- ☐ Status Letter
- ☒ Other Enclosure(s) *(please identify below)*:

  Declaration; Check in the amount of $130 (Declaration Surcharge); Petition for 1-Month Extension of Time; Check in the Amount of $110 (Extension of Time Fee); and Return Postcard.

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm or Individual name	John C. Alemanni (Registration No. 47,384)
Signature	
Date	September 30, 2004

CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below.

Typed or printed name			
Signature		Date	

This collection of information is required by 37 CFR 1.5. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

Express Mail No. EV 367 779 453 US

PTO/SB/17 (10-03)
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U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
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OIPE SEP 30 2004 PATENT & TRADEMARK OFFICE 1616

FEE TRANSMITTAL for FY 2004

Effective 10/01/2003. Patent fees are subject to annual revision.

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT ($) 130

Complete if Known	
Application Number	10/723,778
Filing Date	November 26, 2003
First Named Inventor	Henry DaCosta
Examiner Name	Not yet Assigned
Art Unit	2673
Attorney Docket No.	IMM174

METHOD OF PAYMENT *(check all that apply)*

☒ Check ☐ Credit card ☐ Money Order ☐ Other ☐ None

☒ Deposit Account:

Deposit Account Number: 16-1435

Deposit Account Name: Kilpatrick Stockton LLP

The Director is authorized to: *(check all that apply)*

☐ Charge fee(s) indicated below ☒ Credit any overpayments

☒ Charge any additional fee(s) during the pendency of this application

☐ Charge fee(s) indicated below, **except for the filing fee** to the above-identified deposit account.

FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1001	770	2001	385	Utility filing fee	
1002	340	2002	170	Design filing fee	
1003	530	2003	265	Plant filing fee	
1004	770	2004	385	Reissue filing fee	
1005	160	2005	80	Provisional filing fee	

SUBTOTAL (1) ($) 0

2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

			Extra Claims		Fee from below		Fee Paid
Total Claims		- ** =	0	X		=	0
Independent Claims		- ** =	0	X		=	0
Multiple Dependent				X		=	0

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
1202	18	2202	9	Claims in excess of 20
1201	86	2201	43	Independent claims in excess of 3
1203	290	2203	145	Multiple dependent claim, if not paid
1204	86	2204	43	** Reissue independent claims over original patent
1205	18	2205	9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($) 0

**or number previously paid, if greater; For Reissues, see above

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1051	130	2051	65	Surcharge - late filing fee or oath	130
1052	50	2052	25	Surcharge - late provisional filing fee or cover sheet.	
1053	130	1053	130	Non-English specification	
1812	2,520	1812	2,520	For filing a request for reexamination	
1804	920*	1804	920*	Requesting publication of SIR prior to Examiner action	
1805	1,840*	1805	1,840*	Requesting publication of SIR after Examiner action	
1251	110	2251	55	Extension for reply within first month	
1252	420	2252	210	Extension for reply within second month	
1253	950	2253	475	Extension for reply within third month	
1254	1,480	2254	740	Extension for reply within fourth month	
1255	2,010	2255	1,005	Extension for reply within fifth month	
1401	330	2401	165	Notice of Appeal	
1402	330	2402	165	Filing a brief in support of an appeal	
1403	290	2403	145	Request for oral hearing	
1451	1,510	1451	1,510	Petition to institute a public use proceeding	
1452	110	2452	55	Petition to revive – unavoidable	
1453	1,330	2453	665	Petition to revive – unintentional	
1501	1,330	2501	665	Utility issue fee (or reissue)	
1502	480	2502	240	Design issue fee	
1503	640	2503	320	Plant issue fee	
1460	130	1460	130	Petitions to the Commissioner	
1807	50	1807	50	Processing fee under 37 CFR 1.17 (q)	
1806	180	1806	180	Submission of Information Disclosure Stmt	
8021	40	8021	40	Recording each patent assignment per property (times number of properties)	
1809	770	2809	385	Filing a submission after final rejection (37 CFR § 1.129(a))	
1810	770	2810	385	For each additional invention to be examined (37 CFR § 1.129(b))	
1801	770	2801	385	Request for Continued Examination (RCE)	
1802	900	1802	900	Request for expedited examination of a design application	
				Other fee (specify) ____	

*Reduced by Basic Filing Fee Paid SUBTOTAL (3) ($) 130

SUBMITTED BY				Complete *(if applicable)*	
Name (Print/Type)	John C. Alemanni	*Registration No. (Attorney/Agent)*	47,384	*Telephone*	(336) 607-7311
Signature				*Date*	September 30, 2004

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

This collection of information is required by 37 CFR 1.17 and 1.27. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing this form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.



EXPRESS MAIL CERTIFICATE

"Express Mail" mailing label number	:	EV 367 779 453 US
Date of Deposit	:	September 30, 2004
Type of Document(s) :	:	Transmittal Form;
	:	Fee Transmittal (*In Duplicate*);
	:	Response to Notice to File Missing Parts (*In Duplicate*);
	:	Copy of Notice to File Missing Parts from USPTO;
	:	Declaration;
	:	Check in the amount of $130.00 (Declaration Surcharge); and
	:	Return Postcard.
Serial No.	:	10/723,778
Filing Date	:	November 26, 2003

I hereby certify that the documents identified above are being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. §1.10 on the date indicated above and are addressed to: Mail Stop Missing Parts, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

P. Devan Culbreth

OIPE
SEP 30 2004
PATENT & TRADEMARK OFFICE

Express Mail Certificate EV 367 779 453 US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	10/723,778
Applicant	:	Henry DaCosta, *et al.*
Filed	:	November 26, 2003
Title	:	SYSTEMS AND METHODS FOR ADAPTIVE INTERPRETATION OF INPUT FROM A TOUCH-SENSITIVE INPUT DEVICE
Art Unit	:	2673
Examiner	:	Not yet assigned
Attorney Docket No.	:	IMM174

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

RESPONSE TO NOTICE TO FILE MISSING PARTS

Sir:

This Response is filed in response to the Notice to File Missing Parts mailed on July 2, 2004. Enclosed herewith for filing in the above-identified patent application are the following documents:

1) Transmittal Form;
2) Fee Transmittal (*In Duplicate*);
3) Response to Notice to File Missing Parts (*In Duplicate*);
4) Copy of Notice to File Missing Parts from USPTO;
5) Declaration;
6) Petition for 1-Month Extension of Time (Under 37 CFR 1.136(a);
7) Check in the amount of $130.00 (Declaration Surcharge);
8) Check in the amount of $110.00 (Extension of Time Fee);
9) Return Postcard.

The Commissioner is hereby authorized to charge any additional fees required by this action, or credit any overpayment, to Deposit Account No. 16-1435. A duplicate of this sheet is attached for that purpose.

Respectfully submitted,

Dated: September 30, 2004

John C. Alemanni (Registration No. 47,384)

Kilpatrick Stockton LLP
1001 West Fourth Street
Winston-Salem, NC 27106-2400
Telephone: (336) 607-7300
Facsimile: (336) 607-7500

OIPE
SEP 30 2004
PATENT & TRADEMARK OFFICE

10-01-04

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371 (c) DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NUMBER
10/723,778	11/26/2003	Henry DaCosta	IMM174 (51851/279589)

CONFIRMATION NO. 4196

34300
PATENT DEPARTMENT (51851)
KILPATRICK STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

FORMALITIES LETTER

OC000000013249301

Date Mailed: 07/15/2004

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The oath or declaration is missing.
  A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date, is required.
- To avoid abandonment, a late filing fee or oath or declaration surcharge as set forth in 37 CFR 1.16(e) of $130 for a non-small entity, must be submitted with the missing items identified in this letter.

SUMMARY OF FEES DUE:

Total additional fee(s) required for this application is **$130** for a Large Entity

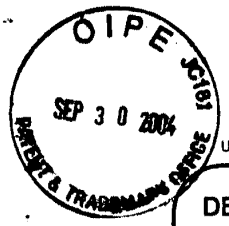
- **$130** Late oath or declaration Surcharge.

Replies should be mailed to: Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

10/04/2004 HGUTEMA1 00000022 10723778
01 FC:1051 130.00 OP

A copy of this notice MUST be returned with the reply.

Customer Service Center
Initial Patent Examination Division (703) 308-1202
PART 2 - COPY TO BE RETURNED WITH RESPONSE



EXPRESS MAIL NO. EV 367 779 453 US

PTO/SB/01 (08-03)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63)

☐ Declaration Submitted With Initial Filing OR ☒ Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (e)) required)

Attorney Docket Number	IMM174
First Named Inventor	Henry DaCosta
COMPLETE IF KNOWN	
Application Number	10/723,778
Filing Date	November 26, 2003
Art Unit	2673
Examiner Name	Not yet Assigned

I hereby declare that:

Each inventor's residence, mailing address, and citizenship are as stated below next to their name.

I believe the inventor(s) named below to be the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

SYSTEMS AND METHODS FOR ADAPTIVE INTERPRETATION OF INPUT FROM A TOUCH-SENSITIVE INPUT DEVICE

the specification of which *(Title of the Invention)*

☐ is attached hereto

OR

☒ was filed on (MM/DD/YYYY) 11/26/2003 as United States Application Number or PCT International Application Number 10/723,778 and was amended on (MM/DD/YYYY) _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent, inventor's or plant breeder's rights certificate(s), or any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached? YES	NO
			☐	☐	☐
			☐	☐	☐
			☐	☐	☐
			☐	☐	☐

☐ Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto:

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 1.14. This collection is estimated to take 21 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

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EXPRESS MAIL NO. EV367779453US

PTO/SB/01 (08-03)
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DECLARATION — Utility or Design Patent Application

Direct all correspondence to: ☒ Customer Number	34300	OR ☐ Correspondence address below	
Name			
Address			
City	State	ZIP	
Country	Telephone	Fax	

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

NAME OF SOLE OR FIRST INVENTOR:	☐ A petition has been filed for this unsigned inventor		
Given Name (first and middle [if any]) Henry		Family Name or Surname DaCosta	
Inventor's Signature		Date AUG. 23, 2004	
Residence: City Montreal	State Quebec	Country Canada	Citizenship Canada
Mailing Address 11700 Gilles Trottier			
City Montreal	State Quebec	Zip H1E 5R9	Country Canada
NAME OF SECOND INVENTOR:	☐ A petition has been filed for this unsigned inventor		
Given Name (first and middle [if any]) Christophe		Family Name or Surname Ramstein	
Inventor's Signature		Date	
Residence: City San Francisco	State California	Country USA	Citizenship Canada
Mailing Address 818 Union Street			
City San Francisco	State California	Zip 94019	Country USA

☒ Additional inventors or a legal representative are being named on the 1 supplemental sheet(s) PTO/SB/02A or 02LR attached hereto.

EXPRESS MAIL NO. EV 367779453 US

PTO/SB/01 (08-03)
Approved for use through 07/31/2006. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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DECLARATION — Utility or Design Patent Application

Direct all correspondence to: ☒ Customer Number	34300	OR ☐ Correspondence address below	
Name			
Address			
City	State	ZIP	
Country	Telephone	Fax	

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

NAME OF SOLE OR FIRST INVENTOR:	☐ A petition has been filed for this unsigned inventor		
Given Name (first and middle [if any]) Henry	Family Name or Surname DaCosta		
Inventor's Signature	Date		
Residence: City	State	Country	Citizenship
Montreal	Quebec	Canada	Canada
Mailing Address			
11700 Gilles Trottier			
City	State	Zip	Country
Montreal	Quebec	H1E 5R9	Canada

NAME OF SECOND INVENTOR:	☐ A petition has been filed for this unsigned inventor		
Given Name (first and middle [if any]) Christophe	Family Name or Surname Ramstein		
Inventor's Signature	Date 9/24/2004		
Residence: City	State	Country	Citizenship
San Francisco	California	USA	Canada
Mailing Address			
818 Union Street			
City	State	Zip	Country
San Francisco	California	94131	USA

☒ Additional inventors or a legal representative are being named on the 1 supplemental sheet(s) PTO/SB/02A or 02LR attached hereto.

OIPE SC181
SEP 3 0 2004
PATENT & TRADEMARK OFFICE

EXPRESS MAIL NO. EV 367 779 453 US

PTO/SB/02A (08-03)
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DECLARATION

ADDITIONAL INVENTOR(S)
Supplemental Sheet

Name of Additional Inventor, if any		☐ A petition has been filed for this unsigned inventor	
Given Name (first and middle [if any])		Family Name or Surname	
Danny		Grant	
Inventor's Signature Danny Grant			**Date** Sept. 15, 2004
Residence: City Montreal	**State** Quebec	**Country** Canada	**Citizenship** Canada
Mailing Address 5961 La Roche #4			
Mailing Address			
City Montreal	**State** Quebec	**ZIP** H2S 2C8	**Country** Canada

Name of Additional Inventor, if any		☐ A petition has been filed for this unsigned inventor	
Given Name (first and middle [if any])		Family Name or Surname	
Inventor's Signature			**Date**
Residence: City	**State**	**Country**	**Citizenship**
Mailing Address			
Mailing Address			
City	**State**	**Zip**	**Country**

Name of Additional Inventor, if any		☐ A petition has been filed for this unsigned inventor	
Given Name (first and middle [if any])		Family Name or Surname	
Inventor's Signature			**Date**
Residence: City	**State**	**Country**	**Citizenship**
Mailing Address			
Mailing Address			
City	**State**	**Zip**	**Country**

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 1.14. This collection is estimated to take 21 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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EXPRESS MAIL NO. EV 367 779 453 US

PTO/SB/22 (06-04)
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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)	Docket Number (Optional) IMM174 (51851/279589)
Application Number 10/723,778	Filed November 26, 2003
For Henry DaCosta, et al.	
Art Unit 2673	Examiner Not Yet Assigned

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

	Fee	Small Entity Fee	
☒ One month (37 CFR 1.17(a)(1))	$110	$55	$110
☐ Two months (37 CFR 1.17(a)(2))	$420	$210	$____
☐ Three months (37 CFR 1.17(a)(3))	$950	$475	$____
☐ Four months (37 CFR 1.17(a)(4))	$1480	$740	$____
☐ Five months (37 CFR 1.17(a)(5))	$2010	$1005	$____

☐ Applicant claims small entity status. See 37 CFR 1.27.

☒ A check in the amount of the fee is enclosed.

☐ Payment by credit card. Form PTO-2038 is attached.

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☒ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number 16-1435 . I have enclosed a duplicate copy of this sheet.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

☐ applicant/inventor.

☐ assignee of record of the entire interest. See 37 CFR 3.71

Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96).

☒ attorney or agent of record. Registration Number 47,384

☐ attorney or agent under 37 CFR 1.34(a).

Registration number if acting under 37 CFR 1.34(a). _____ .

Signature	September 30, 2004
	Date
John C. Alemanni	336-607-7311
Typed or printed name	Telephone Number

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

☐ Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.136(a). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 6 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.

10/04/2004 HGUTEMA1 00000023 10723778 110.00 OP
01 FC:1251

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371 (c) DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NUMBER
10/723,778	11/26/2003	Henry DaCosta	IMM174 (51851/279589)

CONFIRMATION NO. 4196

34300
PATENT DEPARTMENT (51851)
KILPATRICK STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

FORMALITIES LETTER

OC000000013249301

Date Mailed: 07/15/2004

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The oath or declaration is missing.
  A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date, is required.
- To avoid abandonment, a late filing fee or oath or declaration surcharge as set forth in 37 CFR 1.16(e) of $130 for a non-small entity, must be submitted with the missing items identified in this letter.

SUMMARY OF FEES DUE:

Total additional fee(s) required for this application is **$130** for a Large Entity

- **$130** Late oath or declaration Surcharge.

Replies should be mailed to: Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
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A copy of this notice MUST be returned with the reply.

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TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	10/723,778
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Not yet assigned
Examiner Name	Not yet assigned
Total Number of Pages in This Submission: 5	Attorney Docket Number: IMM174 (51851/279589)

ENCLOSURES ***(check all that apply)***

- ☐ Fee Transmittal Form
  - ☐ Fee Attached
- ☐ Amendment / Reply
  - ☐ After Final
  - ☐ Affidavits/declaration(s)
- ☐ Extension of Time Request
- ☐ Express Abandonment Request
- ☒ Information Disclosure Statement
- ☐ Certified Copy of Priority Document(s)
- ☐ Response to Missing Parts/ Incomplete Application
  - ☐ Response to Missing Parts under 37 CFR 1.52 or 1.53
- ☐ Drawing(s)
- ☐ Licensing-related Papers
- ☐ Petition
- ☐ Petition to Convert to a Provisional Application
- ☐ Power of Attorney, Revocation Change of Correspondence Address
- ☐ Terminal Disclaimer
- ☐ Request for Refund
- ☒ CD, Number of CD(s) 1
- ☐ After Allowance Communication to Group
- ☐ Appeal Communication to Board of Appeals and Interferences
- ☐ Appeal Communication to Group **(Appeal Notice, Brief, Reply Brief)**
- ☐ Proprietary Information
- ☐ Status Letter
- ☒ Other Enclosure(s) *(please identify below)*:
  PTO/SB/08a
  Return Postcard

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm or Individual name	John C. Alemanni (Reg. No. 47,384) Kilpatrick Stockton LLP 1001 West Fourth Street Winston-Salem, NC 27101
Signature	
Date	March 8, 2004

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below.

Typed or printed name	Kay Farmer		
Signature	Kay Farmer	Date	3/8/04

This collection of information is required by 37 CFR 1.5. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

OIPE JC
MAR 1 0 2004
PATENT & TRADEMARK OFFICE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants	:	Henry da Costa, et al.
Ser. No.	:	10/723,778
Filed	:	November 26, 2003
For	:	System and Method for Adaptive Interpretation of Input From a Touch – Sensitive Input Device
Examiner	:	Not yet assigned
Art Unit	:	Not yet assigned

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

INFORMATION DISCLOSURE STATEMENT

Dear Sir:

Applicant has submitted references listed on the enclosed Information Disclosure Statement in electronic form on the enclosed compact disc. Pursuant to 37 C.F.R. §§1.56, 1.97 and 1.98, the attention of the Patent and Trademark Office is hereby directed to the references listed on the attached Form-PTO SB/08a. If the Examiner desires hard copies of some or all of these references, Applicant will provide these expeditiously upon Examiner's request.

This Information Disclosure Statement is being submitted before the mailing of a first Office Action in this application. The Commissioner is hereby authorized to charge any additional fees under 37 C.F.R. 1.16 or 1.17 which may be required during the entire pendency of this application, or to credit any overpayment, to Deposit Account No. 16-1435. A duplicate of this sheet is attached for that purpose.

It is respectfully requested that the references listed on the attached form be expressly considered by the Examiner and be made of record in the application and appear among the "References Cited" on any patent to issue therefrom. For the documents listed in "Other Documents," Applicant has listed the dates which are shown on the documents. Applicant makes no representation as to the publication dates, if any, of the documents. Further, and although the form supplied by the PTO contains the header of "Other Prior Art," Applicant makes no representation or statement that the references listed are or are not prior art.

Respectfully submitted,

Dated: March 8, 2004 By: _____

John C. Alemanni (Reg. No. 47,384)

KILPATRICK STOCKTON LLP
1001 West Fourth Street
Winston-Salem, North Carolina 27101-2400
Telephone: (336) 607-7300
Facsimile: (336) 607-7500

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Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 7

Complete if Known	
Application Number	10/723,778
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Not yet assigned
Examiner Name	Not yet assigned
Attorney Docket Number	IMM174 (51851/279589)

U.S. PATENT DOCUMENTS

Examiner Initials *	Cite No.[1]	Document Number Number - Kind Code[2] (*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
	1	2,972,140	2/14/1961	Hirsch	
	2	3,157,853	11/17/1964	Hirsch	
	3	3,220,121	11/30/1965	Cutler	
	4	3,497,668	2/24/1970	Hirsch	
	5	3,517,446	6/30/1970	Corlyon et al.	
	6	3,623,064	11/23/1970	Kagan	
	7	3,902,687	6/25/1973	Hightower	
	8	3,903,614	9/9/1975	Diamond et al	
	9	3,911,416	10/7/1995	Feder	
	10	4,127,752	11/28/1978	Lowthorp	
	11	4,160,508	7/10/1979	Salsbury	
	12	4,236,325	10/2/1980	Hall et al.	
	13	4,262,549	4/21/1981	Schwellenbach	
	14	4,333,070	6/1/1982	Barnes	
	15	4,464,117	8/7/1984	Forest	
	16	4,484,191	11/20/1984	Vavra	
	17	4,513,235	4/23/1985	Acklam et al.	
	18	4,581,491	4/8/1986	Boothroyd	
	19	4,599,070	7/8/1986	Hladky et al.	
	20	4,708,656	11/24/1987	De Vries et al.	
	21	4,713,007	12/15/1987	Alban	
	22	4,758,165	7/19/1988	Tieman, et al.	
	23	4,772,205	9/20/1988	Chlumsky, et al.	
	24	4,794,392	12/27/1988	Selinko	
	25	4,885,565	12/5/1989	Embach	
	26	4,891,764	1/2/1990	McIntosh	
	27	4,926,879	5/22/1990	Sevrain, et al.	
	28	4,930,770	6/5/1990	Baker	
	29	4,934,694	6/19/1990	McIntosh	
	30	5,019,761	5/28/1991	Kraft	
	31	5,022,384	6/11/1991	Freels	
	32	5,022,407	6/11/1991	Horch et al.	
	33	5,035,242	7/30/1991	Franklin	
	34	5,038,089	8/6/1991	Szakaly	
	35	5,078,152	1/7/1992	Bond	
	36	5,121,091	6/9/1992	Fujiyama	
	37	5,165,897	11/24/1992	Johnson	
	38	5,175,459	12/29/1992	Danial et al.	
	39	5,186,695	2/16/1993	Mangseth et al.	

O.I.P.E.
MAR 1 0 2004
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 2 of 7

Complete if Known	
Application Number	10/723,778
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Not yet assigned
Examiner Name	Not yet assigned
Attorney Docket Number	IMM174 (51851/279589)

	40	5,212,473	5/18/1993	Louis	
	41	5,240,417	8/31/1993	Smithson et al.	
	42	5,271,290	12/21/1993	Fischer	
	43	5,275,174	1/4/1994	Cook	
	44	5,283,970	2/8/1994	Aigner	
	45	5,299,810	4/5/1994	Pierce	
	46	5,302,132	4/12/1994	Corder	
	47	5,309,140	5/3/1994	Everett, Jr., et al.	
	48	5,334,027	8/2/1994	Wherlock	
	49	5,389,849	2/14/1995	Asano, et al.	
	50	5,436,622	7/25/1995	Gutman et al.	
	51	5,437,607	8/1/1995	Taylor	
	52	5,461,711	10/24/1995	Wang, et al.	
	53	5,466,213	11/14/1995	Hogan	
	54	5,547,382	8/20/1996	Yamasaki	
	55	5,575,761	11/19/1996	Hajianpour	
	56	5,600,777	2/4/1997	Wang, et al.	
	57	5,638,060	6/10/1997	Kataoka, et al.,	
	58	5,719,561	2/17/1998	Gonzales	
	59	5,736,978	4/7/1998	Hasser, et al.	
	60	5,766,016	6/16/1998	SInclair	
	61	5,785,630	7/28/1998	Bobick et al.	
	62	5,887,995	3/30/1999	Holehan	
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Sheet 3 of 7

Complete if Known	
Application Number	10/723,778
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Not yet assigned
Examiner Name	Not yet assigned
Attorney Docket Number	IMM174 (51851/279589)

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Sheet 4 of 7

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Application Number	10/723,778
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Not yet assigned
Examiner Name	Not yet assigned
Attorney Docket Number	IMM174 (51851/279589)

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document: Country Code[3] - Number[4] - Kind Code[5] (*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	T[6]
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Sheet 5 of 7

Complete if Known	
Application Number	10/723,778
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Not yet assigned
Examiner Name	Not yet assigned
Attorney Docket Number	IMM174 (51851/279589)

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Sheet 6 of 7

Complete if Known	
Application Number	10/723,778
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Not yet assigned
Examiner Name	Not yet assigned
Attorney Docket Number	IMM174 (51851/279589)

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Sheet 7 of 7

Complete if Known	
Application Number	10/723,778
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Not yet assigned
Examiner Name	Not yet assigned
Attorney Docket Number	IMM174 (51851/279589)

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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. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 C.F.R. 1.53(b))

Attorney Docket No.	IMM174 (51851/279589)
First Inventor	Henry da Costa, et al.
Title	Systems and Methods for Adaptive Interpretation of Input From a Touch-Sensitive Input Device
Express Mail Label No.	**EV 315 183 263 US**

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

1. ☒ Fee Transmittal Form (e.g., PTO/SB/17) *(Submit an original and a duplicate for fee processing)*
2. ☐ Applicant claims small entity status. See 37 CFR 1.27.
3. ☒ Specification [*Total Pages* 26]
   (preferred arrangement set forth below)
   - Descriptive title of the Invention
   - Cross Reference to Related Applications
   - Statement Regarding Fed sponsored R & D
   - Reference to sequence listing, a table, or a computer program listing appendix
   - Background of the Invention
   - Brief Summary of the Invention
   - Brief Description of the Drawings *(if filed)*
   - Detailed Description
   - Claim(s)
   - Abstract of the Disclosure
4. ☒ Drawing(s) (*35 U.S.C.113*) [*Total Sheets* 4]
5. Oath or Declaration [*Total Sheets*]
   a. ☐ Newly executed (original or copy)
   b. ☐ Copy from a prior application (37 CFR 1.63 (d))
   (for a continuation/divisional with Box 18 completed)
   i. ☐ DELETION OF INVENTOR(S)
   Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).
6. ☐ Application Data Sheet. See 37 CFR 1.76

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7. ☐ CD-ROM or CD-R in duplicate, large table or Computer Program *(Appendix)*
8. Nucleotide and/or Amino Acid Sequence Submission *(if applicable, all necessary)*
   a. ☐ Computer Readable Form (CRF)
   b. Specification Sequence Listing on:
      i. ☐ CD-ROM or CD-R (2 copies); or
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   c. ☐ Statements verifying identity of above copies

ACCOMPANYING APPLICATIONS PARTS

9. ☐ Assignment Papers (cover sheet & document(s))
10. ☐ 37 C.F.R. 3.73(b) Statement ☐ Power of Attorney *(when there is an assignee)*
11. ☐ English Translation Document *(if applicable)*
12. ☒ Information Disclosure Statement (IDS)/PTO-1449 ☒ Copies of IDS Citations
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18. If a CONTINUING APPLICATION, *check appropriate box, and supply the requisite information below and in a preliminary amendment, or in an Application Data Sheet under 37 CFR 1.76:*

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No: ____ / ____

Prior application information: *Examiner* ____ *Art Unit:* ____

For CONTINUATION or DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 5b, is considered a part of the disclosure of the accompanying or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

19. CORRESPONDENCE ADDRESS

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Signature		*Date*	November 26, 2003

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FEE TRANSMITTAL for FY 2004

Effective 10/01/2003. Patent fees are subject to annual revision.

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT ($) 914

Complete if Known	
Application Number	Unassigned
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Examiner Name	Unassigned
Art Unit	Unassigned
Attorney Docket No.	IMM174 (51851/279589)

METHOD OF PAYMENT *(check all that apply)*

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FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1001	770	2001	385	Utility filing fee	770
1002	340	2002	170	Design filing fee	
1003	530	2003	265	Plant filing fee	
1004	770	2004	385	Reissue filing fee	
1005	160	2005	80	Provisional filling fee	

SUBTOTAL (1) ($) 770

2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

			Extra Claims		Fee from below		Fee Paid
Total Claims	28	-20 ** =	8	X	18	=	144
Independent Claims	2	-3 ** =	0	X	86	=	0
Multiple Dependent				X		=	0

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
1202	18	2202	9	Claims in excess of 20
1201	86	2201	43	Independent claims in excess of 3
1203	290	2203	145	Multiple dependent claim, if not paid
1204	86	2204	43	** Reissue independent claims over original patent
1205	18	2205	9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($) 144

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FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1051	130	2051	65	Surcharge - late filing fee or oath	
1052	50	2052	25	Surcharge - late provisional filing fee or cover sheet.	
1053	130	1053	130	Non-English specification	
1812	2,520	1812	2,520	For filing a request for reexamination	
1804	920*	1804	920*	Requesting publication of SIR prior to Examiner action	
1805	1,840*	1805	1,840*	Requesting publication of SIR after Examiner action	
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1253	950	2253	475	Extension for reply within third month	
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1255	2,010	2255	1,005	Extension for reply within fifth month	
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1809	770	2809	385	Filing a submission after final rejection (37 CFR § 1.129(a))	
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1801	770	2801	385	Request for Continued Examination (RCE)	
1802	900	1802	900	Request for expedited examination of a design application	
				Other fee (specify) ____	

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SUBMITTED BY				Complete *(if applicable)*	
Name (Print/Type)	John C. Alemanni	*Registration No. (Attorney/Agent)*	47,384	*Telephone*	(336) 607-7311
Signature				*Date*	November 26, 2003

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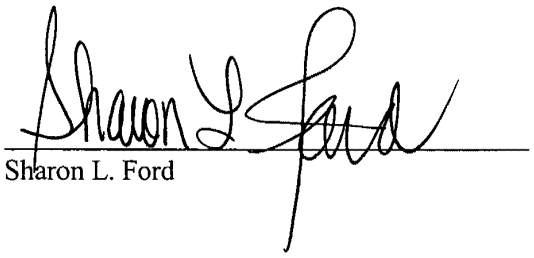
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Date of Deposit	:	November 26, 2003
Type of Document(s)	:	Fee Transmittal for FY 2004
	:	Utility Patent Application Transmittal
	:	Transmittal of Application Under 37 CFR 1.41(c)
	:	Specification (26 Pages)
	:	Figures (4 Pages)
	:	Information Disclosure Statement
	:	IDS (PTO/SB/08A) (141 Referenced on CD)
	:	Check #348067 for $914
	:	Return Post Card.
Serial No.	:	Unassigned
Filing Date	:	Unassigned

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Sharon L. Ford

51851-279589 WINLIB01:1026361.1

Express Mail No. EV 315 183 263 US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants	:	Henry da Costa, et al.
Serial No.	:	Unassigned
Filing Date	:	November 26, 2003
For	:	SYSTEMS AND METHODS FOR ADAPTIVE INTERPRETATION OF INPUT FROM A TOUCH-SENSATIVE INPUT DEVICE

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

TRANSMITTAL OF APPLICATION UNDER 37 CFR 1.41(c)

Sir:

The undersigned attorney hereby makes application for U.S. Letters Patent on behalf of Applicants Henry da Costa, et al. whose addresses and citizenship are as follows:

Inventor	Address	Citizenship
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Christophe Ramstein	818 Union Street, San Francisco, CA 941019	Canadian
Danny Grant	6678 Chateaubriand, Montreal, Quebec, Canada H2S 2N7	Canadian

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John C. Alemanni, Esq.
Kilpatrick Stockton LLP
1001 West Fourth Street
Winston-Salem, NC 27101
Telephone: (336) 607-7311
Facsimile: (336) 734-2621

Respectfully submitted,

John C. Alemanni, Reg. No. 47,384

KILPATRICK STOCKTON LLP
Kilpatrick Stockton LLP
1001 West Fourth Street
Winston-Salem, NC 27101

51851-279589 WINLIB01:1026317.1

PTO/SB/05 (05-03)
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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 C.F.R. 1.53(b))

Attorney Docket No.	IMM174 (51851/279589)
First Inventor	Henry da Costa, et al.
Title	Systems and Methods for Adaptive Interpretation of Input From a Touch-Sensitive Input Device
Express Mail Label No.	**EV 315 183 263 US**

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

1. ☒ Fee Transmittal Form (e.g., PTO/SB/17) *(Submit an original and a duplicate for fee processing)*
2. ☐ Applicant claims small entity status. See 37 CFR 1.27.
3. ☒ Specification [*Total Pages* 26]
   (preferred arrangement set forth below)
   - Descriptive title of the Invention
   - Cross Reference to Related Applications
   - Statement Regarding Fed sponsored R & D
   - Reference to sequence listing, a table, or a computer program listing appendix
   - Background of the Invention
   - Brief Summary of the Invention
   - Brief Description of the Drawings *(if filed)*
   - Detailed Description
   - Claim(s)
   - Abstract of the Disclosure
4. ☒ Drawing(s) (*35 U.S.C.113*) [*Total Sheets* 4]
5. Oath or Declaration [*Total Sheets*]
   a. ☐ Newly executed (original or copy)
   b. ☐ Copy from a prior application (37 CFR 1.63 (d))
   (for a continuation/divisional with Box 18 completed)
   i. ☐ DELETION OF INVENTOR(S)
   Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).
6. ☐ Application Data Sheet. See 37 CFR 1.76

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Alexandria VA 22313-1450

22141 U.S.PTO
10/723778
112603

7. ☐ CD-ROM or CD-R in duplicate, large table or Computer Program *(Appendix)*
8. Nucleotide and/or Amino Acid Sequence Submission *(if applicable, all necessary)*
   a. ☐ Computer Readable Form (CRF)
   b. Specification Sequence Listing on:
      i. ☐ CD-ROM or CD-R (2 copies); or
      ii. ☐ paper
   c. ☐ Statements verifying identity of above copies

ACCOMPANYING APPLICATIONS PARTS

9. ☐ Assignment Papers (cover sheet & document(s))
10. ☐ 37 C.F.R. 3.73(b) Statement *(when there is an assignee)* ☐ Power of Attorney
11. ☐ English Translation Document *(if applicable)*
12. ☒ Information Disclosure Statement (IDS)/PTO-1449 ☒ Copies of IDS Citations
13. ☐ Preliminary Amendment
14. ☒ Return Receipt Postcard (MPEP 503) *(Should be specifically itemized)*
15. ☐ Certified Copy of Priority Document(s) *(if foreign priority is claimed)*
16. ☐ Nonpublication Request under 35 U.S.C. 122 (b)(2)(B)(i). Applicant must attach form PTO/SB/35 or its equivalent.
17. ☒ Other: Express Mail Certificate; Transmittal Under 37 CFR 1.41(c); Check #348067 for $914; Return Post Card.

18. If a CONTINUING APPLICATION, *check appropriate box, and supply the requisite information below and in a preliminary amendment, or in an Application Data Sheet under 37 CFR 1.76:*

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No: ____ / ____

Prior application information: *Examiner* ____ *Art Unit:* ____

For CONTINUATION or DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 5b, is considered a part of the disclosure of the accompanying or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

19. CORRESPONDENCE ADDRESS

☒ *Customer Number or Bar Code Label* 34300 *(Insert Customer No. or Attach bar code label here)* or ☐ *Correspondence address below*

Name	John C. Alemanni (Reg. No. 47,384)				
Address	Kilpatrick Stockton LLP				
	1001 West Fourth Street				
City	Winston-Salem	*State*	NC	*Zip Code*	27101
Country	USA	*Telephone*	(336) 607-7311	*Fax*	(336) 734-2621

Name (Print/Type)	John C. Alemanni	*Registration No. (Attorney/Agent)*	47,384
Signature		*Date*	November 26, 2003

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PTO/SB/17 (10-03)
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16569 U.S.PTO
112603

FEE TRANSMITTAL for FY 2004

Effective 10/01/2003. Patent fees are subject to annual revision.

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT ($) 914

Complete if Known	
Application Number	Unassigned
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Examiner Name	Unassigned
Art Unit	Unassigned
Attorney Docket No.	IMM174 (51851/279589)

METHOD OF PAYMENT *(check all that apply)*

☒ Check ☐ Credit card ☐ Money Order ☐ Other ☐ None

☒ Deposit Account:

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SUBTOTAL (1) ($) 770

2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

			Extra Claims		Fee from below		Fee Paid
Total Claims	28	-20 ** =	8	X	18	=	144
Independent Claims	2	-3 ** =	0	X	86	=	0
Multiple Dependent				X		=	0

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SUBTOTAL (2) ($) 144

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FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
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1802	900	1802	900	Request for expedited examination of a design application	
				Other fee (specify) ____	

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SUBMITTED BY				Complete *(if applicable)*	
Name (Print/Type)	John C. Alemanni	*Registration No. (Attorney/Agent)*	47,384	*Telephone*	(336) 607-7311
Signature				*Date*	November 26, 2003

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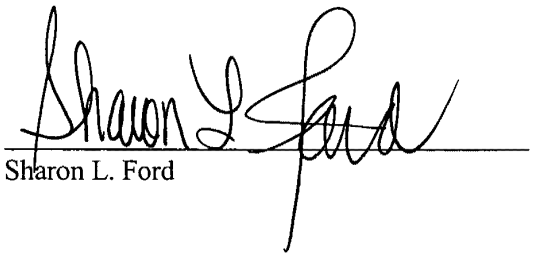
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	:	Specification (26 Pages)
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Sharon L. Ford

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants	:	Henry da Costa, et al.
Serial No.	:	Unassigned
Filing Date	:	November 26, 2003
For	:	SYSTEMS AND METHODS FOR ADAPTIVE INTERPRETATION OF INPUT FROM A TOUCH-SENSATIVE INPUT DEVICE

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

TRANSMITTAL OF APPLICATION UNDER 37 CFR 1.41(c)

Sir:

The undersigned attorney hereby makes application for U.S. Letters Patent on behalf of Applicants Henry da Costa, et al. whose addresses and citizenship are as follows:

Inventor	Address	Citizenship
Henry DaCosta	11700 Gilles Trottier, Montreal, Quebec, Canada H1E 5R9	Canadian
Christophe Ramstein	818 Union Street, San Francisco, CA 941019	Canadian
Danny Grant	6678 Chateaubriand, Montreal, Quebec, Canada H2S 2N7	Canadian

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Respectfully submitted,

John C. Alemanni, Reg. No. 47,384

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51851-279589 WINLIB01:1026317.1

Express Mail No. EV 315 183 263 US
Attorney Docket No. IMM174
PATENT

SYSTEMS AND METHODS FOR ADAPTIVE INTERPRETATION OF INPUT FROM A TOUCH-SENSITIVE INPUT DEVICE

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FIELD OF THE INVENTION

[0002] The present invention generally relates to receiving input from a touch-sensitive input device. This invention more particularly relates to adaptive interpretation of input received from a touch-sensitive input device.

BACKGROUND

[0003] A variety of input devices may be used to provide position and control data to programs executing on computers, cell phones, and other processor-equipped devices. These input devices include mice, trackballs, touchpads, touch screens, touch panels, and various other devices. While the mouse and trackball provide distinct control elements for performing positioning and other control actions, the touchpad combines positioning and control.

[0004] For example, a conventional mouse includes a ball or optical sensor for determining changes in position of the mouse. The mouse also includes one or more buttons for performing a control function, such as selecting a graphical representation on

a screen. In these systems, a user's intent to make a positional change or provide control input is apparent to the system.

[0005] In contrast, conventional touchpads combine the position and control functionality in a way that often masks the user's intent to make a positional change to provide control input. A user moves a finger along a touchpad to reposition a cursor. A user may also perform gestures to simulate functions of the buttons of a mouse, such as drag, click, and double-click. In either case, the user's finger is in contact with the surface of the touchpad. Changes in position on the touchpad and in the pressure exerted on the surface of the touchpad must be used to determine the user's intent. Because of the variety of users that may interact with a touchpad and the variety of functions that may be performed, determining the user's intent based on a gesture on a touchpad is difficult. Variables affecting the ability of a program to determine what a user is attempting to do include the following: the physical difference between users; the different angles at which a user may place their finger while using a touchpad; the variance in pressure between different users and between the same user; the movement of the finger across the touchpad while simultaneously attempting to perform actions on the touchpad. U.S. Patent Number 6,414,671 to Gillespie, *et al.* describes one conventional method for recognizing a user's gesture as a drag gesture.

[0006] Thus, a method and system are needed for accurately determining a user's intent based on data supplied by a touch-sensitive input device.

SUMMARY

[0007] An embodiment of the present invention provides systems and methods for adaptive interpretation of input received from a touch-sensitive input device by receiving a pressure signal indicating a pressure from the input device, comparing the pseudo pressure signal to an adaptive pressure threshold value, and outputting a signal if the pseudo pressure signal is greater than the adaptive pressure threshold value.

[0008] Further details and advantages of embodiments of the present invention are set forth below.

BRIEF DESCRIPTION OF THE FIGURES

[0009] These and other features, aspects, and advantages of the present invention are better understood when the following Detailed Description is read with reference to the accompanying drawings, wherein:

Figure 1 illustrates an exemplary environment for implementation of one embodiment of the present invention;

Figure 2 is a flow chart illustrating a process or algorithm for detecting finger presses on a touchpad in one embodiment of the present invention;

Figure 3 is a flow chart illustrating a process for detecting a finger press on a touchpad in another embodiment of the present invention; and

Figure 4 is a group of charts illustrating various filters that may be utilized in embodiments of the present invention.

DETAILED DESCRIPTION

[0010] Referring now to the drawings in which like numerals indicate like elements throughout the several figures, Figure 1 illustrates an exemplary environment for implementation of an embodiment of the present invention. The embodiment shown includes a touch-sensitive device commonly called a touchpad 102. Touchpad 102 senses the position of a conductor, such as a finger, on the surface of the touchpad (102). The touchpad (102) is further able to provide a position, comprising X and Y parameters, as well as a pressure, Z parameter, as an output signal. Conventional touchpads are very accurate in determining and providing the position of the conductor. For example, some conventional touchpads have resolutions greater than 1000 dpi. However, conventional touchpads are less accurate in determining and providing the pressure exerted on the touchpad. Other embodiments of the present invention may use other touch-sensitive input devices, such as a touch panel or touch screen.

[0011] The touchpad 102 shown does not sense an actual pressure. Instead, the pressure reading from the touchpad 102 is a pseudo pressure. Touchpads work by utilizing resistance, capacitance, or membrane switches. The touchpad 102 shown in Figure 1 utilizes capacitance, however, an embodiment of the present invention may be implemented in conjunction with any touch-sensitive input device, including resistive and membrane-switch touchpads. In other embodiments, actual pressure may be sensed. For example, in one embodiment, a touch screen with an attached explicit pressure sensor is utilized.

[0012] Capacitance-based touchpads are well known to those skilled in the art, and therefore, only a basic description of their function is provided herein. A capacitance touchpad, such as touchpad 102 shown in Figure 1, includes two sets of wires, which are perpendicular to one another and configured so that a gap is formed between them. When a user places a conductor, such as a finger, on the touchpad 102, wires of the two perpendicular sets are brought together and form a capacitance. The touchpad 102 measures which of the wires in each of the two sets has the most capacitance to determine where the conductor is touching the touchpad 102 and, based on this information, provides the X and Y coordinates of the position of the conductor on the touchpad 102.

[0013] The touchpad 102 also provides a pseudo pressure, Z. The pseudo pressure is based on the amount of capacitance resulting from the conductor touching the touchpad 102. Accordingly, the amount of capacitance is not a direct measure of pressure but rather a pseudo pressure.

[0014] In other words, the pseudo pressure or Z parameter provided by the touchpad 102 is not a measure of the actual vertical displacement by a conductor at a single point on the touchpad 102, but rather an estimation of the vertical displacement based on the size of the capacitance change. The pseudo pressure may not accurately represent the amount of pressure actually exerted on the touchpad 102. For example, the larger the surface of the conductor used on the touchpad 102, e.g., a user's finger, the larger the change in capacitance per amount of pressure exerted. As would be expected, if a user presses heavily against the touchpad 102 with a fleshy part of the finger, the amount of touchpad 102 area covered by the finger is greater than then when the same part of the

finger is touching lightly. However, what is less obvious is that the area covered, and the corresponding pseudo pressure, is also greater than when the user presses heavily with a bony part of a finger.

[0015] Additionally, the difference in the features of different conductors, for instance the size or makeup of different users' fingers, affects the capacitance change for any given change in pressure. For example, if a first user with a large finger applies the same pressure as a second user with a small finger, the pseudo pressure signal output by the touchpad 102 is greater for the first person than for the second person for the same amount of applied pressure.

[0016] The difficulty in determining a user's intent by evaluating the data provided by the touchpad 102 is compounded by the different ways in which a conductor may be utilized. For example, the pressure exerted across the surface of the touchpad may vary as the user's finger moves in relation to the hand. The user's finger covers a larger area of the touchpad when the finger is extended horizontally away from the hand on the touchpad 102 than when the finger is close to the hand. Similarly, a pointing device held vertical in relation to the touchpad 102 may cover a smaller surface area than one held at an angle to the touchpad 102.

[0017] Referring again to Figure 1, the touchpad 102 transmits the X, Y, and Z parameters 104 to a processor 106. The touchpad 102 in various embodiments of the present invention may be capable of sending several types of coordinate information. For example, a Synaptics TouchPad is able to send either relative or absolute coordinates. Relative coordinates provide the movement of the conductor on the touchpad 102 since

the last coordinates were transferred. Absolute coordinates provide the position of the conductor on the touchpad 102 at that moment. An embodiment of the present invention may utilize additional parameters as well. For example, the Synaptics TouchPad provides a "W" parameter, which reports the character of a contact with the touchpad, such as "accidental." An embodiment of the present invention may utilize such a parameter to accurately determine a user's intent.

[0018] Referring again to Figure 1, the processor 106 and touchpad 102 may be connected directly or indirectly and may be connected via wires or a wireless connection. For example, the touchpad 102 may utilize the PS/2, Serial, Apple Desktop Bus (ADB), or other communication protocol in communicating with the processor. The processor 106 is capable of executing program code stored on a computer-readable medium. Although the processor shown is separate from the touchpad 102, some conventional touchpads include a processor, such as an Application Specific Integrated Circuit (ASIC). An ASIC may provide some processing of the movements on the touchpad 102 to determine whether or not the user is making gestures. This integrated processor may be utilized alone or in combination with the processor 106 according to the present invention.

[0019] Processor 106 may include, for example, digital logic processors capable of processing input, executing algorithms, and generating output as necessary in response to the inputs received from the touch-sensitive input device. Such processors may include a microprocessor, the aforementioned ASIC, and state machines. Such processors include, or may be in communication with, media, for example computer-readable media, which

stores instructions that, when executed by the processor 106, cause the processor 106 to perform the steps described herein.

[0020] Embodiments of computer-readable media include, but are not limited to, an electronic, optical, magnetic, or other storage or transmission device capable of providing a processor, such as the processor 106 in communication with a touch-sensitive input device, with computer-readable instructions. Other examples of suitable media include, but are not limited to, a floppy disk, CD-ROM, magnetic disk, memory chip, ROM, RAM, an ASIC, a configured processor, all optical media, all magnetic tape or other magnetic media, or any other medium from which a computer processor can read instructions. Also, various other forms of computer-readable media may transmit or carry instructions to a computer, including a router, private or public network, or other transmission device or channel, both wired and wireless. The instructions may comprise code from any computer-programming language, including, for example, C, C#, Visual Basic, Java, and JavaScript.

[0021] The embodiment shown in Figure 1 may be implemented in a variety of devices. Such devices include personal computers, many of which include an integrated touchpad. Such devices may also include handheld devices, such as handheld organizers, cellular telephones, handheld communicators, MP3 players, GPS receivers, and the like.

[0022] Embodiments of the present invention may also be utilized to implement haptic effects in devices such as those mentioned above. In such an embodiment, the haptic effects result from various actions by a user interfacing with a touch-sensitive input device, and the effects may be based on the user's intent as determined by the

processor 106. Haptic effects may also result from interaction with software executing on a device in communication with the touch-sensitive input device.

[0023] Embodiments of the present invention address the difficulties faced in attempting to determine the intent of a user based on the X, Y, and Z parameters supplied by the touchpad 102. Examples of determining a user's intent include determining when a user is tapping or pressing on a specific portion of a touch-sensitive input device that corresponds to a control displayed on the input device or displayed on a separate, synchronized display.

[0024] Embodiments of the present invention provide systems and methods for adaptive interpretation of the intent of a user of a touch-sensitive input device. In one embodiment of the present invention, a processor receives a pressure signal indicating a pressure from the input device, compares the pressure signal to an adaptive pressure threshold value, and outputs a signal if the pressure signal is greater than the adaptive pressure threshold value. The pressure may be a pseudo pressure or an explicit pressure. Also, the pressure may be filtered.

[0025] Embodiments of the present invention may also utilize the velocity of the conductor across the touchpad in determining a user's intent. Additionally, an embodiment may utilize adaptive thresholds alone or in combination with digital filtering to more accurately determine a user's intent.

[0026] Thresholds for pressure, pseudo pressure, pseudo-pressure change, velocity, and other measures may be stored in a computer-readable medium when the device is

manufactured. Alternatively, software executed by a processor may provide settings for the thresholds. Thresholds set by software may be static or adaptive. Adaptive thresholds may rely on various parameters, including, for example, the length of time the input device has been active, the placement of the conductor on the surface of the input device, and the current user of the device.

[0027] Figure 2 is a flow chart illustrating a process or algorithm for detecting and interpreting finger presses on the touchpad (102) according to the present invention. In the embodiment shown, a keypad is displayed on the touchpad (102) or on a corresponding display. In various embodiments, the keypad may be virtual or physical, and may be displayed or not displayed. A processor executing the process shown compares the pseudo pressure against a minimum threshold value and compares changes in pseudo pressure against additional minimum thresholds.

[0028] The processor (106) may use adaptive thresholds. For example, the processor (106) may utilize different threshold values based on the position of the conductor on the touchpad (102). The processor (106) may also vary the thresholds based on the specific user who is touching the touchpad (102). The processor (106) may also vary the threshold when the user initially touches the touchpad (102) to account for the large change in pseudo pressure typically encountered during initial contact. For example, in one embodiment, the processor (106) varies the thresholds during the first one-half second that a pseudo pressure is detected, because the pseudo pressure value tends to vary drastically during the first one-half second of input. The variances may be based on activity of the user or upon the passage of time. The processor (106) may update the

threshold stored in memory, store a separate set of adaptive thresholds, or calculate and apply the adaptive thresholds on an ongoing basis.

[0029] In one embodiment in which an adaptive threshold is based on a specific user, the processor (106) executing the software is able to identify the user. A user identifier is stored in a computer-readable medium, and retrieved based on input received from a user, such as a user name, password, or other user identifier. Multiple user identifiers and threshold sets may be stored. The threshold may also depend on the orientation of the user's grip on a device used for pointing. For example, a stylus may incorporate a sensor to sense a user's grip orientation on the stylus.

[0030] Referring again to Figure 2, the processor (106) executes whenever the touchpad (102) is active 202. The touchpad (102) reports data continuously to the processor (106) at approximately 80 Hz. The processor (106) receives this data and uses it to determine the user's intent based on gestures made on the touchpad (102). The processor (106) first determines whether or not a finger or other conductor is on the touchpad (102) 204. The processor (106) determines that the finger is on the touchpad (102) by evaluating the pseudo-pressure (Z) parameter. If the Z parameter is greater than zero, the user's finger is touching. If not, the algorithm repeats step 204 until a finger is detected. If a finger is on the touchpad (102), the processor (106) determines whether a finger was previously on the touchpad (102) 206. The processor (106) may accomplish this in several ways. For example, the processor (106) may store the current or previous state of the touchpad (102) in memory and from that data, deduce whether the finger was previously on the touchpad (102).

[0031] If the finger was not previously on the touchpad (102), the processor (106) starts a first tick count 208. The first tick count is used to determine the length of time the finger remains on the key and is used in other parts of the algorithm for gesture recognition. If the finger was not on the touchpad (102) or after the first tick count is started, the processor (106) determines where the finger is positioned 210. The processor (106) makes this determination based on the X and Y coordinates provided by the touchpad (102).

[0032] In the embodiment shown, the processor (106) then utilizes the coordinates to determine whether the finger is on a key 212. Each key displayed on the touchpad (102) or corresponding display is associated with numerous attributes. These attributes include characteristics of the key, such as the size, position and behavior of the key. The processor (106) determines if the finger is on the key by comparing the X and Y position data reported by the touchpad (102) to the characteristics of the key. If the finger is not on a key, the processor (106) repeats the process beginning at step 204. If the finger is on a key, the processor (106) determines whether the release tick count has elapsed 214. If the release tick count has not elapsed, then the processor (106) repeats the process beginning at step 204. If the release tick count has elapsed, the processor (106) determines whether or not the first tick count has elapsed 216.

[0033] In the embodiment shown, if the first tick count has elapsed, the threshold is set to the move threshold for the key 218. If the first tick count has not elapsed, the threshold is set to the first threshold for the key 220. The threshold value is then compared to the change in pseudo pressure 222. If the change in pseudo pressure does

not exceed the threshold set in steps 218 and 220, the process repeats beginning at step 204. If the change in pseudo pressure exceeds the threshold value, the pseudo pressure, i.e., the current value of Z, is compared to an absolute threshold 224. If the pseudo pressure does not exceed the absolute threshold, the process repeats beginning at step 204. If the pseudo pressure exceeds the absolute threshold, then the processor (106) determines that the user is pressing the key 226. The processor (106) generates and sends a signal indicating that a press has been made. This signal is used by other software to control the flow of a program. For example, a word processing program may receive the signal, and in response, display a number, highlight a word, or perform some other action.

[0034] Once the determination that a press has occurred is made, the processor (106) starts the release tick count 228, and the process repeats beginning at step 204. As described above, the process continues to iterate for as long as the touchpad (102) is active.

[0035] In the process shown in Figure 2, the first tick count is set when the finger goes from a non-touching to a touching state and is used to measure a time interval during which a different (higher) set of thresholds is used because users typically push harder when they first touch a touchpad (102). The release tick count is used to measure a time interval following the detection of a press during which the finger is deemed to be pressing. During this interval, the processor (106) does not perform further press detection. In other words, the user cannot press again if the user is already pressing and the user cannot press any faster than some predetermined rate. Once the release tick

count expires, even if the user is still pressing hard, the algorithm detects a press if the user presses even harder (provided there is still room to press harder). The use of these tick counts provides for the adaptability of the algorithm.

[0036] Figure 3 is a flow chart illustrating another process according to the present invention for detecting a finger press on a touchpad (102). Similar to the embodiment shown in Figure 2, in the process shown in Figure 3, a processor (106) compares the pseudo pressure against a minimum threshold value and compares the change in pseudo pressure against a minimum threshold value. Also similar to the process above the thresholds may vary depending on where the finger touches the touchpad (102).

[0037] However, the process shown in Figure 3 differs from the process shown in Figure 2 in several ways. In the embodiment shown in Figure 2, the processor (106) compares the pseudo pressure against both lower and upper thresholds to determine whether the finger is touching. If the finger was not previously touching the touchpad (102), the processor (106) requires that the pseudo pressure exceed the upper threshold before the processor (106) can conclude that the finger is currently touching the touchpad (102). If the finger was previously touching the touchpad (102), the processor (106) requires that the pseudo pressure fall below the lower threshold before concluding that the finger is not touching the touchpad (102). Also, in the embodiment shown in Figure 3, the change in pseudo pressure is digitally filtered to reduce the effects of unwanted noise, which results from extraneous contact with the touchpad (102), such as sliding of a finger.

[0038] One digital filter useful in an embodiment of the present invention comprises software executing on a processor (106), such as a digital signal processor (DSP), to receive samples of data sent from a device, perform a numerical calculation on the data received, and provide the filtered data as output. The digital filter is programmable, allowing some signals to pass unaltered (passband) and blocks other signals (stopband). The signals between the passband and the stopband are signals in the transition band. A low-pass filter allows low-frequency (defined by the filter parameters) to pass. A high-pass filter allows high-frequency signals to pass. A band-pass filter allows frequencies to pass that are at some defined frequency, and a band-reject filter prevents certain signals from passing.

[0039] A recursive or non-recursive filter may be utilized in an embodiment of the present invention. A non-recursive or finite impulse response (FIR) filter utilizes only current input values for calculating an output value. A non-recursive filter does not use previous output values from the filter in computing the current output. In contrast, a recursive or infinite impulse response (IIR) filter utilizes both current input values and past output values in calculating the current output value. In one embodiment, the filter performs as a sliding window, placing more weight on recent values than on previous values.

[0040] A digital filter has order. The order of a non-recursive digital filter is equal to the number of previous input values used in the current calculation. The order of a recursive digital filter is the greater of either the number of (i) previous input values and (ii) previous output values that are used in the current output calculation. A non-

recursive filter can be a zero order filter. A recursive filter must by definition be at least a first order filter.

[0041] In the embodiment shown in Figure 3, the speed at which the finger is moving over the surface of the touchpad (102), i.e., the change in X and Y position on the touchpad (102) per cycle ($s = \sqrt{(\Delta X)^2 + (\Delta Y)^2}$), is also filtered and then compared against a maximum speed threshold. Until the speed falls below the maximum speed threshold, the processor (106) will not recognize a press.

[0042] In the embodiment shown in Figure 3, a processor (106) executing program code first compares the pseudo pressure to an upper threshold value 302. If the pseudo pressure exceeds the upper threshold value, the process continues at step 314. If not, the processor (106) determines whether the user was previously touching, for example by checking the value of a stored flag 304. If so, the processor (106) compares the pseudo pressure to a lower threshold value 306. If the user was not previously touching or if the pseudo pressure is equal to or below the lower threshold, the processor (106) determines whether the first tick counter has elapsed 308.

[0043] If the first tick counter has elapsed, the process resumes at step 302. If the tick counter has not elapsed, then the processor (106) concludes that the user is tapping 310. The processor (106) clears the first tick count, and the process returns to step 302.

[0044] At step 302, if the processor (106) determines that the pseudo pressure exceeds the upper threshold, the processor (106) determines whether the user was previously touching 314. If so, the processor (106) bypasses step 316 and concludes that

the user is touching 318. If the user was not previously touching at step 314, the processor (106) starts the first tick counter 316 and concludes that the user is touching 318. If the pseudo pressure is greater than the lower threshold 306 and the user was previously touching 304, the processor (106) restarts the tick count 316.

[0045] In any event, in the embodiment shown, once the processor (106) concludes that the user is touching 318, the processor (106) compares the speed to a speed threshold value 320. If the speed is greater than or equal to the speed threshold, the processor (106) returns to step 302 in the process. In comparing the speed to the speed threshold, the processor (106) may determine that although the user is exerting enough pressure to signify a press, because the finger is moving across the touchpad (102), the user does not intend for a press to be recognized.

[0046] If the speed is less than the speed threshold, the change in pseudo pressure is compared to a threshold value 322. If the change in pseudo pressure is less than or equal to the threshold, the processor (106) returns to step 302 in the process. If the change in pseudo pressure is greater than the threshold, the processor (106) determines whether the first interval has elapsed 324. If so, the processor (106) concludes that the user is pressing 326 and the processor (106) returns to step 302 in the process.

[0047] Embodiments of the invention may use filtering to reduce the effects of unwanted noise. In one such embodiment, three variables are filtered: (1) the speed at which the finger moves across the surface of the touchpad (102), (2) the pseudo-pressure (Z), and (3) the change in pseudo-pressure (Δ Z). The filtering of each of the above quantities may be performed using the same type of filter or different types of filters. For

example, in one embodiment, the quantities are filtered using a low-pass first-order recursive digital filter based on the following formula:

$$y(n) = \frac{x(n) + (N-1)y(n)}{N} \qquad \text{[Equation 1]}$$

[0048] N is a parameter affecting the cut-off frequency of the filter. For example, in one embodiment, N is set to 10 in filtering speed and pseudo pressure, and N is set to 5 in filtering the change in pseudo-pressure. These values are related to the sampling frequency of the touchpad (102), which, in the embodiment shown, is about 80 Hz. Such a filter computes a rolling average using a weighting function emphasizing more recent samples. This filter requires minimal computational and storage requirements.

[0049] In one embodiment, the following thresholds are used to detect finger presses:

Table 1:

Variable	**Threshold**
S	32
Z	*lower* = 16 *upper* = 32
ΔZ	User-dependent and location-dependent. Thresholds typically range from 2 to 8.

[0050] Ramp type filters work very well in filtering out unwanted noise. However, various types of filters, utilizing a variety of waveforms, a combination of filters, and other processing means may be used as part of a process for determining a user's intent. In one embodiment, the change in pseudo pressure is computed by subtracting the filtered

(average) pseudo pressure from the current pseudo pressure. In another embodiment, the previous filtered pseudo pressure is subtracted from the current filtered pseudo pressure.

[0051] In one embodiment, the user adjusts the threshold values for each key to attain maximum accuracy in intent determination. In another embodiment, the threshold is based on the standard deviation of the pseudo-pressure change. In yet another embodiment, more sophisticated filtering techniques are utilized. Figure 4 is a group of charts illustrating various filters that may be utilized in embodiments of the present invention. The following table provides the waveforms used for each filter shown:

Table 2:

Reference	Waveform	Formula
402	Step	$\lambda(n) = \begin{cases} 1, & n < N/2 \\ 0, & n = N/2 \\ -1, & n > N/2 \end{cases}$
404	Pulse	$\lambda(n) = \begin{cases} -1, & n < N/4, n > 3N/4 \\ 0, & n = N/4, n = 3N/4 \\ 1, & N/4 < n < 3N/4 \end{cases}$
406	Ramp	$\lambda(n) = 1 - 2n/N$
408	Triangle	$\lambda(n) = \begin{cases} 4n/N - 1, & n \le N/2 \\ 3 - 4n/N, & n > N/2 \end{cases}$
410	Quarter Cosine	$\lambda(n) = -\sin(\pi n/2N)$
412	Quarter Sine	$\lambda(n) = \cos(\pi n/2N)$
414	Half Cosine	$\lambda(n) = \cos(\pi n/N)$
416	Half Sine	$\lambda(n) = \sin(\pi n/N)$
418	Full Cosine	$\lambda(n) = -\cos(2\pi n/N)$

[0052] In various embodiments, the coefficients of these waveforms are further biased so their average is zero and scaled so the sum of the positive coefficients is one.

More formally, the filter coefficients $a(n)$ are computed from the above coefficients $\lambda(n)$ by the following equations:

$$\beta = \frac{1}{N+1}\sum \lambda(n) \qquad \text{[Equation 2]}$$

$$\nu(n) = \lambda(n) - \beta \qquad \text{[Equation 3]}$$

$$\rho(n) = \begin{cases} \nu(n), & \nu(n) > 0 \\ 0, & \nu(n) \le 0 \end{cases} \qquad \text{[Equation 4]}$$

$$\mu = \sum \rho(n) \qquad \text{[Equation 5]}$$

$$a(n) = \frac{\rho(n)}{\mu} \qquad \text{[Equation 6]}$$

where:

B	is the bias among $\lambda(n)$,
$N(n)$	are the unbiased coefficients,
$P(n)$	are the positive coefficients extracted from $\nu(n)$,
M	is the sum of the positive coefficients, and
$A(n)$	are the final filter coefficients.

[0053] The foregoing description of the preferred embodiments of the invention has been presented only for the purpose of illustration and description and is not intended to be exhaustive or to limit the invention to the precise forms disclosed. Numerous modifications and adaptations thereof will be apparent to those skilled in the art without departing from the spirit and scope of the present invention.

That which is claimed:

1. A method comprising:

receiving a pressure signal indicating a pressure from an input device;

comparing the pressure signal to an adaptive pressure threshold value; and

outputting a signal if the pressure signal is greater than the adaptive pressure threshold value.

2. The method of claim 1, wherein the adaptive pressure threshold value is associated with an absolute pressure threshold.

3. The method of claim 1, wherein the adaptive pressure threshold value is associated with a position received from the input device.

4. The method of claim 1, wherein the adaptive pressure threshold value can vary over time.

5. The method of claim 1, wherein the adaptive pressure threshold value is associated with a user identifier.

6. The method of claim 1, wherein the adaptive pressure threshold value comprises a first pressure threshold value, and further comprising:

comparing the pressure signal to a second pressure threshold value; and

outputting the signal if the pressure signal is greater than both the first pressure threshold value and the second pressure threshold value.

7. The method of claim 1, wherein the pressure signal comprises a pseudo pressure signal.

8. The method of claim 1, further comprising applying a pressure filter to the pressure signal to create a filtered pressure signal.

9. The method of claim 8, wherein the pressure filter comprises a first pressure filter comprising a first attribute, and further comprising applying a second pressure filter to the pressure signal, the second pressure filter comprising a second attribute that is different than the first attribute.

10. The method of claim 9, wherein the first attribute comprises a first frequency value and the second attribute comprises a second frequency value.

11. The method of claim 10, wherein the second frequency value is lower than the first frequency value.

12. The method of claim 8, wherein applying the pressure filter comprises applying the pressure filter utilizing a sliding window.

13. The method of claim 1, wherein the input device comprises one of a touchpad, a touch panel, and a touch screen.

14. The method of claim 1, further comprising:

calculating a first value associated with the speed of movement across the input device;

comparing the first value to a speed threshold value; and

outputting the signal if the first value is less than the speed threshold value.

15. The method of claim 14, further comprising applying a speed filter to the first value before comparing the speed to the speed threshold value.

16. The method of claim 1, wherein the pressure signal comprises a first pressure signal and further comprising:

receiving a second pressure signal indicating a second pressure from the input device;

calculating a difference signal indicative of a difference between the first pressure signal and the second pressure signal;

comparing the difference signal to a difference threshold value; and

outputting the signal if the difference signal is greater than the difference threshold value.

17. The method of claim 16, further comprising filtering the difference signal to create a filtered difference signal.

18. The method of claim 1, further comprising outputting a signal associated with a haptic effect, the haptic effect based at least in part on the pressure signal.

19. A computer-readable medium on which is encoded programming code, comprising:

program code for receiving a pressure signal indicating a pressure from an input device;

program code for comparing the pressure signal to an adaptive pressure threshold value; and

program code for outputting a signal if the pressure signal is greater than the adaptive pressure threshold value.

20. The computer-readable medium of claim 19, wherein the adaptive pressure threshold value comprises a first pressure threshold value, and further comprising:

program code for comparing the pressure signal to a second pressure threshold value; and

program code for outputting the signal if the pressure signal is greater than both the first pressure threshold value and the second pressure threshold value.

21. The computer-readable medium of claim 19, further comprising program code for applying a pressure filter to the pressure signal to create a filtered pressure signal.

22. The computer-readable medium of claim 21, wherein the pressure filter comprises a first pressure filter comprising a first attribute, and further comprising program code for applying a second pressure filter to the pressure signal, wherein the second pressure filter comprises a second attribute that is different than the first attribute.

23. The computer-readable medium of claim 21, wherein program code for applying the pressure filter comprises program code for applying the pressure filter utilizing a sliding window.

24. The computer-readable medium of claim 19, further comprising:

program code for calculating a first value associated with the speed of movement across the input device;

program code for comparing the first value to a speed threshold value; and

program code for outputting the signal if the first value is less than the speed threshold value.

25. The computer-readable medium of claim 24, further comprising program code for applying a speed filter to the first value before comparing the speed to the speed threshold value.

26. The computer-readable medium of claim 19, wherein the pressure signal comprises a first pressure signal and further comprising:

program code for receiving a second pressure signal indicating a second pressure from the input device;

program code for calculating a difference signal indicative of a difference between the first pressure signal and the second pressure signal;

program code for comparing the difference signal to a difference threshold value; and

program code for outputting the signal if the difference signal is greater than the difference threshold value.

27. The computer-readable medium of claim 26, further comprising program code for filtering the difference signal to create a filtered difference signal.

28. The computer-readable medium of claim 19, further comprising program code for outputting a signal associated with a haptic effect, the haptic effect based at least in part on the pressure signal.

ABSTRACT

Systems and methods for adaptively interpreting a user's intent based on parameters supplied by a touch-sensitive input device are described. In one of the methods described, a processor receives a pressure signal indicating a pressure from an input device, such as a touchpad, compares the pseudo pressure signal to a pressure threshold value, and outputs a signal if the pseudo pressure signal is greater than the pressure threshold value. In another embodiment, the processor also calculates the speed of movement of a conductor, for instance a user's finger, across the input device, and compares the speed to a threshold. If the speed is greater than the threshold, the processor determines that although the pressure may be great enough to signal a press, no press is intended. The various parameters supplied by the input device may be digitally filtered to increase the accuracy of the determination of user intent.

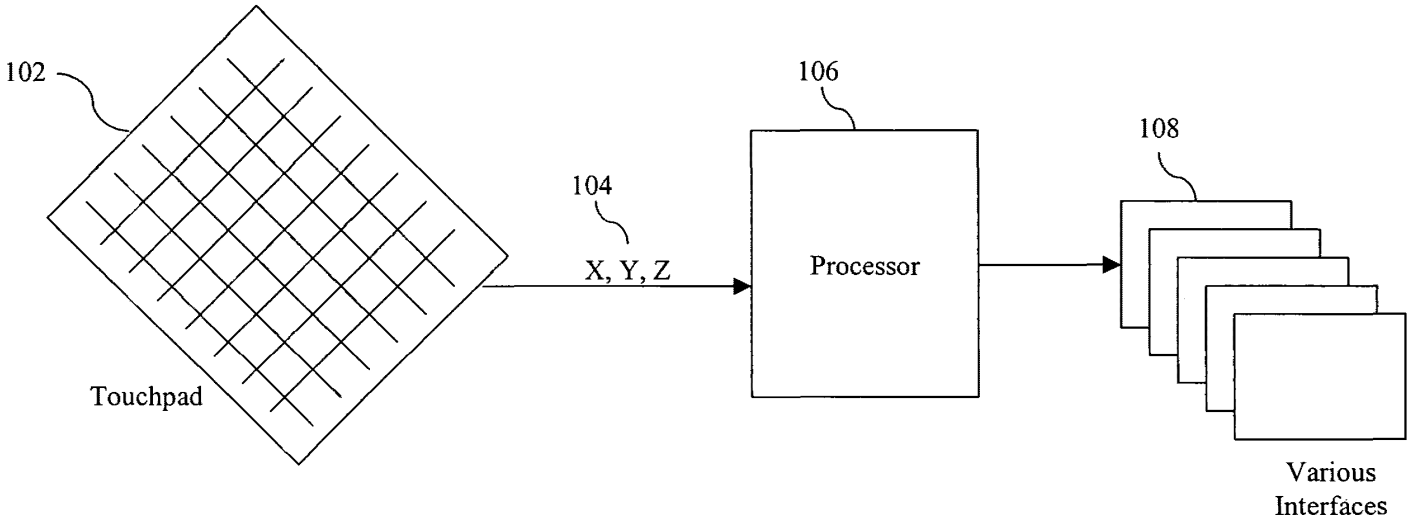


FIG. 1

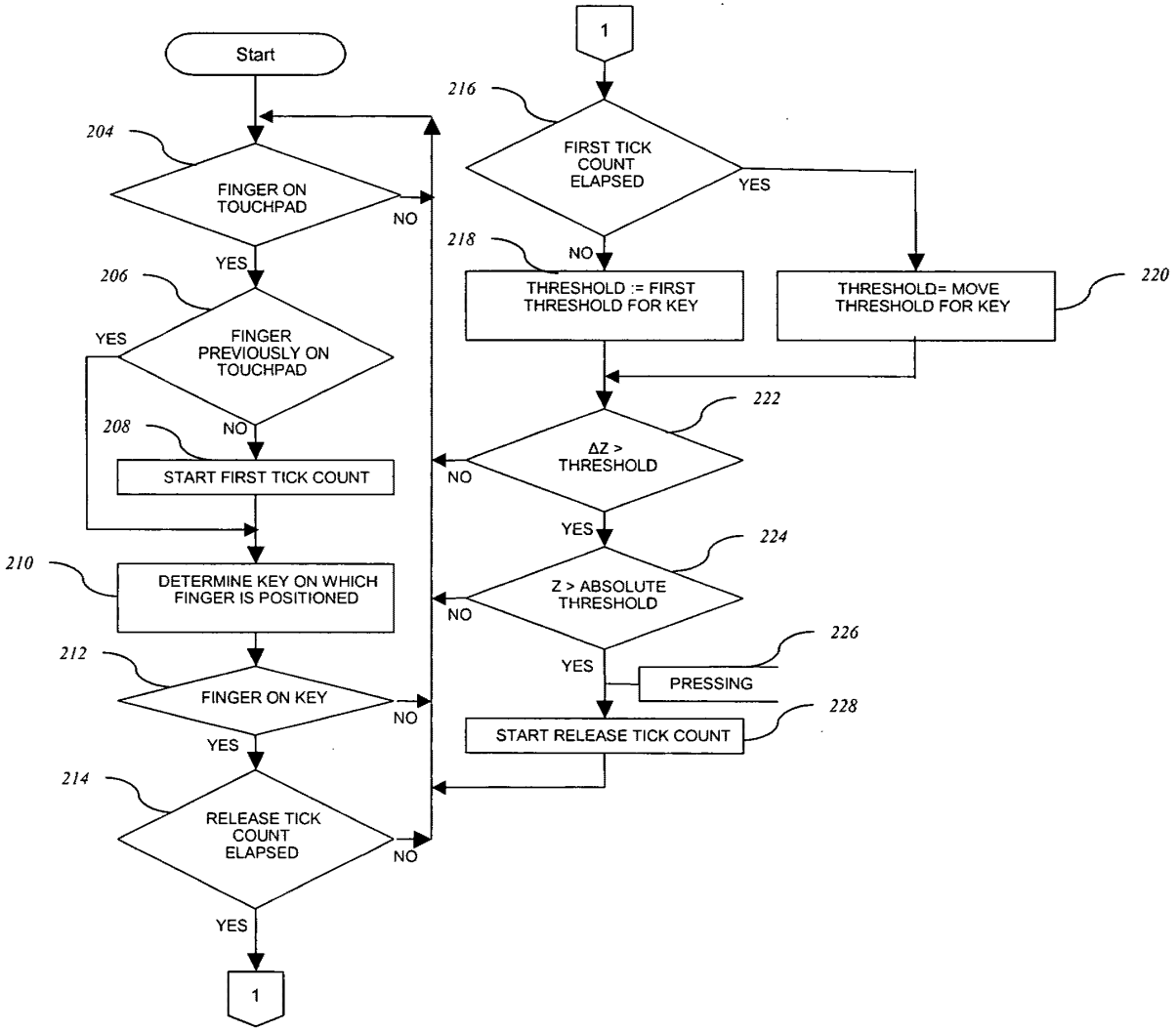

Start
204
FINGER ON TOUCHPAD
NO
YES
206
FINGER PREVIOUSLY ON TOUCHPAD
YES
NO
208
START FIRST TICK COUNT
210
DETERMINE KEY ON WHICH FINGER IS POSITIONED
212
FINGER ON KEY
NO
YES
214
RELEASE TICK COUNT ELAPSED
NO
YES
1
1
216
FIRST TICK COUNT ELAPSED
YES
NO
218
THRESHOLD := FIRST THRESHOLD FOR KEY
220
THRESHOLD= MOVE THRESHOLD FOR KEY
222
ΔZ > THRESHOLD
NO
YES
224
Z > ABSOLUTE THRESHOLD
NO
YES
226
PRESSING
228
START RELEASE TICK COUNT

FIG. 2

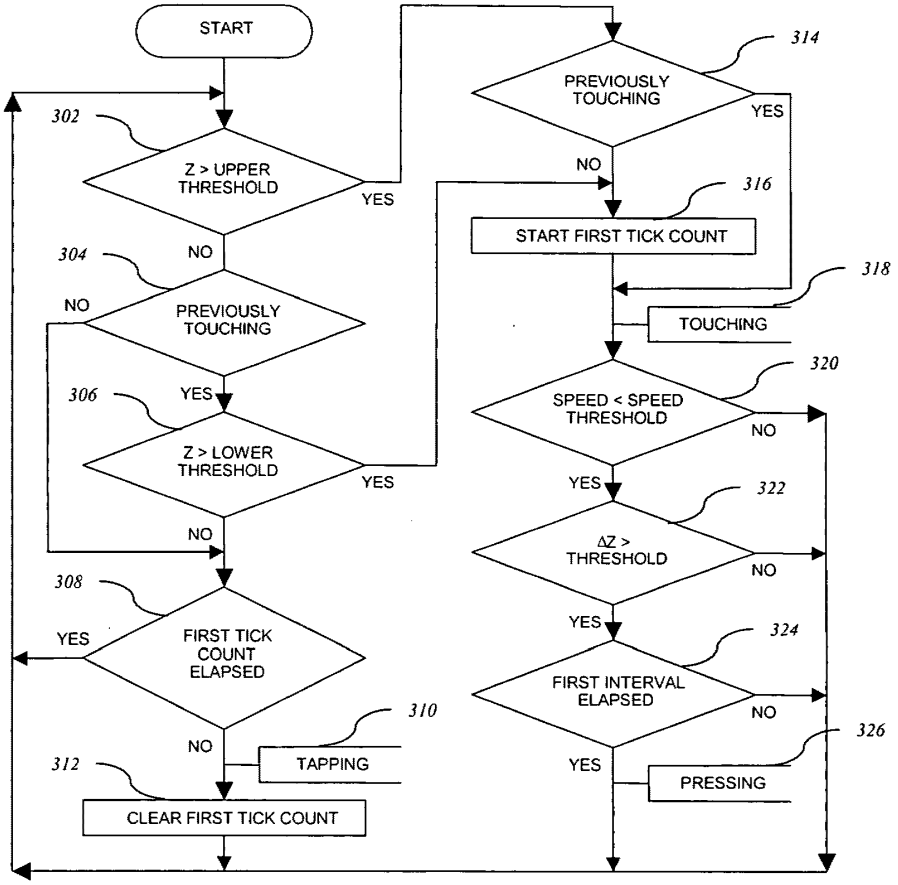

START
302
Z > UPPER THRESHOLD
YES
NO
304
PREVIOUSLY TOUCHING
NO
YES
306
Z > LOWER THRESHOLD
YES
NO
308
FIRST TICK COUNT ELAPSED
YES
NO
310
TAPPING
312
CLEAR FIRST TICK COUNT
314
PREVIOUSLY TOUCHING
YES
NO
316
START FIRST TICK COUNT
318
TOUCHING
320
SPEED < SPEED THRESHOLD
NO
YES
322
ΔZ > THRESHOLD
NO
YES
324
FIRST INTERVAL ELAPSED
NO
YES
326
PRESSING

FIG. 3

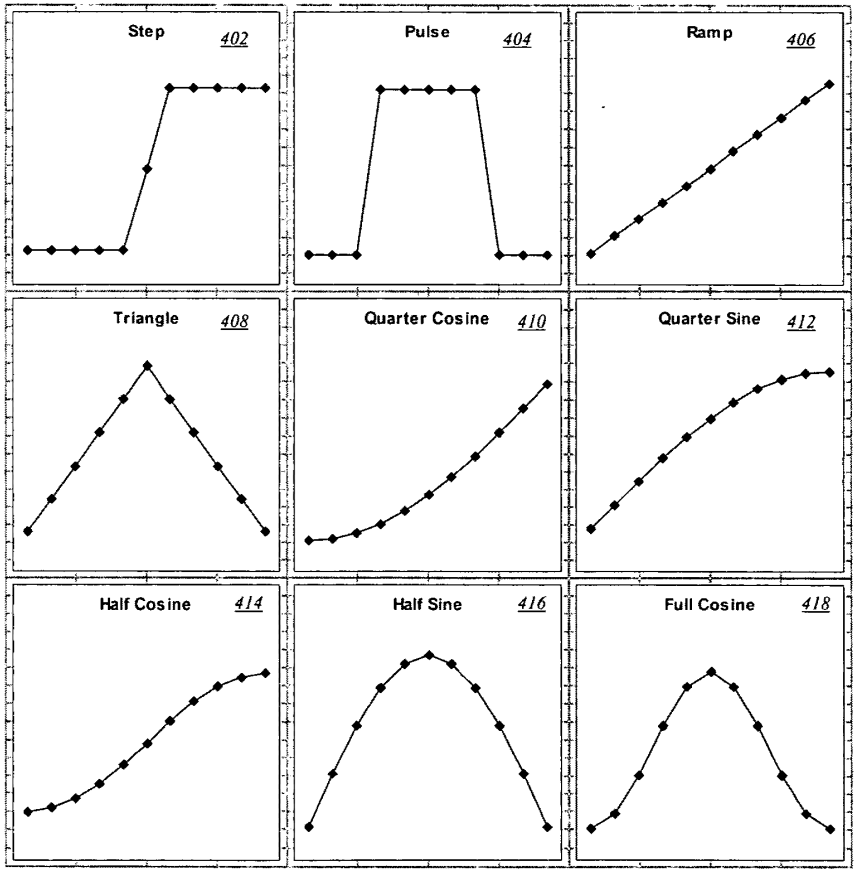

Step 402
Pulse 404
Ramp 406
Triangle 408
Quarter Cosine 410
Quarter Sine 412
Half Cosine 414
Half Sine 416
Full Cosine 418

FIG. 4

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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Henry da Costa, et al.
Serial No.:	Unassigned
Filing Date:	November 26, 2003
For:	**Systems and Methods for Adaptive Interpretation of Input From a Touch-Sensitive Input Device**
Art Unit:	Unassigned

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

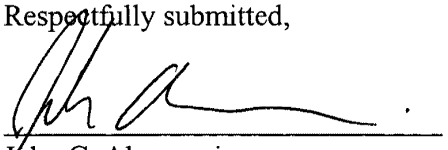
Sir:

INFORMATION DISCLOSURE STATEMENT

Pursuant to 37 C.F.R. §§ 1.56, 1.97, and 1.98, Applicants submit herewith on Form PTO-1449 a listing of documents known to the Applicants and/or their attorney. Applicants respectfully request consideration of the cited documents and making the same of record in the prosecution of the above-identified application. In so doing, Applicants do not waive any rights to take appropriate action to establish patentability over the listed documents should they be applied as references against the claims of the present application. Copies of One Hundred Forty-one documents listed on the enclosed CD.

This Information Disclosure Statement is being submitted with the application, and, therefore, no certification or fee is required (37 C.F.R. § 1.97b(1)). However, should any fees be due, the Commissioner is authorized to charge such fees to Deposit Account No. 16-1435. A duplicate of this sheet is attached for that purpose.

Respectfully submitted,



John C. Alemanni
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 1 of 7

Complete if Known	
Application Number	Unassigned
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Unassigned
Examiner Name	Unassigned
Attorney Docket Number	IMM174 (51851/279589)

U.S. PATENT DOCUMENTS

Examiner	Cite No.[1]	Document Number Number Kind Code[2] (*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
	1	2,972,140	2/14/1961	Hirsch	
	2	3,157,853	11/17/1964	Hirsch	
	3	3,220,121	11/30/1965	Cutler	
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	5	3,517,446	6/30/1970	Corlyon et al.	
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	25	4,930,770	6/5/1990	Baker	
	26	4,934,694	6/19/1990	McIntosh	
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	28	5,022,384	6/11/1991	Freels	
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	36	5,240,417	8/31/1993	Smithson et al.	

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Sheet 2 of 7

Complete if Known	
Application Number	Unassigned
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Unassigned
Examiner Name	Unassigned
Attorney Docket Number	IMM174 (51851/279589)

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	37	5,271,290	12/21/1993	Fischer	
	38	5,275,174	1/4/1994	Cook	
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	69	6,422,941	7/23/2002	Thorner et al.	
	70	6,424,338	7/23/2002	Anderson	

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Application Number	Unassigned
Filing Date	November 26, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Unassigned
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Attorney Docket Number	IMM174 (51851/279589)

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	74	6,429,846	8/6/2002	Rosenberg, et al.	
	75	US 2002/0149561 A1	10/17/2002	Fukumoto et al.	
	76	6,610,936	8/26/03	Gillespie	
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Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]	Number[4]	Kind Code[5] (*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
	77	EP	0349086		1/3/1990	Stork Kwant B.V.	√
	78	JP	01-003664		7/19/1990	Taito Corporation	√
	79	JP	02-109714		1/13/1992	Epoch Co. and Key-Planning Co.	√
	80	JP	04-007371		8/3/1993	Taito Corporation	√
	81	JP	05-193862		1/27/1995	Sega Corporation	√
	82	WO	97/18546 A1		5/22/1997	Gerpheide	√
	83	JP	2001-350592A		12/21/2001	Ryo et al.	√
	84	WO	02/12991 A1		2/14/2002	Fukumoto et al.	√
	85	EP	1182851 A1		2/27/2002	Becker	√
	86	WO	02/27645		4/4/2002	Franzen	√
	87	WO	02/31807 A1		4/18/2002	Hwang et al.	√
	88	JP	2002-259059A		9/13/2002	Motoyama et al.	√

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Filing Date	August 27, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Unassigned
Examiner Name	Unassigned
Attorney Docket Number	IMM174 (51851/279589)

OTHER DOCUMENTS			
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	89	ADELSTEIN, "A Virtual Environment System For The Study of Human Arm Tremor," Ph.D. Dissertation, Dept. of Mechanical Engineering, MIT, June 1989.	
	90	ADELSTEIN, " Design and Implementation of a Force Reflecting Manipulandum for Manual Control research," DSC-Vol. 42, Advances in Robotics, Edited by H. Kazerooni, pp. 1-12, 1992.	
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Examiner Signature		Date Considered	

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	103	"Cyberman Technical Specification," Logitech Cyberman SWIFT Supplement, 4/5/1994.	
	104	EBERHARDT et al., "OMAR - A Haptic display for speech perception by deaf and deaf-blind individuals," IEEE Virtual Reality Annual International Symposium, Seattle, WA, Sep. 18-22, 1993.	
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	111	IWATA, "Pen-based Haptic Virtual Environment," 0-7803-1363-1/93 IEEE, pp 287-292, 1993.	
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	114	JONES et al., "A perceptual analysis of stiffness," ISSN 0014-4819 Springer International (Springer-Verlag); Experimental Brain Research, Vol. 79, No. 1, pp. 150-156, 1990.	
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	116	KONTARINIS et al., "Display of High-Frequency Tactile Information to Teleoperators," Telemanipulator Technology and Space Telerobotics, Won S. Kim, Editor, Proc. SPIE Vol. 2057, pp. 40-50, Sep. 7-9, 1993.	

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	117	KONTARINIS et al., "Tactile Display of Vibratory Information in Teleoperation and Virtual Environments," PRESENCE, 4(4):387-402, 1995.	
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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.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 7 of 7

Complete if Known	
Application Number	Unassigned
Filing Date	August 27, 2003
First Named Inventor	Henry da Costa, et al.
Art Unit	Unassigned
Examiner Name	Unassigned
Attorney Docket Number	IMM174 (51851/279589)

OTHER DOCUMENTS			
Examiner Initials *	Cite No.[1]	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.	
	131	Safe Flight Instruments Corporation, "Coaxial Control Shaker," Part No. C-25502, 1 July 1967.	
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ARTIFACT SHEET

Enter artifact number below. Artifact number is application number + artifact type code (see list below) + sequential letter (A, B, C ...). The first artifact folder for an artifact type receives the letter A, the second B, etc.. Examples: 59123456PA, 59123456PB, 59123456ZA, 59123456ZB

10723798 cA

Indicate quantity of a single type of artifact received but not scanned. Create individual artifact folder/box and artifact number for each Artifact Type.

☐ CD(s) containing computer program listing
Doc Code: Computer Artifact Type Code: P

☐ Stapled Set(s) of Extra Color Drawings/Photographs
Doc Code: Artifact Artifact Type Code: C

☐ CD(s) containing pages of specification ☐ and/or sequence listing ☐
Doc Code: Artifact Artifact Type Code: S

☑ CD(s) with content unspecified
Doc Code: Artifact Artifact Type Code: U

☐ Microfilm(s)
Doc Code: Artifact Artifact Type Code: F

☐ Video tape(s)
Doc Code: Artifact Artifact Type Code: V

☐ Model(s)
Doc Code: Artifact Artifact Type Code: M

☐ Bound Document(s)
Doc Code: Artifact Artifact Type Code: B

☐ Other, description: _____
Doc Code: Artifact Artifact Type Code: Z

06/26/2003

ARTIFACT SHEET

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Indicate quantity of a single type of artifact received but not scanned. Create individual artifact folder/box and artifact number for each Artifact Type.

- ☐ CD(s) containing computer program listing
  Doc Code: Computer Artifact Type Code: P
- ☐ Stapled Set(s) of Extra Color Drawings/Photographs
  Doc Code: Artifact Artifact Type Code: C
- ☐ CD(s) containing pages of specification ☐ and/or sequence listing
  Doc Code: Artifact Artifact Type Code: S
- ☒ CD(s) with content unspecified
  Doc Code: Artifact Artifact Type Code: U
- ☐ Microfilm(s)
  Doc Code: Artifact Artifact Type Code: F
- ☐ Video tape(s)
  Doc Code: Artifact Artifact Type Code: V
- ☐ **Model(s)**
  Doc Code: Artifact Artifact Type Code: M
- ☐ **Bound Document(s)**
  Doc Code: Artifact Artifact Type Code: B
- ☐ **Other, description:** _____
  Doc Code: Artifact Artifact Type Code: Z

06/26/2003

PATENT APPLICATION SERIAL NO. _____

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
FEE RECORD SHEET

12/03/2003 BSAYASI1 00000041 10723778

01 FC:1001 770.00 OP
02 FC:1202 144.00 OP

PTO-1556
(5/87)

*U.S. Government Printing Office: 2002 — 489-267/69033

PATENT APPLICATION FEE DETERMINATION RECORD
Effective October 1, 2003

Application or Docket Number
10723778

CLAIMS AS FILED - PART I

	(Column 1)	(Column 2)
TOTAL CLAIMS	28	
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	28 minus 20=	* 8
INDEPENDENT CLAIMS	2 minus 3 =	* —
MULTIPLE DEPENDENT CLAIM PRESENT		☐

* If the difference in column 1 is less than zero, enter "0" in column 2

SMALL ENTITY TYPE ☐		OR	OTHER THAN SMALL ENTITY	
RATE	FEE		RATE	FEE
BASIC FEE	385.00	OR	BASIC FEE	770.00
X$ 9=		OR	X$18=	144
X43=		OR	X86=	1
+145=		OR	+290=	1
TOTAL		OR	TOTAL	

CLAIMS AS AMENDED - PART II

AMENDMENT A

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				☐

SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X43=		OR	X86=	
+145=		OR	+290=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

AMENDMENT B

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Ind pendent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				☐

RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X43=		OR	X86=	
+145=		OR	+290=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

AMENDMENT C

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				☐

RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X43=		OR	X86=	
+145=		OR	+290=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

* If the ntry in column 1 is less than th 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 Ind pendent) is the highest number found in the appropriate box in column 1.

1-19-