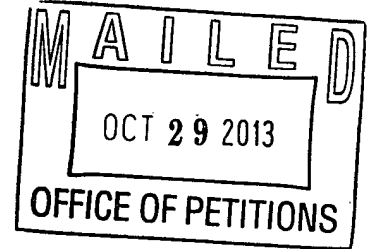




UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

MAURIEL KAPOUYTIAN WOODS LLP
27 W. 24TH STREET
SUITE #302
NEW YORK, NY 10010



In re Patent No. 7,218,313 :
Issued: May 15, 2007 :
Application No. 10/699,555 :
Filed: October 31, 2003 :
Attorney Docket No.: 10046-2000100 :

NOTICE

This is a notice regarding your request for acceptance of a fee deficiency submission under 37 CFR 1.28, filed September 23, 2013.

The Office no longer investigates or rejects original or reissue patent under 37 CFR 1.56. **1098 Off. Gaz. Pat. Office 502 (January 3, 1989)**. Therefore, nothing in this Notice is intended to imply that an investigation was done.

Your fee deficiency submission under 37 CFR 1.28 is hereby **ACCEPTED**.

Status as a small entity has been removed. Accordingly, all future fees paid in this patent must be paid at the undiscounted rate.

/SDB/

Sherry D. Brinkley
Paralegal Specialist
Office of Petitions

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 7,218,313 B2
APPLICATION NO. : 10/699555
DATED : May 15, 2007
INVENTOR(S) : Beth Marcus and David Lee

Page 1 of 1

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

In the Claims

In claim 37, at col. 20, line 3 (which is the 15th line of the claim), the words --second surface-- should be inserted between “a” and “so.”

Signed and Sealed this
First Day of October, 2013



Teresa Stanek Rea
Deputy Director of the United States Patent and Trademark Office

Attorney Docket No.: 10046-2000100
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor:
Beth Marcus

Application No.: 10/699,555

Patent Number: 7,218,313

Filing Date: October 31, 2003

Issue Date: May 15, 2007

Title: HUMAN INTERFACE SYSTEM

FEE DEFICIENCY STATEMENT AND PAYMENT UNDER 37 C.F.R. 1.28

Mail Stop

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

09/25/2013 MBANGURA 00000108 504242 7218313
01 FC:1599 1110.00 DA

Dear Sir:

Assignee has recently learned that the amount paid for the 3.5 year maintenance fee for the above-referenced patent may have been deficient. In an abundance of caution, this paper hereby requests the Director to charge payment to Deposit Account No. 50-4242 in the amount of \$1,110.00, referencing docket number 10046-2000100. This payment amount is the difference between the amount paid and the current large entity fee amount for a 3.5 year maintenance fee. An itemization as required under 37 C.F.R. 1.28(c) is provided below.

Fee Type	Date Paid	Amount Paid	Current Large Entity Fee	Deficiency Amount
3.5 Year Maintenance Fee	October 14, 2010	\$490	\$1600	\$1110

Application Serial No.: 10/699,555

Attorney Docket No.: 10046-2000100

The Director is also hereby authorized to charge any additional fees which may be required by this paper to Deposit Account No. 50-4242, referencing docket no. 10046-2000100.

Dated: September 23, 2013

Respectfully submitted,

By: Michael Mauriel / Reg. No. 44,226
Michael Mauriel
Registration No.: 44,226
Mauriel Kapouytian Woods LLP
27 West 24th Street, Suite 302
New York, New York 10010
(212) 529-5131
Attorney for Applicant



New York Office
 27 W. 24th Street Suite 302
 New York, New York 10010
 Phone: 212-529-5131
 Fax: 212-529-5132
 Email: info-ny@mkwllp.com

California Office
 1517 North Point Street #454
 San Francisco, California 94123
 Phone: 415-992-3420
 Fax: 415-992-3421
 Email: info-ca@mkwllp.com

www.mkwllp.com

FAX COVER SHEET

DATE: September 23, 2013

TO: Maintenance Fee Branch

FAX: 571-273-6500

FROM: Michael Mauriel

RE: Fee Deficiency
 US Patent Application No. 10/699,555; Patent No.
 7,218,313

PAGES: 3 (including cover)

Contents:

1. Fee Deficiency Statement and Payment under 37 C.F.R. 1.28

SPE RESPONSE FOR CERTIFICATE OF CORRECTION

DATE : 08-29-13

TO SPE OF : ART UNIT 2629

SUBJECT : Request for Certificate of Correction for Appl. No.: 10/699555 Patent No.: 7218313

CofC mailroom date: 08-01-13

Please respond to this request for a certificate of correction within 7 days.

FOR IFW FILES:

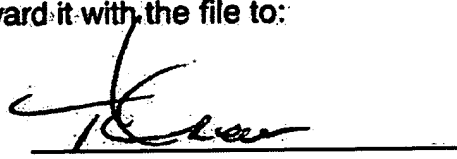
Please review the requested changes/corrections as shown in the **COCIN** document(s) in the IFW application image. No new matter should be introduced, nor should the scope or meaning of the claims be changed.

Please complete the response (see below) and forward the completed response to scanning using document code **COCX**.

FOR PAPER FILES:

Please review the requested changes/corrections as shown in the attached certificate of correction. Please complete this form (see below) and forward it with the file to:

Certificates of Correction Branch (CofC)
Randolph Square - 9D10-A
Palm Location 7580



Note: _____

Angela Green 571:272.9005
CofC Branch 703-756-1814

Thank You For Your Assistance

The request for issuing the above-identified correction(s) is hereby:

Note your decision on the appropriate box:

Approved

All changes apply.

Approved in Part

Specify below which changes do not apply.

Denied

State the reasons for denial below.

Comments: _____

SPE /LUN-YI LAO/

Art Unit 2692



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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Alexandria, Virginia 22313-1450
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
10/699,555	10/31/2003	Beth Marcus	

51417
Mauriel Kapouytian Woods LLP
27 W. 24th Street
Suite #302
New York, NY 10010

CONFIRMATION NO. 3602
POA ACCEPTANCE LETTER



Date Mailed: 08/16/2013

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 08/01/2013.

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

/rnturner myles/

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



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	ATTY. DOCKET NO./TITLE
10/699,555	10/31/2003	Beth Marcus	09096-8001.US00

CONFIRMATION NO. 3602

POWER OF ATTORNEY NOTICE

97075
Perkins Coie LLP - SDO General
PO Box 1247
Seattle, WA 98111-1247



Date Mailed: 08/16/2013

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 08/01/2013.

- 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).

/rmtturner myles/

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

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors:

Beth Marcus, David Lee

Patent Number: 7,218,313

Application No.: 10/699,555

Title: HUMAN INTERFACE SYSTEM

Issue Date: May 15, 2007

REQUEST FOR CORRECTION TO PATENT

Commissioner for Patents

Office of Data Management Attention: Certificates of Correction Branch

P.O. Box 1450

Alexandria, Virginia 22313-1450

Dear Sir:

Applicants hereby assert that an error appears in claim 37 on the printed patent. Specifically, at col. 20, line 3 (which is the 15th line of the claim), the words “second surface” should be inserted between “a” and “so.” Applicants respectfully request that a Certificate of Correction be issued as indicated in the attached form PTO/SB/44. Applicants further submit remarks in support of this request beginning on page 2 of this paper. Applicants request correction of the error under 37 C.F.R. 1.322. However, in case the Patent Office determines that correction under 37 C.F.R. 1.323 is more appropriate, Applicants request correction thereunder and the corresponding fee is submitted herewith.

REMARKS

Applicants respectfully bring to the Commissioner's attention the following facts: Claim 37 of U.S. Patent No. 7,218,313 ("the '313 patent") corresponds to claim 29 from the prosecuted application, U.S. Application Serial No.: 10/699,555 ("the '555 application"). The final and correct wording of the claim was submitted in a preliminary amendment dated March 20, 2006. The claim language was not subsequently amended during the prosecution. The correct wording of the claim also appeared in a claim listing of a later preliminary amendment dated April 17, 2006. The claim was then allowed in an office action dated October 5, 2006. The claim listing included in an amendment dated February 2, 2007 inadvertently omitted the words "second surface" in line 10 of the claim as listed in that amendment. The claim was indicated to be "Previously Presented." Therefore, the February 2, 2007 paper did not amend the claim and the correct state of the claim remained as reflected in the preliminary amendments of March 20, 2006 and April 17, 2006. However, this error in the claim listing of February 2, 2007 was apparently copied into the issued patent.

In view of the above facts, Applicants respectfully submit that the error in the issued patent resulted at least in part from the Patent Office's failure to review the wording of the claim as submitted in the March 20, 2006 amendment. Therefore, Applicants respectfully request that the Certificate of Correction be issued under 37 C.F.R. 1.322 without requiring a fee. If the Patent Office determines that correction under 37 C.F.R. 1.322 is appropriate, then Applicants respectfully request a refund of the fee paid herewith.

However, if the Patent Office determines that the need for correction is due to Applicants' error, then Applicants' respectfully request correction under 37 C.F.R. 1.323. Applicants respectfully submit that the conditions for such correction under 35 U.S.C. 255 are clearly met in the case. Section 255 provides, in relevant part:

Whenever a mistake of a clerical or typographical nature, or of minor character, which was not the fault of the Patent and Trademark Office, appears in a patent and a showing has been made that such mistake occurred in good faith, the Director may, upon payment of the required fee, issue a certificate of correction, if the correction does not involve such changes in the patent as would constitute new matter or would require reexamination.

In the present case, the error is clearly “a mistake of a clerical or typographical nature, or of minor character” and it is also the sort of error that on its face indicates that it occurred in good faith. It resulted simply from the inadvertent omission of two words in a claim listing. The omitted words were plainly present in the amendment of March 20, 2006 and were still present in the claim listing of April 17 2006. Therefore, the correct wording was present in the most recent claim listing of record when the claim was allowed on October 5, 2006.

Furthermore, correction of the error will not add new matter. Disclosure of a second input assembly that is on “a second surface” so as to optimize a biomechanical effect the human user’s hand is present in several places in the ‘313 patent’s specification as issued. For example, col. 8 lines 53-59 states: “A second input assembly 350 is disposed on the back-side surface 314, left-side surface 316 and right side surface 318. Alternatively, the second input assembly may be disposed on one of those surfaces or a combination of those surfaces. In this implementation, the first input assembly 340 is disposed relative to the second input assembly 350 to take advantage of the opposition of the human thumb and finger.”

Finally, it is also clear that, in this case, correction will not require reexamination. The claim was allowed prior to the error being introduced into a later claim listing. Therefore, the error plainly did not impact allowance of the claim and reexamination would not be necessary.

In summary and in view of the above, Applicants respectfully request correction of the patent under 37 C.F.R. 1.322 or, alternatively, under 37 C.F.R. 1.323. If the Patent Office determines that correction under 37 C.F.R. 1.322 is appropriate for this case, then the Applicants respectfully request a refund of the fee submitted herewith.

Application Serial No.: 10/699,555
(U.S. Patent No.: 7,218,313)

Attorney Docket No.: 10046-2000100

In the unlikely event that the transmittal letter is separated from this document and the Patent Office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time. The Director is hereby authorized to charge any fees which may be required by this paper to **Deposit Account No. 50-4242**, referencing docket no. **10046-2000100**.

Dated: August 1, 2013

Respectfully submitted,
By:/Michael Mauriel/ Reg. No. 44,226

Michael Mauriel
Registration No.: 44,226
Mauriel Kapouytian & Treffert LLP
27 West 24th Street, Suite 302
New York, New York 10010
(212) 529-5131
Attorney(s) for Applicant

UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

Page 1 of 1

PATENT NO. : 7,218,313 B2

APPLICATION NO.: 10/699,555

ISSUE DATE : May 15, 2007

INVENTOR(S) : Beth Marcus; David Lee

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:

In claim 37, at col. 20, line 3 (which is the 15th line of the claim), the words "second surface" should be inserted between "a" and "so."

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

Michael Mauriel
27 West 24th Street, Suite 302, New York, New York 10010

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.

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.

Electronic Patent Application Fee Transmittal

Application Number:	10699555
Filing Date:	31-Oct-2003
Title of Invention:	HUMAN INTERFACE SYSTEM
First Named Inventor/Applicant Name:	Beth Marcus
Filer:	Michael John Mauriel/Jasmine Habbas
Attorney Docket Number:	09096-8001.US00

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:				
Certificate of Correction	1811	1	100	100

Extension-of-Time:

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Total in USD (\$)				100

Electronic Acknowledgement Receipt

EFS ID:	16481239
Application Number:	10699555
International Application Number:	
Confirmation Number:	3602
Title of Invention:	HUMAN INTERFACE SYSTEM
First Named Inventor/Applicant Name:	Beth Marcus
Customer Number:	97075
Filer:	Michael John Mauriel/Jasmine Habbas
Filer Authorized By:	Michael John Mauriel
Attorney Docket Number:	09096-8001.US00
Receipt Date:	01-AUG-2013
Filing Date:	31-OCT-2003
Time Stamp:	17:28:13
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Electronic Funds Transfer
Payment was successfully received in RAM	\$100
RAM confirmation Number	4685
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
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1	Change of Address	100462000100_Correspondenceaddress.pdf	585779 7528acd728e2ade8897119a69bac52a617e47358	no	2
Warnings:					
Information:					
2	Assignee showing of ownership per 37 CFR 3.73.	100462000100_POAtrans.pdf	503990 95889194f5deb84787b214569c38003dda8bc21c	no	4
Warnings:					
Information:					
3	Power of Attorney	100462000100_POA.pdf	65072 e2b7040ffa059dc4b67b89126c1d7e33aa09ee11	no	1
Warnings:					
Information:					
4	Request for Certificate of Correction	100462000100_CorrectionRequest.pdf	603478 234ed9446284de13fdee93efe893d442f5b7ebc1	no	6
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	29985 4b00c66d32a1c4fe2ae93e53eeaa22f388c17833	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			1788304		

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.

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 TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(b).

I hereby appoint:

Practitioners associated with the Customer Number: 51417

OR

Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(b) to:

The address associated with Customer Number: 51417

OR

<input type="checkbox"/> Firm or Individual Name			
Address			
City	State	Zip	
Country			
Telephone	Email		


Assignee Name and Address:

Zeemote Technology Inc.
7F, No. 102, Sec. 4, Civic Blvd.
Daan District, Taipei, Taiwan, 106

A copy of this form, together with a statement under 37 CFR 3.73(b) (Form PTO/SB/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(b) may be completed by one of the practitioners appointed in this form if the appointed practitioner is authorized to act on behalf of the assignee, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date	Apr. 1st 2011
Name	Arron Fang	Telephone	
Title	President		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

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**CHANGE OF
CORRESPONDENCE ADDRESS
Patent**Address to:
Mail Stop Post Issue
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Patent Number	7,218,313
Issue Date	May 15, 2007
Application Number	10/699,555
Filing Date	October 31, 2003
First Named Inventor	Beth Marcus
Attorney Docket Number	10046-2000100

Please change the Correspondence Address for the above-identified patent to:



The address associated with Customer Number:

51417

OR**Firm or
Individual Name****Address****City****State****ZIP****Country****Telephone****Email**

This form cannot be used to change the data associated with a Customer Number. To change the data associated with an existing Customer Number use "Request for Customer Number Data Change" (PTO/SB/124).

This form will not affect any "fee address" provided for the above-identified patent. To change a "fee address" use the "Fee Address Indication Form" (PTO/SB/47).

I am the:



Patentee.



If the Patentee was not the applicant for patent (37 CFR 1.42), then a Statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is enclosed or was filed on _____. See 37 CFR 3.71.

Attorney or agent of record. Registration Number 44226.Patent practitioner acting in a representative capacity whose correspondence address is the correspondence address of record. Notice has been given to the patentee or owner. Registration Number 44226.

Signature /Michael Mauriel/ Reg. No. 44,226

Typed or
Printed Name Michael Mauriel, Reg. No. 44,226

Date August 1, 2013

Telephone 212-529-5131

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



*Total of _____ forms are submitted.

This collection of information is required by 37 CFR 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: Mail Stop Post Issue, 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.

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(c)Applicant/Patent Owner: Beth Marcus; David LeeApplication No./Patent No.: 7,218,313 Filed/Issue Date: May 15, 2007Titled: HUMAN INTERFACE SYSTEMZeemote Technology Inc., a corporation

(Name of Assignee)

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

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. The assignee of the entire right, title, and interest.
2. An assignee of less than the entire right, title, and interest (check applicable box):
- The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.
- There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. The recipient, via a court proceeding or the like (e.g., bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

- 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 _____, Frame _____, or for which a copy thereof is attached.
- B. A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Beth Marcus, David Lee To: Marcus Enterprises, Ltd.The document was recorded in the United States Patent and Trademark Office at
Reel 014752, Frame 0408, or for which a copy thereof is attached.2. From: Marcus Enterprises, Ltd. To: Zietoo, Inc.The document was recorded in the United States Patent and Trademark Office at
Reel 016134, Frame 0647, or for which a copy thereof is attached.

[Page 1 of 2]

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.

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(c)

3. From: Zietoo, Inc. To: Zeetoo, Inc.

The document was recorded in the United States Patent and Trademark Office at
Reel 019163, Frame 0030, or for which a copy thereof is attached.

4. From: Zeetoo, Inc. To: Zeemote, Inc.

The document was recorded in the United States Patent and Trademark Office at
Reel 021574, Frame 0047, or for which a copy thereof is attached.

5. From: Zeemote, Inc. To: Fish & Richardson, P.C.

The document was recorded in the United States Patent and Trademark Office at
Reel 023472, Frame 0483, or for which a copy thereof is attached.

6. From: Fish & Richardson, P.C. To: Zeemote, Inc.

The document was recorded in the United States Patent and Trademark Office at
Reel 023768, Frame 0631, 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(c)(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.

/Michael Mauriel/ Reg. No. 44,226

August 1, 2013

Signature

Date

Michael Mauriel

Attorney for Applicant; Reg. No. 44,226

Printed or Typed Name

Title or Registration Number

Privacy Act Statement

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

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

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

7. From: Zeemote, Inc. To: Zeemote LLC

This document was recorded in the U.S.P.T.O at

Reel: 023905, Frame: 0564

8. From: Zeemote LLC To: Zeemote Technology Inc.

This document was recorded in the U.S.P.T.O at

Reel: 025137, Frame: 0714



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	ATTY. DOCKET NO./TITLE
10/699,555	10/31/2003	Beth Marcus	19146-0002001

CONFIRMATION NO. 3602

POA ACCEPTANCE LETTER

97075
Perkins Coie LLP
PO Box 1247
Seattle, WA 98111-1247



Date Mailed: 03/02/2011

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 11/03/2010.

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.

/tmwilliams/

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



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	ATTY. DOCKET NO./TITLE
10/699,555	10/31/2003	Beth Marcus	19146-0002001

CONFIRMATION NO. 3602

POWER OF ATTORNEY NOTICE

20985
FISH & RICHARDSON P.C. (SD)
P.O. BOX 1022
MINNEAPOLIS, MN 55440-1022



Date Mailed: 03/02/2011

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 11/03/2010.

- 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).

/tmwilliams/

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

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: Beth Marcus et al.

Application No./Patent No.: 7,218,313 Filed/Issue Date: May 15, 2007

Titled: HUMAN INTERFACE SYSTEM

Zeemote Technology Inc., 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. an 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 _____, Frame _____, or for which a copy thereof 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: Beth MARCUS, W. David LEE To: Marcus Enterprises, Ltd.
The document was recorded in the United States Patent and Trademark Office at Reel 014752, Frame 0408, or for which a copy thereof is attached.
- 2. From: Marcus Enterprises, Ltd. To: Zietoo, Inc.
The document was recorded in the United States Patent and Trademark Office at Reel 016134, Frame 0647, or for which a copy thereof is attached.
- 3. From: Zietoo, Inc. To: Zcetoo, Inc.
The document was recorded in the United States Patent and Trademark Office at Reel 019163, Frame 0030, 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.

/Hwa C. Lee 59,747/
Signature

November 3, 2010
Date

Hwa Lee, Reg. No. 59,747
Printed or Typed Name

Attorney for Assignee
Title

STATEMENT UNDER 37 CFR 3.73(b) - Supplemental Sheet

Continuation of chain of title from the inventor(s) to the current assignee.

4. From: Zeetoo, Inc. To: Zeemote, Inc.
The document was recorded in the United States Patent and Trademark Office at Reel 021574 , Frame 0047 , or for which a copy thereof is attached.
5. From: Zeemote, Inc. To: Fish & Richardson, P.C.
The document was recorded in the United States Patent and Trademark Office at Reel 023472 , Frame 0483 , or for which a copy thereof is attached.
6. From: Fish & Richardson, P.C. To: Zeemote, Inc.
The document was recorded in the United States Patent and Trademark Office at Reel 023768 , Frame 0631 , or for which a copy thereof is attached.
7. From: Zeemote, Inc. To: Zee Holding LLC
The document was recorded in the United States Patent and Trademark Office at Reel 023778 , Frame 0132 , or for which a copy thereof is attached.
8. From: Zeemote, Inc. To: Zeemote LLC
The document was recorded in the United States Patent and Trademark Office at Reel 023905 , Frame 0564 , or for which a copy thereof is attached.
9. From: Zeemote LLC To: Zeemote Technology Inc.
The document was recorded in the United States Patent and Trademark Office at Reel 025137 , Frame 0714 , or for which a copy thereof is attached.

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

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(b).

I hereby appoint:

Practitioners associated with the Customer Number: 97075

OR

Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(b) to:

The address associated with Customer Number: 97075

OR

<input type="checkbox"/> Firm or Individual Name			
Address			
City	State	Zip	
Country			
Telephone	Email		


Assignee Name and Address:

Zeemote Technology Inc.
 6F, No. 102, Sec. 4, Civic Blvd.
 Daan District, Taipei, Taiwan

A copy of this form, together with a statement under 37 CFR 3.73(b) (Form PTO/SB/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(b) may be completed by one of the practitioners appointed in this form if the appointed practitioner is authorized to act on behalf of the assignee, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee.

Signature		Date	7/30/10
Name	Robert M. Pedoloff	Telephone	339-234-5740
Title	Chief Technical Officer		x 200

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-3198 and select option 2.

Electronic Acknowledgement Receipt

EFS ID:	8758959
Application Number:	10699555
International Application Number:	
Confirmation Number:	3602
Title of Invention:	HUMAN INTERFACE SYSTEM
First Named Inventor/Applicant Name:	Beth Marcus
Customer Number:	20985
Filer:	Hwa C. Lee/Dana Spear
Filer Authorized By:	Hwa C. Lee
Attorney Docket Number:	19146-0002001
Receipt Date:	03-NOV-2010
Filing Date:	31-OCT-2003
Time Stamp:	12:48:35
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
------------------------	----

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Assignee showing of ownership per 37 CFR 3.73(b).	2010-11-03_POA.PDF	363679 <small>8c8d4180d312a21f02dc59c6dd78c39569301f2f</small>	no	3

Warnings:

Information:

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.



APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/699,555	05/15/2007	7218313	19146-002001	3602

20985 7590 04/25/2007
 FISH & RICHARDSON, PC
 P.O. BOX 1022
 MINNEAPOLIS, MN 55440-1022

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 502 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 Customer Service Center of the Office of Patent Publication at (571)-272-4200.

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

Beth Marcus, Bedford, MA;
 W. David Lee, Newton, MA;

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 4 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: Legibly mark-up with any corrections or use Block 1)

20985 7590 03/01/2007

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.

FISH & RICHARDSON P.C.
P.O. Box 1022
Minneapolis, MN 55440-1022

APPLICATION NO. 10/699,555	FILING DATE 10/31/2003	FIRST NAMED INVENTOR Beth Marcus	ATTORNEY DOCKET NO. 19146-002001	CONFIRMATION NO. 3602
-------------------------------	---------------------------	-------------------------------------	-------------------------------------	--------------------------

TITLE OF INVENTION: **HUMAN INTERFACE SYSTEM**

APPLN. TYPE nonprovisional	SMALL ENTITY YES	ISSUE FEE \$700	PUBLICATION FEE \$300	TOTAL FEE(S) DUE \$1000	DATE DUE 06/01/2007
-------------------------------	---------------------	--------------------	--------------------------	----------------------------	------------------------

EXAMINER OSORIO, RICARDO	ART UNIT 2629	CLASS-SUBCLASS 345-184000
-----------------------------	------------------	------------------------------

<p>1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).</p> <p><input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.</p> <p><input type="checkbox"/> "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.</p>	<p>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.</p>	<p>1. Fish & Richardson P.C. _____</p> <p>2. _____</p> <p>3. _____</p>
---	--	---

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. Inclusion of assignee data is only appropriate when an assignment has been previously submitted to the USPTO or is being submitted under separate cover. Completion of this form is NOT a substitute for filing an assignment.

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

Zeetoo, Inc. **Bedford, MA**

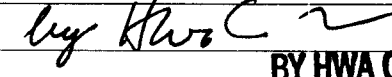
Please check the appropriate assignee category or categories (will not be printed on the patent): individual corporation or other private group entity government

<p>4a. The following fee(s) are enclosed:</p> <p><input checked="" type="checkbox"/> Issue Fee</p> <p><input checked="" type="checkbox"/> Publication Fee (No small entity discount permitted)</p> <p><input type="checkbox"/> Advance Order - # of Copies _____</p>	<p>4b. Payment of Fee(s):</p> <p><input type="checkbox"/> A check in the amount of the fee(s) is enclosed.</p> <p><input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.</p> <p><input checked="" type="checkbox"/> The Director is hereby authorized to charge the required fee(s), or credit any overpayment, to Deposit Account Number <u>06-1050</u> (enclose an extra copy of this form).</p>
--	---

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

a. Applicant claims SMALL ENTITY status. See 37 CFR 1.2.7. b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

The Director of the USPTO is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above.
NOTE: The issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant, a registered agent or; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

<p>(Authorized Signature) </p> <p>Typed or Printed Name John P. Schnurer</p>	<p>(Date) March 23, 2007</p> <p>Registration No. <u>52,196</u></p>
--	--

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.

TRANSMIT THIS FORM WITH FEE(S)

Electronic Patent Application Fee Transmittal

Application Number:	10699555
Filing Date:	31-Oct-2003
Title of Invention:	HUMAN INTERFACE SYSTEM
First Named Inventor/Applicant Name:	Beth Marcus
Filer:	John P. Schnurer/Carroll Allman
Attorney Docket Number:	19146-002001

Filed as Small 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:				
Utility Appl issue fee	2501	1	700	700
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 (\$)				1000

Electronic Acknowledgement Receipt

EFS ID:	1620659
Application Number:	10699555
International Application Number:	
Confirmation Number:	3602
Title of Invention:	HUMAN INTERFACE SYSTEM
First Named Inventor/Applicant Name:	Beth Marcus
Customer Number:	20985
Filer:	John P. Schnurer/mary ann reed
Filer Authorized By:	John P. Schnurer
Attorney Docket Number:	19146-002001
Receipt Date:	23-MAR-2007
Filing Date:	31-OCT-2003
Time Stamp:	18:57:55
Application Type:	Utility

Payment information:

Submitted with Payment	yes
Payment was successfully received in RAM	\$ 1000
RAM confirmation Number	1135
Deposit Account	061050

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)	Multi Part /.zip	Pages (if appl.)
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1		19146002001IF.PDF	131313	yes	2
Multipart Description/PDF files in .zip description					
		Document Description	Start	End	
		Miscellaneous Incoming Letter	1	1	
		Issue Fee Payment (PTO-85B)	2	2	
Warnings:					
Information:					
2	Fee Worksheet (PTO-06)	fee-info.pdf	8263	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			139576		
<p>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.</p> <p><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.</p> <p><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.</p> <p><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.</p>					

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Beth Marcus, et al
Serial No. : 10/699,555
Filed : October 31, 2003
Title : HUMAN INTERFACE SYSTEM

Art Unit : 2629
Examiner : Ricardo Osorio
Confirmation No.: 3602
Notice of Allowance Date: March 1, 2007

MAIL STOP ISSUE FEE

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

RESPONSE TO NOTICE OF ALLOWANCE

In response to the Notice of Allowance mailed March 1, 2007, enclosed is a completed issue fee transmittal form PTOL-85b. Please apply the \$1000 required issue fee and publication fee to Deposit Account No. 06-1050.

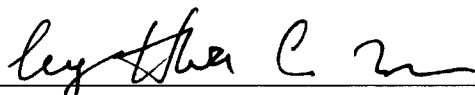
COMMENTS ON EXAMINER'S REASONS FOR ALLOWANCE

It is agreed that the limitations recited in the examiner's Reasons for Allowance are not taught or suggested by the art of record, and that the allowed independent claims 1, 4-21 and 23-63 are distinguished from the cited prior art for at least the reasons stated in the Reasons for Allowance. Applicant does not concede that the stated reasons are the only grounds for patentability of the allowed claims, that the limitations excluded from the Reasons for Allowance are taught or suggested by the art of record, or that all of the limitations are necessary for patentability of the allowed claims or other claims directed to the disclosed subject matter. For example, other claims including different limitations are patentable over the cited prior art.

Please apply any additional charges or credits to our Deposit Account No. 06-1050.

Respectfully submitted,

Date: March 23, 2007



John P. Schnurer
Reg. No. 52,196

BY HWA C. LEE
REG. NO. 59,747

Fish & Richardson P.C.
PTO Customer No. **20985**
12390 El Camino Real
San Diego, California 92130
Telephone: (858) 678-5070
Facsimile: (858) 678-5099
10720591.doc



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

NOTICE OF ALLOWANCE AND FEE(S) DUE

20985 7590 03/01/2007
FISH & RICHARDSON, PC
P.O. BOX 1022
MINNEAPOLIS, MN 55440-1022

EXAMINER: OSORIO, RICARDO
ART UNIT: 2629 PAPER NUMBER:
DATE MAILED: 03/01/2007

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.

TITLE OF INVENTION: HUMAN INTERFACE SYSTEM

Table with 7 columns: APPLN. TYPE, SMALL ENTITY, ISSUE FEE DUE, PUBLICATION FEE DUE, PREV. PAID ISSUE FEE, TOTAL FEE(S) DUE, DATE DUE

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

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

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

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

- A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.
B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

- A. Pay TOTAL FEE(S) DUE shown above, or
B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

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

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

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

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)

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.

20985 7590 03/01/2007
FISH & RICHARDSON, PC
 P.O. BOX 1022
 MINNEAPOLIS, MN 55440-1022

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.
10/699,555	10/31/2003	Beth Marcus	19146-002001	3602

TITLE OF INVENTION: HUMAN INTERFACE SYSTEM

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$700	\$300	\$0	\$1000	06/01/2007

EXAMINER	ART UNIT	CLASS-SUBCLASS
OSORIO, RICARDO	2629	345-184000

<p>1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).</p> <p><input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.</p> <p><input type="checkbox"/> "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.</p>	<p>2. For printing on the patent front page, list</p> <p>(1) the names of up to 3 registered patent attorneys or agents OR, alternatively, _____ 1</p> <p>(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. _____ 2</p> <p>_____ 3</p>
---	---

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

<p>4a. The following fee(s) are submitted:</p> <p><input type="checkbox"/> Issue Fee</p> <p><input type="checkbox"/> Publication Fee (No small entity discount permitted)</p> <p><input type="checkbox"/> Advance Order - # of Copies _____</p>	<p>4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)</p> <p><input type="checkbox"/> A check is enclosed.</p> <p><input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.</p> <p><input type="checkbox"/> 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).</p>
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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.

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.



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

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
Row 1: 10/699,555, 10/31/2003, Beth Marcus, 19146-002001, 3602
Row 2: 20985, 7590, 03/01/2007, [EXAMINER], [OSORIO, RICARDO]
Row 3: [ART UNIT], [PAPER NUMBER]
Row 4: 2629, DATE MAILED: 03/01/2007

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 502 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 502 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.

Notice of Allowability

Application No. 10/699,555	Applicant(s) MARCUS ET AL.	
Examiner RICARDO L. OSORIO	Art Unit 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 2/2/2007.
- 2. The allowed claim(s) is/are 1,4-21 and 23-63.
- 3. 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.**

- 4. 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.
 - 5. 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).
- 6. DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- 1. Notice of References Cited (PTO-892)
- 2. Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3. Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date 10/27/2006
- 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 _____.

Art Unit: 2629

DETAILED ACTION

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

The application has been amended as follows:

In claim 4, line 1, delete ~~3~~ and add "1".

Allowable Subject Matter

2. Claims 1, 4-21, and 23-63 are allowed.

The following is an examiner's statement of reasons for allowance: Claims 1, 4-21, and 23-63 are allowable since certain key features of the claimed invention are not taught or fairly suggested by the prior art. In claim 12, "at least one of the input elements of the first surface is further configured to selectively map to more than one text symbol function". In claim 17, "at least one of the input elements of the first input assembly is further configured to map to more than one input function associated with a selected one of the plurality of applications". In claim 24, "at least one of the input elements is further configured to map to a plurality of symbols in a data input mode, wherein each of the plurality of symbols is associated with a unique index position identifier". In claim 28, "at least one input element is mapped to more than one text function, and one or more selection elements in a finger-manipulated input assembly, wherein each selection element is mapped to a unique shift position". In claim 43, "at least one of the input elements of the first input assembly is further configured to map to more than one input function associated with a selected one of the plurality of applications". The closest prior art Liebenow (6,909,424) discloses a hand-held electronic device with first and second input assemblies on first and second surfaces, respectively, however singularly or in combination fails to anticipate or render the above underlined limitations obvious.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue

Art Unit: 2629

fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ricardo L. Osorio whose telephone number is 571-272-7676. The examiner can normally be reached on Monday through Thursday from 7:00 A.M. to 5:30 P.M. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bipin Shalwala whose telephone number is 571-272-7681.

Any response to this action should be mailed to:

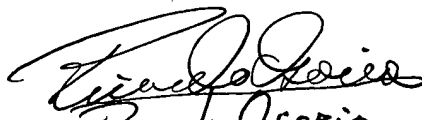
Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to: 571-273-8300 (for Technology Center 2600 only)

Hand-delivered responses should be brought to the Customer Service Window at the Randolph Building, 401, Dulany Street, Alexandria, VA 22314.

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).


Ricardo OSORIO
PRIMARY EXAMINER
Technology Division: 2629

RLO
February 18, 2007


Substitute Form PTO-1449 (Modified) Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 19146-002001	Application No. 10/699,555
	Applicant Beth Marcus, et al		
	Filing Date October 31, 2003		Group Art Unit 2629

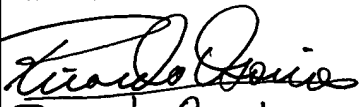

U.S. Patent Documents							
Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
RO	AA	2003/0048205 A1	3/13/2003	J. He			
	AB						
	AC						
	AD						
	AE						

Foreign Patent Documents or Published Foreign Patent Applications								
Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation	
							Yes	No
RO	AF	91/05303 A1	4/18/1991	PCT				
RO	AG	1 293 882 A2	3/19/2003	EPO				
	AH							

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
	AI	
	AJ	
	AK	

Examiner Signature /Ricardo Osorio/	Date Considered 02/20/2007
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Issue Classification 	Application/Control No. 10/699,555	Applicant(s)/Patent under Reexamination MARCUS ET AL.
	Examiner RICARDO L. OSORIO	Art Unit 2629

ISSUE CLASSIFICATION																						
ORIGINAL						INTERNATIONAL CLASSIFICATION																
CLASS			SUBCLASS			CLAIMED			NON-CLAIMED													
345			169			6	09	6	5	100												
CROSS REFERENCES																						
CLASS		SUBCLASS (ONE SUBCLASS PER BLOCK)																				
345		168																				
 (Assistant Examiner) (Date) 						 Ricardo Osorio (Primary Examiner) (Date)						Total Claims Allowed: 60										
 (Legal Instruments Examiner) (Date)						2/24/07						O.G. Print Claim(s) 1 O.G. Print Fig. 3a, 3b										

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant		<input type="checkbox"/> CPA		<input type="checkbox"/> T.D.		<input type="checkbox"/> R.1.47							
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original		
1	1	11	31	51	61		91		121		151		181
2	2	38	32	59	62		92		122		152		182
	3	39	33	60	63		93		123		153		183
2	4	40	34		64		94		124		154		184
3	5	41	35		65		95		125		155		185
4	6	42	36		66		96		126		156		186
5	7	43	37		67		97		127		157		187
6	8	44	38		68		98		128		158		188
7	9	45	39		69		99		129		159		189
8	10	46	40		70		100		130		160		190
9	11	47	41		71		101		131		161		191
15	12	48	42		72		102		132		162		192
16	13	52	43		73		103		133		163		193
17	14	53	44		74		104		134		164		194
18	15	54	45		75		105		135		165		195
19	16	55	46		76		106		136		166		196
21	17	56	47		77		107		137		167		197
22	18	57	48		78		108		138		168		198
23	19	12	49		79		109		139		169		199
24	20	20	50		80		110		140		170		200
25	21	26	51		81		111		141		171		201
26	22	34	52		82		112		142		172		202
27	23	36	53		83		113		143		173		203
30	24	49	54		84		114		144		174		204
31	25	58	55		85		115		145		175		205
32	26	13	56		86		116		146		176		206
33	27	14	57		87		117		147		177		207
35	28	28	58		88		118		148		178		208
37	29	29	59		89		119		149		179		209
10	30	50	60		90		120		150		180		210



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APPLICANTS
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**** CONTINUING DATA ******* *NO RLD*

**** FOREIGN APPLICATIONS ******* *NO RLD*

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**** 02/02/2004**

Foreign Priority claimed <input type="checkbox"/> yes <input checked="" type="checkbox"/> no	STATE OR COUNTRY MA	SHEETS DRAWING 9	TOTAL CLAIMS 29	INDEPENDENT CLAIMS 6
35 USC 119 (a-d) conditions met <input type="checkbox"/> yes <input checked="" type="checkbox"/> no <input type="checkbox"/> Met after Allowance				
Verified and Acknowledged <i>[Signature]</i> Examiner's Signature	<i>RLD</i> Initials			

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TITLE
 Human interface system

FILING FEE RECEIVED 1420	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:	<input type="checkbox"/> All Fees
		<input type="checkbox"/> 1.16 Fees (Filing)
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		<input type="checkbox"/> 1.18 Fees (Issue)
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	Beth Marcus, et al	Art Unit:	2629
Serial No.:	10/699,555	Examiner:	Ricardo Osorio
Filed:	October 31, 2003	Conf. No.:	3602
Title:	HUMAN INTERFACE SYSTEM		

Mail Stop Amendment

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

REPLY TO ACTION OF OCTOBER 5, 2006

Please amend the above-identified application as follows:

Amendments to the Claims:

This listing of claims replaces all prior versions and listings of claims in the application:

Listing of Claims:

1. (Currently Amended) A hand-held electronic device comprising:
 - a memory configured to store a plurality of applications, wherein each application is associated with a set of functions;
 - a processor configured to process a selected one of the plurality of applications;
 - a first input assembly having a plurality of input elements on a first surface configured to receive input from a human user through manipulation of the plurality of input elements, wherein at least one of the input elements on the first surface is configured to selectively map to one or more input functions of the set of functions associated with the selected one of the plurality of applications;[[and]]
 - a second input assembly having one or more input elements on a second surface configured to be manipulated by one or more of the human user's fingers, wherein at least one of the input elements on the second surface is further configured to be selectively mapped to one or more input functions of the set of functions corresponding to the selected one of the plurality of applications, further wherein the plurality of input elements on the first surface and the one or more input elements on the second surface are arranged so as to substantially optimize a biomechanical effect of the human user's hand; and

wherein at least one of the input elements of the second input assembly is a sensor pad configured to selectively represent a plurality of delineated active areas, wherein manipulation of a delineated active area causes the input function of one or more input elements of the first input assembly to change.

2. (Cancelled).

3. (Cancelled).

4. (Previously Presented) The hand-held electronic device of claim 3, further comprising a shape changing media configured relative to the sensor pad so as to permit the human user to tactilely discriminate between the plurality of delineated active areas.

5. (Previously Presented) The hand-held electronic device of claim 1, wherein the processor receives signals generated by the input elements of first or second input assemblies when manipulated by the human user.

6. (Previously Presented) The hand-held electronic device of claim 1 further comprising an input controller, wherein the input controller receives signals generated by the input elements of first or second input assemblies when manipulated by the human user and converts the signals into a form suitable to be interpreted by the processor.

7. (Previously Presented) The hand-held electronic device of claim 1, wherein at least one of the input elements of the second input assembly is a rotary sensor.

8. (Previously Presented) The hand-held electronic device of claim 1, wherein at least one of the input elements of second input assembly is a D-pad.

9. (Previously Presented) The hand-held electronic device of claim 1, further comprising at least one palpable detent, wherein the detent is associated with at least one of the input elements of the first or second input assemblies so as to provide tactile feedback to the human user when the human user manipulates the input element associated with the palpable detent.

10 (Previously Presented) The hand-held electronic device of claim 1 further comprising one or more vibratory or force producing units, at least one of the vibratory or force producing units configured to provide tactile feedback upon the human user's manipulation of at least one of the input elements of the first or second input assemblies.

11. (Previously Presented) The hand-held electronic device of claim 10, wherein at least one of the vibratory units provide tactile feedback in response to events occurring in the selected ~~a software~~ application running on the processor.

12. (Previously Presented) A hand-held electronic device comprising:

- a memory configured to store a plurality of applications, wherein each application is associated with a set of functions;
- a processor configured to process a selected one of the plurality of applications, wherein the set of functions associated with the selected application includes a plurality of text symbol functions and a plurality of shifting functions;
- a first surface having a plurality of input elements configured to receive input from a human user through manipulation of the plurality of input elements, wherein at least one of the input elements of the first surface is further configured to selectively map to more than one text symbol function; and
- a second surface having one or more input elements, wherein at least one of the input elements of the second surface having one or more selectable active areas configured to be manipulated by one or more of the human user's fingers, each selectable active area configured to selectively map to a different shifting function, wherein manipulation of one of the selectable active area causes the text symbol function of the one or more input elements of the first surface to change, further wherein the plurality of input elements of the first surface and the one or more input elements of the second surface are arranged so as to substantially optimize a biomechanical effect of the human user's hand.

13. (Previously Presented) The hand-held electronic device of claim 12 further comprising a controller, wherein the controller receives signals generated by the human user's manipulation of the input elements of the first surface or active areas.

14. (Previously Presented) The hand-held electronic device of claim 13 further comprising a dome cap positioned above at least one input element of the first surface or the second surface and capable of providing tactile feedback to the human user when the input element associated with the dome cap is manipulated.

15. (Previously Presented) The hand-held electronic device of claim 13 further comprising one or more vibratory units capable of providing tactile feedback.

16. (Previously Presented) The hand-held electronic device of claim 13 further comprising one or more force producing units capable of providing tactile feedback.

17. (Previously Presented) A method for configuring a human interface and input system for use with a hand-held electronic device configured to run a plurality of applications, each application associated with a set of functions, the method comprising:
disposing on a first surface a first input assembly having a plurality of input elements configured to receive input from a human user through manipulation of the plurality of input elements, wherein at least one of the input elements of the first input assembly is further configured to map to more than one input function associated with a selected one of the plurality of applications;

disposing on a second surface a second input assembly having one or more input elements configured to be manipulated by one or more of the human user's fingers, wherein at least one of the input elements of the second input assembly is further configured to selectively map to one or more input functions associated with the selected application; and

arranging the plurality of input elements of the first input assembly and the one or more input elements of the second input assembly to substantially optimize a biomechanical effect of the human user's hand.

18. (Previously Presented) The method of claim 17 further comprising: physically or electronically labeling at least one input element of the first input assembly or the second input assembly so as to visually indicate an input function that can be selectively accessed by actuating the input element.

19. (Previously Presented) The method of claim 17 further comprising connecting a controller to the input elements of the first input assembly or the second input assembly, wherein the controller is configured to receive signals generated by a manipulation of one or more of the input elements of first input assembly or the second input assembly.

20. (Previously Presented) The method of claim 19, wherein at least one input element of second input assembly having a plurality of active areas configurable by the controller to form a plurality of delineated active areas.

21. (Previously Presented) The method of claim 20 further comprising positioning a shape changing media relative to the one input element of second input assembly having a plurality of active areas so as to permit the human user to tactilely discriminate between the plurality of delineated active areas.

22 (Cancelled)

23 (Previously Presented) The method of claim 17 further comprising positioning a palpable detent with at least one input element of the first input assembly or the second input assembly so as to provide tactile feedback when manipulated by the human user.

24 (Previously Presented) A method for inputting data on a hand-held electronic device having a first surface with a plurality of input elements configured to receive input from a human user through manipulation of the plurality of input elements, wherein at least one of the input elements is further configured to map to a plurality of symbols in a data input mode, wherein each of the plurality of symbols is associated with a unique index position identifier, and a second surface having one or more selection elements configured to be manipulated by one or more of the human user's fingers, wherein each selection element corresponds to one of the unique index position identifiers, further wherein the plurality of input elements and the one or more selection elements are arranged to substantially optimize a biomechanical effect of the human user's hand, the method comprising:

executing a selected application from a plurality of applications, wherein the selected application is associated with a set of functions

determining the index position identifier of a desired symbol to be inputted based on the functions associated with the selected application;

pressing the selection element corresponding to the index position identifier of the desired symbol with any digit or object held in the human user's hand; and

pressing the input element configured to map to the desired symbol with any digit or object held in the human user's hand. (page 14, lines 2-27).

25. (Previously Presented) The method of claim 24, wherein each input element is physically or electronically labeled indicating each symbol that is mapped to the input element and a positional order in which each symbol can be selectively accessed by actuating the input element.

26 (Previously Presented) The method of claim 24, wherein determining the index position identifier of the desired character to be inputted comprises:

locating the input element configured to map to the desired symbol; and

counting from left to right the number of symbols preceding the desired symbol labeled on the located input element, wherein the index position identifier of the desired symbol is the number of symbols preceding the desired symbol plus one.

27. (Previously Presented) The method of claim 24, wherein at least one of the input elements or selection elements is further configured to map to a plurality of modes corresponding to the selected application executing on the hand-held electronic device, at least one of the modes is the data input mode, the method further comprising enabling the data input mode.

28. (Previously Presented) A method for a human user to input data on a hand-held electronic device using an interface and input system comprising a plurality of input elements in a thumb-manipulated assembly to substantially optimize a biomechanical effect of the human user's thumb and fingers, wherein at least one input element is mapped to more than one text function, and one or more selection elements in a finger-manipulated input assembly, wherein each selection element is mapped to a unique shift position, the method comprising:

executing a selected text application from a plurality of applications, wherein the selected application is associated with a set of functions

pressing a desired selection element of the finger-manipulated input assembly with a human a finger to select a desired shift position the selected text application; and

pressing a desired input element of the thumb-manipulated input assembly with a human thumb to input a desired text character.

29 (Previously Presented) A hand-held electronic device comprising:

- a memory configured to store a plurality of applications, wherein each application is associated with a set of functions;
- a processor configured to process a selected one of the plurality of applications;
- a first input assembly disposed on a first surface of the electronic device, wherein the first input assembly comprises a plurality of input elements configured to be actuated by a human user's hand, wherein at least one of the input elements of the first input assembly is configured to map to one or more input functions of the set of functions associated with the selected one of the plurality of applications; and
- a second input assembly disposed on a so as to substantially optimize a biomechanical effect of the human user's hand, wherein the second input assembly comprises one or more input elements configured to be manipulated by one or more of the human user's fingers, wherein at least one of the input elements of the second input assembly is a selectively configurable sensing surface so as to provide a plurality of delineated active areas, further wherein one or more of the delineated active areas is mapped to one or more functions associated with the selected application, further wherein the memory is further configured to store for each application a mapping of the selectively configurable sensing surface to the plurality of delineated active areas.

30. (Previously Presented) The hand-held electronic device of claim 1, wherein the selected one of the plurality of applications is a text application; and the one or more input elements on the second surface of the second input assembly comprises one or more selection elements, wherein manipulations of the one or more selection elements causes the input elements on the first surface of the first input assembly to be selectively mapped from one text function to another text function.

31. (Previously Presented) The hand-held electronic device of claim 1, wherein the selected one of the plurality of application is a game application, and at least one of the plurality of input elements of the first input assembly and at least one of the input elements of the second input assembly are each configured to selectively map to one or more game functions.

32. (Previously Presented) The hand-held electronic device of claim 29, further comprising: an input controller, wherein the input controller receives a plurality of signals generated by the input elements of the first input assembly and the second input assembly when manipulated by the human user, and converts the plurality of signals into a form suitable to be interpreted by the processor.

33. (Previously Presented) The hand-held electronic device of claim 32, wherein at least one input element of the first input assembly or the second input assembly is configured to map to one or more input functions associated with the selected application that control a cursor on a screen.

34. (Previously Presented) The hand-held electronic device of claim 32, wherein the selected one of the plurality of applications is a game application.

35. (Previously Presented) The hand-held electronic device of claim 34, wherein at least one input element of the first input assembly or the second input assembly is configured to map to one or more input functions associated with the game application that control a game character on a screen.

36. (Previously Presented) The hand-held electronic device of claim 34, wherein the input controller is further configured to interpret a movement of the human user's finger sliding across two or more delineated active areas as a change in the mapped function of the two or more delineated active areas, wherein the mapped function is at least one of a speed control, a size control, a weapon fire control, and a position control. (page 16, lines 4-30).

37. (Previously Presented) The hand-held electronic device of claim 34, wherein the input controller is further configured to interpret a pressure applied by the human user's finger on a selected one of the delineated active areas as a change in the mapped function of the selected delineated active area, wherein the mapped function is at least one of a speed control, a size control, a weapon fire, and position control. (page 16, lines 4-30).

38. (Previously Presented) The hand-held electronic device of claim 34, wherein at least one of the functions mapped to the input element of the first input assembly is a game function that is substantially optimized for actuation by the human user's thumb.

39. (Previously Presented) The hand-held electronic device of claim 38, wherein the game function that is substantially optimized for actuation by the human user's thumbs comprises a directional control.

40. (Previously Presented) The hand-held electronic device of claim 34, wherein at least one of the functions mapped to the delineated active areas is a game function that is substantially optimized for actuation by one or more of the human user's fingers.

41. (Previously Presented) The hand-held electronic device of claim 40, wherein the game function that is substantially optimized for actuation by one or more of the human user's fingers comprises a weapon fire control.

42. (Previously Presented) The hand-held electronic device of claim 40, wherein the game function that is substantially optimized for actuation by one or more of the human user's fingers comprises a game character jump control.

43 (Previously Presented) A method for configuring a human interface and input system for use with a hand-held electronic device configured to run a plurality of applications, each application associated with a set of functions, the method comprising:

disposing on a first surface a first input assembly having a plurality of input elements configured to receive input from a human user's hand through manipulation of the plurality of input elements, wherein at least one of the input elements of the first input assembly

is further configured to map to more than one input function associated with a selected one of the plurality of applications;

disposing on a second surface a second input assembly having one or more input elements configured to be manipulated by one or more of the human user's fingers, wherein at least one of the input elements of the second input assembly is further configured to selectively map to one or more input functions associated with the selected application; and

mapping the set of functions of the selected application to the one or more input elements of the first input assembly and the second input assembly to substantially optimize a biomechanical effect of the human user's hand.

44 (Previously Presented) The method of claim 43, wherein the selected application is at least one of a scrolling application, a text application and a game application.

45 (Previously Presented) The method of claim 44 further comprising: physically or electronically labeling at least one input element of the first input assembly or the second input assembly so as to visually indicate an input function that can be selectively accessed by actuating the input element.

46 (Previously Presented) The method of claim 44 further comprising connecting a controller to the input elements of the first input assembly or the second input assembly, wherein the controller is configured to receive signals generated by a manipulation of one or more of the input elements of first input assembly or the second input assembly.

47. (Previously Presented) The method of claim 46, wherein at least one input element of second input assembly having a plurality of active areas configurable by the controller to form a plurality of delineated active areas.

48. (Previously Presented) The method of claim 47 further comprising positioning a shape changing media relative to the one input element of second input assembly having a plurality of active areas so as to permit the human user to tactilely discriminate between the plurality of delineated active areas.

49. (Previously Presented) The hand-held electronic device of claim 1, wherein the processor is further configured to be communicatively coupled to a host electronic device.

50. (Previously Presented) The hand-held electronic device of claim 12, wherein the processor is further configured to be communicatively coupled to a host electronic device.

51. (Previously Presented) The method of claim 19, wherein the controller is further configured to be communicatively coupled to a host electronic device.

52. (Previously Presented) The method of claim 24, wherein the hand-held electronic device is further configured to be communicatively coupled to a host electronic device.

53. (Previously Presented) The method of claim 28, wherein the hand-held electronic device is further configured to interface with a host electronic device.

54. (Previously Presented) The hand-held electronic device of claim 29, wherein the processor is further configured to interface with a host electronic device.

55. (Previously Presented) The method of claim 43, wherein the hand-held electronic device is configured to interface with a host electronic device.

56. (New) The hand-held electronic device of claim 1, wherein at least one of the input elements of the second input assembly comprises an accelerometer.

57. (New) The hand-held electronic device of claim 1, wherein at least one of the input elements of the second input assembly comprise a gyroscope

58. (New) The method of claim 17 further comprising disposing on one or more surfaces a second input assembly having one or more input elements configured to be manipulated by one or more of the human user's fingers, wherein at least one of the input elements of the second input assembly comprises an accelerometer.

59. (New) The method of claim 17 further comprising disposing on one or more surfaces a second input assembly having one or more input elements configured to be manipulated by one or more of the human user's fingers, wherein at least one of the input elements of the second input assembly comprises a gyroscope.

60. (New) The hand-held electronic device of claim 29, wherein at least one of the input elements of the second input assembly comprises an accelerometer.

61. (New) The hand-held electronic device of claim 29, wherein at least one of the input elements of the second input assembly comprise a gyroscope

62. (New) The method of claim 43 further comprising disposing on one or more surfaces a second input assembly having one or more input elements configured to be manipulated by one or more of the human user's fingers, wherein at least one of the input elements of the second input assembly comprises an accelerometer.

63. (New) The method of claim 43 further comprising disposing on one or more surfaces a second input assembly having one or more input elements configured to be manipulated by one or more of the human user's fingers, wherein at least one of the input elements of the second input assembly comprises a gyroscope.

REMARKS

Claims 1, 3-21 and 23-55 were pending before amendment with claims 1, 12, 17, 24, 28, 29 and 43 being independent. Claim 1 has been amended. Claim 3 has been cancelled. Claims 56-63 have been added. Applicant's specification fully supports the subject matter of the newly added claims. For example, the claimed "accelerometer" and "gyroscope" are described at least on page 19, lines 25-32. No new matter has been added. Reconsideration and allowance of all pending claims are respectfully requested.

Allowable Subject Matter:

Applicants thank the Examiner for allowing claims 29, 32-42 and 54. Applicants also thank the Examiner for indicating claims 3, 4, 20, 21, 47 and 48 as being allowable if rewritten in independent form. These claims are retained. While the Examiner states claims 36 and 37 as allowable (*see* Office Action Dated October 5, 2006 at 7), Applicants believe this to be in error since claims 32-42 depend from allowed claim 29. The Office Action Summary correctly identifies claims 29, 32-42 and 54 as allowed claims.

Rejections Under 35 U.S.C. § 102 (e):

Claims 1, 5, 6, 12-13, 17-19, 24-28, 30-31, 43, 49-53 and 55 stand rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by U.S. Patent No. 6,909,424 to Liebenow et. al. ("Liebenow").

Claim 1 and its dependent claims

While Applicants disagrees with the Examiner's basis for his rejection, claim 1 has been amended to include all features of cancelled claim 3 to expedite the prosecution of the present application. Since claim 3 was identified by the Examiner as allowable subject matter, amended claim 1 is allowable over Liebenow for at least incorporating the allowable subject matter. Claims 4-11, 30-31 and 49 depend from claim 1 and thus are patentable over Liebenow for at least the reason similar to claim 1.

Claim 12 and dependent claims

Claim 12 is allowable over Liebenow because, among other reasons, Liebenow fails to teach each or suggest and every feature of claim 12. In particular, Liebenow fails to teach ***a second surface having one or more input elements, wherein at least one of the input elements of the second surface having one or more selectable active areas configured to be manipulated by one or more of the human user's fingers, each selectable active area configured to selectively map to a different shifting function, wherein manipulation of one of the selectable active area causes the text symbol function of the one or more input elements of the first surface to change*** as recited in claim 12. In contrast to the claimed features of claim 12, Liebenow teaches that the back surface of the device includes a conventional keyboard or touch pad mimicking a conventional keyboard designed to be manipulated by user's fingers. (See Liebenow at col. 4, ll. 33-43; col. 8, ll. 45-67; and col. 9, ll. 53-67.) "Turning now to FIGS. 2, 3 and 4, the input device 130 may be composed of a keyboard 132 having a plurality of key configuration....In this manner, the fingers of the user's left and right hands 122 & 124 may be positioned over the keys 134 of each key range 136 & 138 in a manner allowing the user of conventional touch-typing techniques." (See Liebenow at col. 4, ll. 33-48 and FIGS. 2-4.) The front surface of the device in Liebenow include keys corresponding to "shift", "space bar", "Ctrl", "Alt", etc. (See Liebenow at col. 5, ll. 36-64 and FIGS. 1, 3-4.) Thus, the input elements of the second surface in Liebenow are not ***selectively map to a different shifting function, wherein manipulation of one of the selectable active area causes the text symbol function of the one or more input elements of the first surface to change*** as recited in claim 12. Selecting one of the keys in the keyboard 132 in Liebenow does not cause the ***causes the text symbol function of the one or more input elements of the first surface to change***. In fact, the input elements of the first surface in Liebenow are set to one of the "shift", "space bar", "Ctrl", "Alt", etc. (see Liebenow at col. 5, ll. 36-64 and FIGS. 1, 3-4), which do not change when one of the input elements in the second surface is manipulated by the user's finger.

This is not surprising since Liebenow also fails to teach ***wherein the plurality of input elements of the first surface and the one or more input elements of the second surface are arranged so as to substantially optimize a biomechanical effect of the human user's hand.*** Optimizing the biomechanical effects of the human user's hand includes optimizing human thumb/finger opposition. (See Applicant's Specification at least at pg. 4, ll. 18-24; pg. 5, ll. 15-21; pg. 11, ll. 11-13; pg. 14, ll. 10-32; pg. 19, 13-18.) For example, a ***selectable active area*** on the second surface configured to be manipulated by user's fingers through a sliding motion to activate a shift function as recited in claim 12 optimizes the human thumb/finger opposition. In contrast, Liebenow teaches use of discrete keys (even when using a sensor pad) designed to be manipulated by rigid tapping or pushing motions of the fingers. This does not optimize the biomechanical effects of the human user's hand since combining tapping motion with the thumb and the fingers as taught in Liebenow is difficult and inefficient to accomplish. In fact, Liebenow fails to teach or suggest that ***the plurality of input elements of the first surface and the one or more input elements of the second surface are arranged so as to substantially optimize a biomechanical effect of the human user's hand*** as recited in claim 12. While Liebenow teaches that "[a]ny or all of the front and back surfaces 104 & 106, the left and right side surfaces 108 & 110 and/or the top and bottom surfaces 112 & 114 may further be shaped to provide a comfortable gripping area for the user's hands," (see Liebenow at col. 4, ll. 13-16) a comfortable grip as disclosed in Liebenow is not equivalent to ***optimizing a biomechanical effect of the human user's hand*** as recited in claim 12. The comfort level of a grip is not relevant to the arrangement of the input elements of the first and second surfaces to ***substantially optimize a biomechanical effect of the human user's hand*** as recited in claim 12.

For at least these reasons, claim 12 is allowable over Liebenow. Claims 13-16 and 50 depend from claim 12 and thus are allowable over Liebenow for at least the same reasons.

Claim 17 and its dependent claims

Claim 17 is allowable over Liebenow because, among other reasons, Liebenow fails to teach or suggest each and every feature of claim 17. In particular, Liebenow fails to teach ***disposing on a second surface a second input assembly having one or more input elements configured to be manipulated by one or more of the human user's fingers, wherein at least one of the input elements of the second input assembly is further configured to map to more***

than one input function associated with a selected one of the plurality of applications. To illustrate the claimed mapping to more than one input function, Application's specification describes in one aspect that an input function is a character that can be produced upon depressing one button in the front input assembly (e.g., "P" from the "7PQRS" key), and that the same key can produce multiple characters (7, P, Q, R, S) *while executing the same application and the same data input mode*, simply by using the input elements in the back as shift keys to index into the "7PQRS" string to select one of the possible characters. (See Applicant's Specification at pg. 6, ll. 8-12; pg. 14, ll. 6-27.)

In contrast to claim 17 and as set forth with respect to claim 12 above, Liebenow teaches a standard keyboard having discrete keys designed to be manipulated by a user's fingers. (See Liebenow at col. 4, ll. 33-43; col. 8, ll. 45-67; col. 9, ll. 53-67; and FIGS. 1, 2, 4, 7 and 8.) The discrete keys of the standard keyboard in Liebenow are not mapped to *more than one input function associated with a selected one of the plurality of applications* as recited in claim 17. Liebenow teaches assigning one text or numeric character per key as long as the same application is executed in the same input mode. While the entire mapping of every key can be changed, for example from QWERTY mode to a DVORAK keyboard mode, even after the change, each key is assigned to only a single character. (See Liebenow at col. 15, ll. 12-20.) In addition, while Liebenow allegedly teaches a word processing application in FIG. 15 and a calculator application in FIG. 16, each key is still assigned to a single character only in each application. It is not surprising to see only a single input function assigned to each key in Liebenow since Liebenow teaches a standard full-size keyboard, which includes a key for each input character, i.e., a one to one mapping.

Similarly, Liebenow fails to teach *wherein at least one of the input elements of the first input assembly is further configured to selectively map to one or more input functions associated with the selected application* as recited in claim 12. The input elements on the front surface in Liebenow include keys corresponding to "shift", "space bar", "Ctrl", "Alt", etc. (See Liebenow at col. 5, ll. 36-64 and FIGS. 1, 3-4.) These keys in Liebenow only allow a single

function for an application. For example, the “shift” key in the word processing application in FIG. 15 of Liebenow allows for a single input function. Further, as set forth with respect to claim 12 above, the input elements on the front and back surfaces in Liebenow fails to teach ***substantially optimize a biomechanical effect of the human user's hand*** as recited in claim 17.

For at least these reasons, claim 17 is patentable over Liebenow. Claims 18-21, 23 and 51 depend from claim 17 and are patentable over Liebenow for at least the same reasons.

Claim 24 and its dependent claims

Claim 24 is allowable over Liebenow because, among other reasons, Liebenow fails to teach or suggest each and every feature of claim 24. In particular, Liebenow fails to teach ***wherein at least one of the input elements is further configured to map to a plurality of symbols in a data input mode, wherein each of the plurality of symbols is associated with a unique index position identifier, and a second surface having one or more selection elements configured to be manipulated by one or more of the human user's fingers, wherein each selection element corresponds to one of the unique index position identifiers*** as recited in claim 24. The input elements and the selection elements as recited in claim 24 are designed ***for inputting data on a hand-held electronic device***. The hand-held electronic device as recited in claim 24 has input elements that are configured to ***map to a plurality of symbols in a data input mode***. In contrast to claim 24, Liebenow teaches a standard full-sized keyboard having a key for each character, i.e., it discloses a one for one correspondence between a key and a corresponding character. Thus, Liebenow does not disclose or suggest assigning multiple character symbols to at least one key. In addition, while Examiner states that Liebenow teaches the claimed features of claim 24, the cited portions of Liebenow fails to support such an assertion. (*See* Liebenow at col.4, ll. 33-43; col. 8, ll. 45-67, and col. 9, ll. 53-67.) The portions of Liebenow cited by the Examiner describes a standard full-sized keyboard, which does not assign multiple symbols to at least one key. Simply put, Liebenow does not disclose or suggest these claimed features.

Further, Liebenow teaches input elements (individual keys of the keyboard) on the back surface designed to be manipulated by user's fingers (*see*, Liebenow at FIGS. 1-4) and not ***selection elements*** as recited in claim 24. Therefore, even if the “shift”, “CTRL”, etc. keys on the front surface could reasonable be construed as selection elements (which is not conceded), Liebenow teaches that these keys are designed to be manipulated by the user's thumbs and not

the fingers as recited in claim 24. This is not surprising since Liebenow also fails to teach or suggest the claimed *wherein the plurality of input elements and the one or more selection elements are arranged to substantially optimize a biomechanical effect of the human user's hand*. For reasons similar to claim 12 above, the device in Liebenow is not designed to substantially optimize a biomechanical effect of the human user's hand.

For at least these reasons, claim 24 is patentable over Liebenow. Claims 25-27 and 52 depend from claim 24 and are patentable over Liebenow for at least the same reasons.

Claim 28 and its dependent claim

Claim 28 is allowable over Liebenow because, among other reasons, Liebenow fails to teach or suggest each and every feature of claim 28. In particular, Liebenow fails to teach *wherein at least one input element is mapped to more than one text function, and one or more selection elements in a finger-manipulated input assembly* as recited in claim 28. As set forth with respect to claim 17 above, the keys in Liebenow is assigned to produce a single character and thus a single text function. Also, as set forth with respect to claim 24 above, the "shift" and "CTRL" keys are not arranged in *a finger-manipulated input assembly* as recited in claim 28 since the device in Liebenow is not designed to *substantially optimize a biomechanical effect of the human user's hand* as recited in claim 28.

For at least these reasons, claim 28 is allowable over Liebenow. Claim 53 depends from claim 28 and is also allowable over Liebenow for at least the same reasons.

Claim 43 and dependent claims

Claim 43 is allowable over Liebenow for at least reasons similar to claim 17 above. In particular, Liebenow fails to teach or suggest the claimed *disposing on a first surface a first input assembly having a plurality of input elements configured to receive input from a human user's hand through manipulation of the plurality of input elements, wherein at least one of the input elements of the first input assembly is further configured to map to more than one input function associated with a selected one of the plurality of applications; disposing on a second surface a second input assembly having one or more input elements configured to be manipulated by one or more of the human user's fingers, wherein at least one of the input elements of the second input assembly is further configured to selectively map to one or more input functions associated with the selected application and mapping the set of functions of*

the selected application to the one or more input elements of the first input assembly and the second input assembly to substantially optimize a biomechanical effect of the human user's hand as recited in claim 43. As set forth with respect to claim 17 above, Liebenow teaches a single input function assigned to each key for an application.

For at least these reasons, claim 43 is allowable over Liebenow. Claims 44-48 and 55 depend from claim 43 and are allowable over Liebenow for at least the same reasons.

New Claims 56-63

New claims 56-63 depend from claims 1, 17, 29 and 43, and are allowable over Liebenow for at least the same reasons set forth with respect to claims 1, 17, 29 and 43.

Conclusion

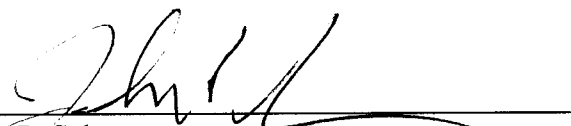
It is believed that all of the pending claims have been addressed in this paper. However, failure to address a specific rejection, issue, or comment, does not signify agreement with or concession of that rejection, issue or comment. In addition, because the arguments made above are not intended to be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed. Finally, nothing in this response should be construed as an intent to concede any issue with regard to any claim, except as specifically stated in this response, and the amendment of any claim does not necessarily signify concession of unpatentability of the claim prior to its amendment.

Claims 1, 4-21 and 23-55 are in condition for allowance, and a notice to that effect is respectfully request. If the Examiner has any questions regarding this response, the Examiner is invited to telephone the undersigned at (858) 678-5070.

Please apply \$60 for the one month extension of time fee and any other charges or credits to deposit account 06-1050.

Respectfully submitted,

Date: February 2, 2007



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JPS/HCL/jhg
10695424.doc

Electronic Patent Application Fee Transmittal

Application Number:	10699555
Filing Date:	31-Oct-2003
Title of Invention:	Human interface system
First Named Inventor/Applicant Name:	Beth Marcus
Filer:	Hwa C. Lee/Julie Giordano
Attorney Docket Number:	19146-002001

Filed as Small 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	2251	1	60	60

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Total in USD (\$)				60

Electronic Acknowledgement Receipt

EFS ID:	1487374
Application Number:	10699555
International Application Number:	
Confirmation Number:	3602
Title of Invention:	Human interface system
First Named Inventor/Applicant Name:	Beth Marcus
Customer Number:	20985
Filer:	Hwa C. Lee/mary ann reed
Filer Authorized By:	Hwa C. Lee
Attorney Docket Number:	19146-002001
Receipt Date:	02-FEB-2007
Filing Date:	31-OCT-2003
Time Stamp:	16:01:00
Application Type:	Utility

Payment information:

Submitted with Payment	yes
Payment was successfully received in RAM	\$60
RAM confirmation Number	365
Deposit Account	061050

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)	Multi Part /.zip	Pages (if appl.)
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1		19146002001Reply.pdf	953338	yes	26
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Amendment - After Non-Final Rejection		1	1	
	Claims		2	18	
	Applicant Arguments/Remarks Made in an Amendment		19	26	
Warnings:					
Information:					
2	Fee Worksheet (PTO-06)	fee-info.pdf	8122	no	2
Warnings:					
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Total Files Size (in bytes):			961460		
<p>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.</p> <p><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.</p> <p><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.</p> <p><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.</p>					

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 10/699,555	Filing Date 10/31/2003	<input type="checkbox"/> To be Mailed
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APPLICATION AS FILED – PART I			OTHER THAN SMALL ENTITY				
	(Column 1)	(Column 2)	SMALL ENTITY <input checked="" type="checkbox"/>	OR			
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	OR	RATE (\$)	FEE (\$)
<input type="checkbox"/> BASIC FEE <small>(37 CFR 1.16(a), (b), or (c))</small>	N/A	N/A	N/A			N/A	
<input type="checkbox"/> SEARCH FEE <small>(37 CFR 1.16(k), (l), or (m))</small>	N/A	N/A	N/A			N/A	
<input type="checkbox"/> EXAMINATION FEE <small>(37 CFR 1.16(o), (p), or (q))</small>	N/A	N/A	N/A			N/A	
TOTAL CLAIMS <small>(37 CFR 1.16(i))</small>	minus 20 =	*	X \$ =		OR	X \$ =	
INDEPENDENT CLAIMS <small>(37 CFR 1.16(h))</small>	minus 3 =	*	X \$ =			X \$ =	
<input type="checkbox"/> APPLICATION SIZE FEE <small>(37 CFR 1.16(s))</small>	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).						
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT <small>(37 CFR 1.16(j))</small>							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II					OTHER THAN SMALL ENTITY				
	(Column 1)	(Column 2)	(Column 3)		SMALL ENTITY	OR			
AMENDMENT	02/02/2007	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)
	Total <small>(37 CFR 1.16(i))</small>	* 60	Minus ** 53	= 7	X \$25 =	175		X \$ =	
	Independent <small>(37 CFR 1.16(h))</small>	* 7	Minus *** 7	= 0	X \$100 =	0		X \$ =	
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>								
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>						OR		
					TOTAL ADD'L FEE	175	OR	TOTAL ADD'L FEE	

	(Column 1)	(Column 2)	(Column 3)						
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)
	Total <small>(37 CFR 1.16(i))</small>	*	Minus **	=	X \$ =			X \$ =	
	Independent <small>(37 CFR 1.16(h))</small>	*	Minus ***	=	X \$ =			X \$ =	
	<input type="checkbox"/> Application Size Fee <small>(37 CFR 1.16(s))</small>								
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <small>(37 CFR 1.16(j))</small>						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.
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Legal Instrument Examiner:
 Jacquelyn L. Williams

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Substitute Form PTO-1449 (Modified) Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 19146-002001	Application No. 10/699,555
	Applicant Beth Marcus, et al		
	Filing Date October 31, 2003	Group Art Unit 2629	

U.S. Patent Documents							
Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	AA	2003/0048205 A1	3/13/2003	J. He			
	AB						
	AC						
	AD						
	AE						

Foreign Patent Documents or Published Foreign Patent Applications								
Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation	
							Yes	No
	AF	91/05303 A1	4/18/1991	PCT				
	AG	1 293 882 A2	3/19/2003	EPO				
	AH							

Other Documents (include Author, Title, Date, and Place of Publication)		
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Examiner Signature	Date Considered
EXAMINER: Initials citation considered. 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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INTERNATIONALE ANMELDUNG VERÖFFENTLICHT NACH DEM VERTRAG ÜBER DIE
INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES PATENTWESENS (PCT)

<p>(51) Internationale Patentklassifikation 5 : G06F 3/023</p>	<p align="center">A1</p>	<p>(11) Internationale Veröffentlichungsnummer: WO 91/05303 (43) Internationales Veröffentlichungsdatum: 18. April 1991 (18.04.91)</p>
<p>(21) Internationales Aktenzeichen: PCT/EP90/01597 (22) Internationales Anmeldedatum: 20. September 1990 (20.09.90) (30) Prioritätsdaten: G 89 12 302.6 U 28. September 1989 (28.09.89) DE (71)(72) Anmelder und Erfinder: BILLER, Kurt, W. [DE/DE]; In langen Bergen 4, D-7760 Radolfzell 15 (DE). (81) Bestimmungsstaaten: AT (europäisches Patent), AU, BE (europäisches Patent), CH (europäisches Patent), DE (europäisches Patent)*, DK (europäisches Patent), ES (europäisches Patent), FR (europäisches Patent), GB (europäisches Patent), IT (europäisches Patent), JP, LU (europäisches Patent), NL (europäisches Patent), SE (europäisches Patent), US.</p>		<p>Veröffentlicht <i>Mit internationalem Recherchenbericht.</i></p>

(54) Title: **DATA INPUT KEYBOARD**

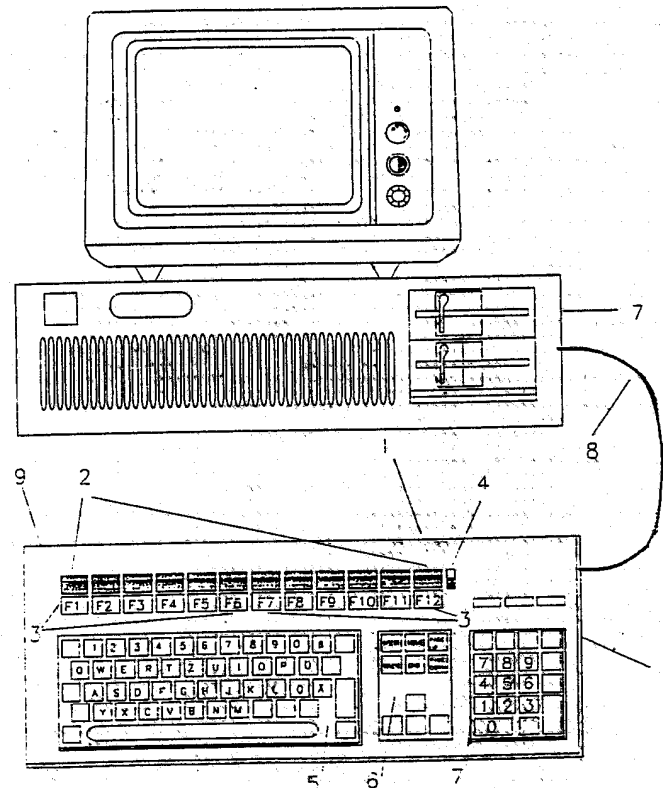
(54) Bezeichnung: **TASTATUR ZUR DATENEINGABE**

(57) Abstract

The data input keyboard (1) of the invention facilitates work with programs running on computer installations. This is achieved by the indication of the functions to which the function keys (3) are allocated. The markings (2) are directly above the keys (3) and may be different depending upon the application program running.

(57) Zusammenfassung

Die Tastatur zur Dateneingabe (1) gemäß der Erfindung erleichtert das Arbeiten mit Programmen die auf Rechenanlagen ablaufen. Dies geschieht durch das Anzeigen der Funktionen, denen Funktionstasten (3) zugeordnet sind. Die Anzeigen (2) befinden sich direkt über den Tasten (3) und können, je nach ablaufendem Anwendungsprogramm, verschiedene Inhalte anzeigen.



BENENNUNGEN VON "DE"

Bis auf weiteres hat jede Benennung von "DE" in einer internationalen Anmeldung, deren internationaler Anmeldetag vor dem 3. Oktober 1990 liegt, Wirkung im Gebiet der Bundesrepublik Deutschland mit Ausnahme des Gebietes der früheren DDR.

LEDIGLICH ZUR INFORMATION

Code, die zur Identifizierung von PCT-Vertragsstaaten auf den Kopfbögen der Schriften, die internationale Anmeldungen gemäss dem PCT veröffentlichen.

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Tastatur zur Dateneingabe

Beschreibung

Die Erfindung betrifft eine Tastatur gemäß dem Oberbegriff des Anspruchs 1.

Bei dem meisten sich im Gebrauch befindenden Tastaturen befinden sich über oder neben den Tastenfeld zur Eingabe von Schriftzeichen die sogenannten Funktionstasten. Diesen Funktionstasten ist, abhängig vom Programm das auf der Datenverarbeitungsanlage abläuft, eine bestimmte Funktion zugeordnet. Die Kennzeichnung der Funktionen die diesen Funktionstasten zugeordnet sind, wird durch Beschriftungen über den Funktionstasten, durch Aufkleben von Etiketten oder durch Auflegeschablonen erreicht. Dies hat in den ersten beiden Fällen den Nachteil, daß bei einem Programmwechsel auf der Datenverarbeitungsanlage und somit einer Änderung der Zuordnungen die Beschriftung nicht oder nur schwer geändert werden kann. Die Lösung des Problems mit den Schablonen hat den Nachteil, daß Schablonen verloren gehen können und das versehentlich eine falsche Schablone aufgelegt werden kann.

Der Erfindung liegt die Aufgabe zugrunde eine Tastatur derart zu konstruieren, daß die den den Funktionstasten zugeordnete Funktionen jederzeit angezeigt werden und das die Anzeigen jederzeit und einfach zu ändern sind. Auch muß gewährleistet sein, daß die angezeigten Zuordnungen immer korrekt sind.

Die Erfindung löst die Aufgabe dadurch, daß sich über den als Funktionstasten gekennzeichneten Tasten LCD-Anzeigeelemente befinden, deren Anzeigeinhalte geändert werden können, ohne einen Eingriff in die Tastatur vorzunehmen. Die Änderung kann automatisch oder manuell erfolgen.

Die Erfindung wird in der folgenden Beschreibung an Hand eines in der Zeichnung dargestellten bevorzugten Ausführungsbeispiels im einzelnen erläutert.

-2-

Gemäß der Zeichnung besteht die Tastatur im wesentlichen aus dem Tastaturgehäuse (1), dem Tastenfeld zur Eingabe von Schriftzeichen (5), dem Tastenfeld zur Cursorsteuerung (6) und dem Tastenfeld zur Eingabe von Zahlen (4). Über dem Tastenfeld zur Eingabe von Schriftzeichen (5) befinden sich die Funktionstasten (3). Über den Funktionstasten (3) sind die LED-Anzeigen (2) angebracht.

Die LED-Anzeigen (2) sind in dem Tastaturgehäuse (1) mit der Tastatursteuerelektronik verbunden die hier nicht dargestellt ist. Mit dieser Elektronik lassen sich die Inhalte der LED-Anzeigen (2) leicht ändern. Die manuelle Änderung geschieht mit Hilfe eines Schalters (4), der Tastatursteuerelektronik und dem Tastenfeld zur Eingabe von Schriftzeichen (5).

Die Inhalte der LED-Anzeigen (2) können auch automatisch durch das Programm, das auf der Datenverarbeitungsanlage (7) abläuft, geändert werden. Die Tastatur (1) ist mit einem Kabel (8) mit der Datenverarbeitungsanlage (7) verbunden.

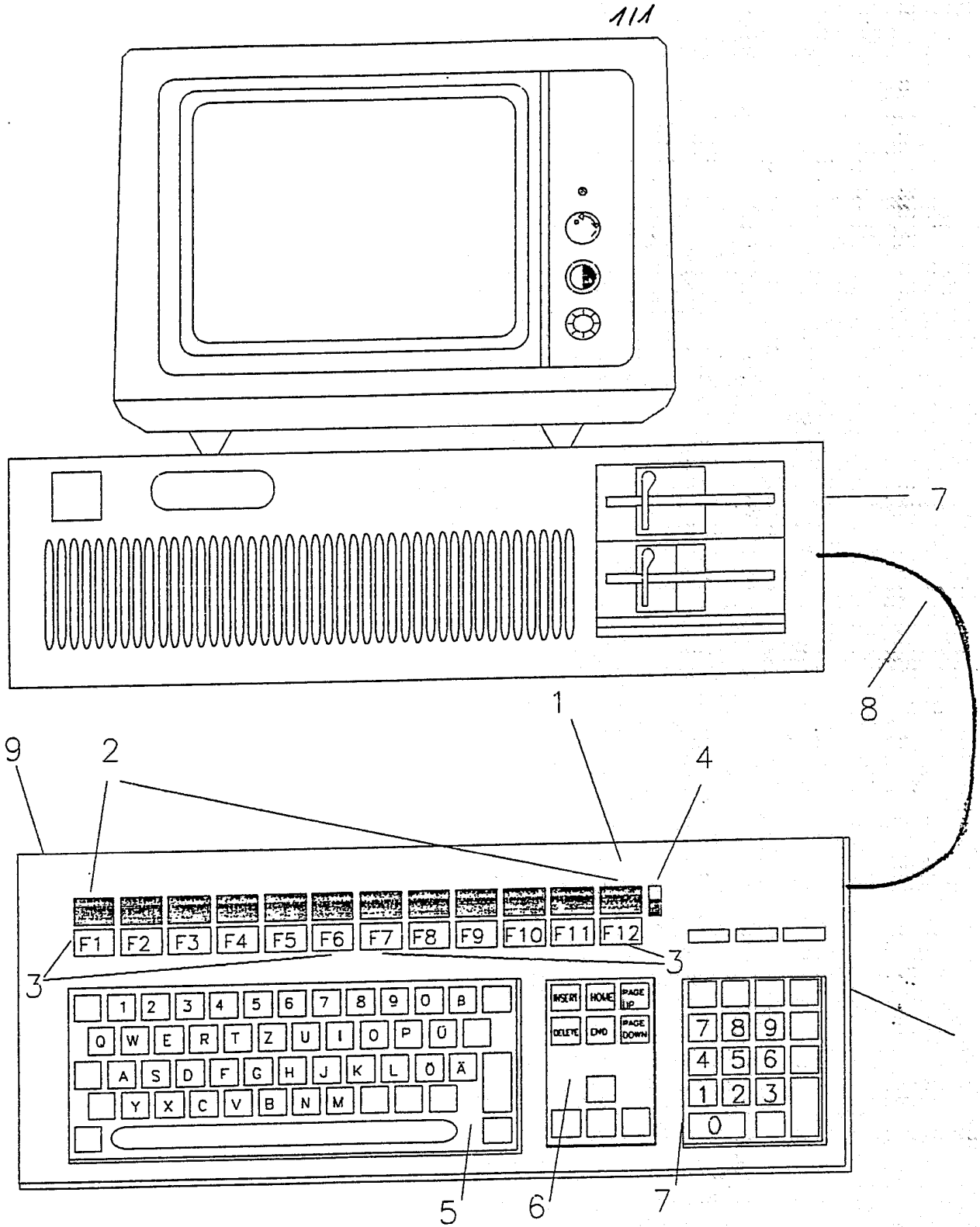
-3-

Patentansprüche

1. Tastatur (1) zur Dateneingabe dadurch gekennzeichnet, daß sich über den als Funktionstasten (3) gekennzeichneten Tasten LED-Anzeigeelemente (2) angebracht sind.

2. Tastatur (1) nach Anspruch 1 dadurch gekennzeichnet, daß die Anzeigen (2) für alle Funktionstasten (3) in einer sich über alle Funktionstasten (3) erstreckende LCD-Anzeige zusammengefasst sind.

3. Tastatur (1) nach einem der Ansprüche 1 bis 2 dadurch gekennzeichnet, daß die Inhalte der LCD-Anzeigen (2), beim Umschalten des Datensystems auf ein anderes Verarbeitungsprogramm, automatisch geändert werden.



INTERNATIONAL SEARCH REPORT

International Application No PCT/EP 90/01597

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC		
Int.Cl. ⁵ G 06 F 3/023		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
Int.Cl. ⁵	G 06 F	
Documentation Searched other than Minimum Documentation to the extent that such Documents are included in the Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹		
Category ⁹	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
X	GB, A, 2167218 (ROYSTON JOHN MALCOLM BRUCE) 21 May 1986 See page 1, lines 32-89 --	1
X	EP, A, 0251477 (TEXAS INSTRUMENTS) 7 January 1988 See the whole document --	2,3
X	Patent Abstracts of Japan, Vol. 8, N° 79 (P-267) (1516), 11 April 1984, & JP, A, 58222329 (TOKYO SHIBAURA DENKI K.K.) 24 December 1983 See abstract -----	2,3
<p>¹⁰ Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"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</p> <p>"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"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.</p> <p>"&" document member of the same patent family</p>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search		Date of Mailing of this International Search Report
18 December 1990 (18.12.90)		24 January 1991 (24.01.91)
International Searching Authority		Signature of Authorized Officer
European Patent Office		

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.**

EP 9001597

SA 40429

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 14/01/91. The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

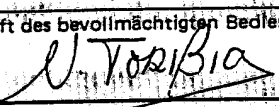
Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB-A- 2167218	21-05-86	None	
EP-A- 0251477	07-01-88	US-A- 4823311 JP-A- 63059616	18-04-89 15-03-88

EPO FORM P0479

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

INTERNATIONALER RECHERCHENBERICHT

Internationales Aktenzeichen PCT/EP 90/01597

I. KLASSIFIKATION DES ANMELDUNGSGEGENSTANDS (bei mehreren Klassifikationssymbolen sind alle anzugeben) ⁶		
Nach der Internationalen Patentklassifikation (IPC) oder nach der nationalen Klassifikation und der IPC		
Int.Cl. ⁵ G 06 F 3/023		
II. RECHERCHIERTE SACHGEBIETE		
Recherchierter Mindestprüfstoff ⁷		
Klassifikationssystem	Klassifikationssymbole	
Int.Cl. ⁵	G 06 F	
Recherchierte nicht zum Mindestprüfstoff gehörende Veröffentlichungen, soweit diese unter die recherchierten Sachgebiete fallen ⁸		
III. EINSCHLÄGIGE VERÖFFENTLICHUNGEN⁹		
Art*	Kennzeichnung der Veröffentlichung ¹¹ , soweit erforderlich unter Angabe der maßgeblichen Teile ¹²	Betr. Anspruch Nr. ¹³
X	GB, A, 2167218 (ROYSTON JOHN MALCOLM BRUCE) 21. Mai 1986 siehe Seite 1, Zeilen 32-89 --	1
X	EP, A, 0251477 (TEXAS INSTRUMENTS) 7. Januar 1988 siehe das ganze Dokument --	2, 3
X	Patent Abstracts of Japan, Band 8, Nr. 79 (P-267)(1516), 11. April 1984, & JP, A, 58222329 (TOKYO SHIBAURA DENKI K.K.) 24. Dezember 1983 siehe Zusammenfassung -----	2, 3
<p>* Besondere Kategorien von angegebenen Veröffentlichungen¹⁰:</p> <p>"A" Veröffentlichung, die den allgemeinen Stand der Technik definiert, aber nicht als besonders bedeutsam anzusehen ist</p> <p>"E" älteres Dokument, das jedoch erst am oder nach dem internationalen Anmeldedatum veröffentlicht worden ist</p> <p>"L" Veröffentlichung, die geeignet ist, einen Prioritätsanspruch zweifelhaft erscheinen zu lassen, oder durch die das Veröffentlichungsdatum einer anderen im Recherchenbericht genannten Veröffentlichung belegt werden soll oder die aus einem anderen besonderen Grund angegeben ist (wie ausgeführt)</p> <p>"O" Veröffentlichung, die sich auf eine mündliche Offenbarung, eine Benutzung, eine Ausstellung oder andere Maßnahmen bezieht</p> <p>"P" Veröffentlichung, die vor dem internationalen Anmeldedatum, aber nach dem beanspruchten Prioritätsdatum veröffentlicht worden ist</p> <p>"T" Spätere Veröffentlichung, die nach dem internationalen Anmeldedatum oder dem Prioritätsdatum veröffentlicht worden ist und mit der Anmeldung nicht kollidiert, sondern nur zum Verständnis des der Erfindung zugrundeliegenden Prinzips oder der ihr zugrundeliegenden Theorie angegeben ist</p> <p>"X" Veröffentlichung von besonderer Bedeutung; die beanspruchte Erfindung kann nicht als neu oder auf erfinderischer Tätigkeit beruhend betrachtet werden</p> <p>"Y" Veröffentlichung von besonderer Bedeutung; die beanspruchte Erfindung kann nicht als auf erfinderischer Tätigkeit beruhend betrachtet werden, wenn die Veröffentlichung mit einer oder mehreren anderen Veröffentlichungen dieser Kategorie in Verbindung gebracht wird und diese Verbindung für einen Fachmann naheliegend ist</p> <p>"&" Veröffentlichung, die Mitglied derselben Patentfamilie ist</p>		
IV. BESCHEINIGUNG		
Datum des Abschlusses der internationalen Recherche	Absenddatum des internationalen Recherchenberichts	
18. Dezember 1990	24. 01. 91	
Internationale Recherchenbehörde	Unterschrift des bevollmächtigten Bediensteten	
Europäisches Patentamt	 Nuria TORIBIO	

**ANHANG ZUM INTERNATIONALEN RECHERCHENBERICHT
 ÜBER DIE INTERNATIONALE PATENTANMELDUNG NR.**

EP 9001597
 SA 40429

In diesem Anhang sind die Mitglieder der Patentfamilien der im obengenannten internationalen Recherchenbericht angeführten Patentdokumente angegeben.
 Die Angaben über die Familienmitglieder entsprechen dem Stand der Datei des Europäischen Patentamts am 14/01/91
 Diese Angaben dienen nur zur Unterrichtung und erfolgen ohne Gewähr.

Im Recherchenbericht angeführtes Patentdokument	Datum der Veröffentlichung	Mitglied(er) der Patentfamilie	Datum der Veröffentlichung
GB-A- 2167218	21-05-86	Keine	
EP-A- 0251477	07-01-88	US-A- 4823311 JP-A- 63059616	18-04-89 15-03-88

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Für nähere Einzelheiten zu diesem Anhang : siehe Amtsblatt des Europäischen Patentamts, Nr.12/82



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- Bubb, Peter, Dr.
82194 Gröbenzell (DE)
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- Hafner, Ernst
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- Albrecht, Stephan
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(30) Priority: 11.09.2001 DE 10144634

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(54) Command input system

(57) The command input system has a display screen and a touch-sensitive input field. On the input field, there is a spatial relationship with control options shown on the display field of the display screen. The

input field conveys tactile feedback about the available and/or executed control actions. The command input system is especially well-suited for use in vehicles since it does not require constant eye contact with the display field.

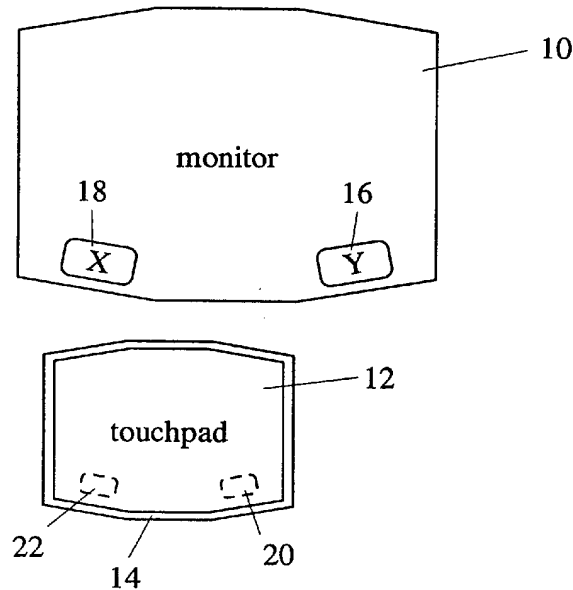


Fig. 1a

Description

[0001] The present invention relates to a command input system with a display screen and a touch-sensitive input field.

[0002] Tactile command input systems are known especially from the realm of data processing equipment, particularly in so-called notebooks and laptops, where the touch-sensitive input field is generally referred to as a touchpad. In desktop systems, such a touchpad replaces the commonly employed computer mouse and serves to control the cursor and to trigger control actions. The cursor movements and the control actions are shown on the display field of the display screen. Since a touchpad only has a surface area of a few square centimeters, no spatial relationship exists between, on the one hand, the control options shown on the display field and the cursor movements and, on the other hand, the touch positions on the touchpads. As a result, in spite of the limited surface area of the touchpad, the cursor can be moved over the entire surface area of the display field.

[0003] With such command input systems, constant eye contact with the display field is needed in order to specifically select one of the control options shown there. Therefore, such a command input system is only suitable in environments that permit constant eye contact with the display field. Generally speaking, this condition cannot be met, for example, in vehicles, at least not for the control of vehicle features by the driver while driving.

[0004] The present invention provides a command input system that, due to tactile feedback about available or executed input functions, does not require constant eye contact with the display field of the display screen. Specifically, the invention provides a command input system with a display screen where command input options are displayed, and a touch-sensitive input field. A spatial correspondence exists between command input options shown on the display screen and the physical surface area on the touch-sensitive input field, as signalled to a user by tactile feedback from the input field. As used herein, "spatial correspondence" means that the display field where available command input options appear on the display screen and the input field are of a generally similar, if not identical, shape, although their sizes may be different (substantially congruent shapes), and commands referred to by command input options appearing at particular locations in the display field, are executed when similar locations are touched on the input field. Preferably, at least the contour of the input field is of a palpable structure such as a raised rim. Also, command input options are easily recognised on the input field by corresponding palpable structures.

[0005] Further details of the invention will ensue from the following description of several embodiments with reference to the accompanying drawings. In the drawings:

Figure 1a shows a first embodiment with an input field that is surrounded by an orientation frame;

Figure 1b shows a second embodiment with an input field that is surrounded by an orientation frame;

Figure 2 shows an embodiment in which command input elements can be felt underneath a smooth, but flexibly yielding surface of the input field;

Figure 3 shows different three-dimensional shapes of the input field; and

Figure 4 shows an embodiment in which the input field has a plurality of local actuators situated beneath a flexible tensioned foil.

[0006] In the embodiment shown in Figure 1a, a flat display screen 10 has an irregular octogon shape close to that of a rectangle. A touch-sensitive input field 12, also referred to as a touchpad below, has the same general shape as the display screen, although it is of a smaller size. Input field 12 is surrounded by a palpable, especially raised, continuous rim or frame 14. Frame 14 preferably has a relatively soft feel along its inner periphery and a relatively hard feel along its outer periphery. Near the right-hand and the left-hand lower corners of display screen 10, symbolic "push-buttons" 16, 18 are displayed, labelled "X" and "Y", respectively. Similarly, input field (touchpad) 12 has sensitive locations 20, 22 near its right-hand and left-hand lower corners, as suggested by dotted lines. When input field 12 is touched at location 20 or 22, a command is generated which is associated with "push-button" 16 or 18 appearing on display screen 10.

[0007] The Fig. 1b embodiment is generally similar, but has an irregular n-cornered shape (11 corners, actually). It also has a pair of "push-button" symbols 16b, 18b on the display screen 10b and corresponding sensitive locations 20b, 22b on input field 12b.

[0008] It should be understood that in both embodiments, the number, shape and distribution of symbols on the display field of the display screen and of corresponding sensitive locations on the input field may vary according to intended use.

[0009] In the embodiment shown in Figure 2, the input field (touchpad) 30 has a flexibly yielding tensioned foil 32 with a generally smooth outer surface. Beneath foil 32, a plurality of palpable command input structures 34 are situated. These structures 34 are associated with corresponding command input options shown on the display field of the display screen.

[0010] In the embodiment shown in Figure 3, the input field or touchpad generally has a structured tree-dimensional surface wherein palpable structures are associated with corresponding command input options shown on the display field. The palpable structures can be of various kinds. Especially suitable types are raised, flat

shaped elements, indented flat shaped elements, bulges, geometric shaped elements such as circles, rectangles, triangles, roughened surfaces, smooth surfaces, palpable hard/soft material transitions and palpable rigid/flexible material transitions.

[0011] In the embodiment shown in Figure 4, actuators 40 are situated at specific locations beneath a flexible surface of the input field or touchpad 42. The actuators 40 are associated with command input options shown on the display field. These actuators 40 generate palpable, tactile feedback about the executed command actions or available command input options, corresponding to the contents on the display screen. The actuators can be made on the basis of different technologies, including electromechanic, electromagnetic, piezoelectric, pneumatic or hydraulic.

Claims

1. A command input system with a display screen where command input options are displayed and a touch-sensitive input field, **characterized in that** a spatial correspondence exists between command input options shown on the display screen and the physical surface area on the touch-sensitive input field, as signalled to a user by tactile feedback from the input field.

2. The command input system according to Claim 1, wherein the input field has a rim with a contour that palpably replicates the display screen.

3. The command input system according to Claim 2, wherein the rim is raised relative to the input field.

4. The command input system according to Claim 2 or 3, wherein the rim continuously surrounds the input field.

5. The command input system according to Claim 1, wherein the input field has palpable structures that are associated with the command input options shown on the display screen.

6. The command input system according to Claim 5, wherein the palpable structures are covered by a tensioned flexible foil that has a smooth surface on its side opposite to the palpable structures.

7. The command input system according to Claim 5, wherein the palpable structures comprise at least one of the following elements:

- raised, flat shaped elements,
- indented flat shaped elements,
- bulges,
- geometric shaped elements such as circles,

- rectangles, triangles,
- roughened surfaces,
- smooth surfaces,
- palpable hard/soft material transitions
- palpable rigid/flexible material transitions.

8. The command input system according to Claim 1, wherein the input field has a flexibly yielding, smooth surface beneath which a plurality of actuators are situated that generate a palpable reaction in response to an executed command input or to an available command input option.

9. The command input system according to Claim 8, wherein the actuators are selected from among the following types:

- electromechanical,
- electromagnetic,
- piezoelectric,
- pneumatic
- hydraulic.

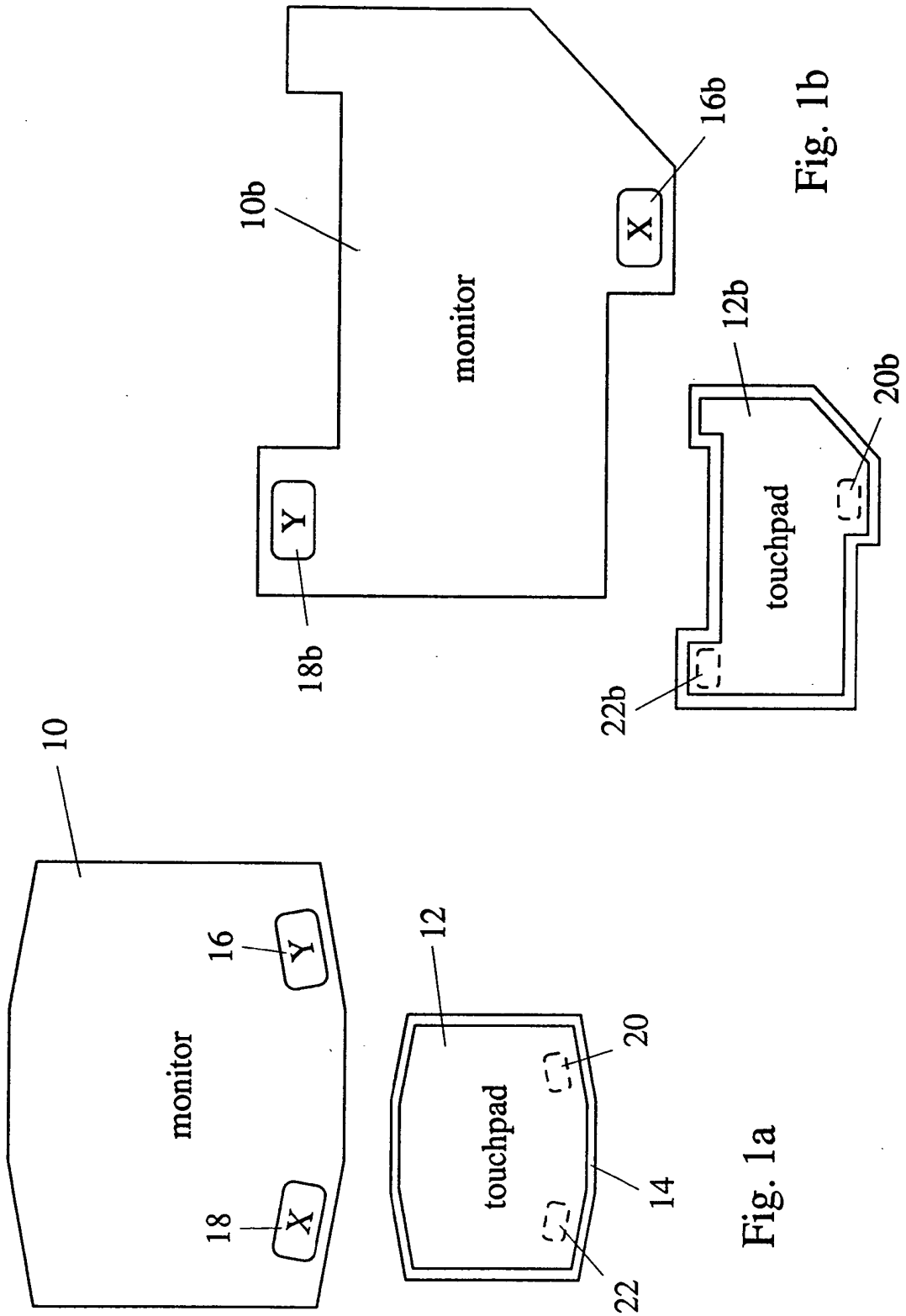


Fig. 1b

Fig. 1a

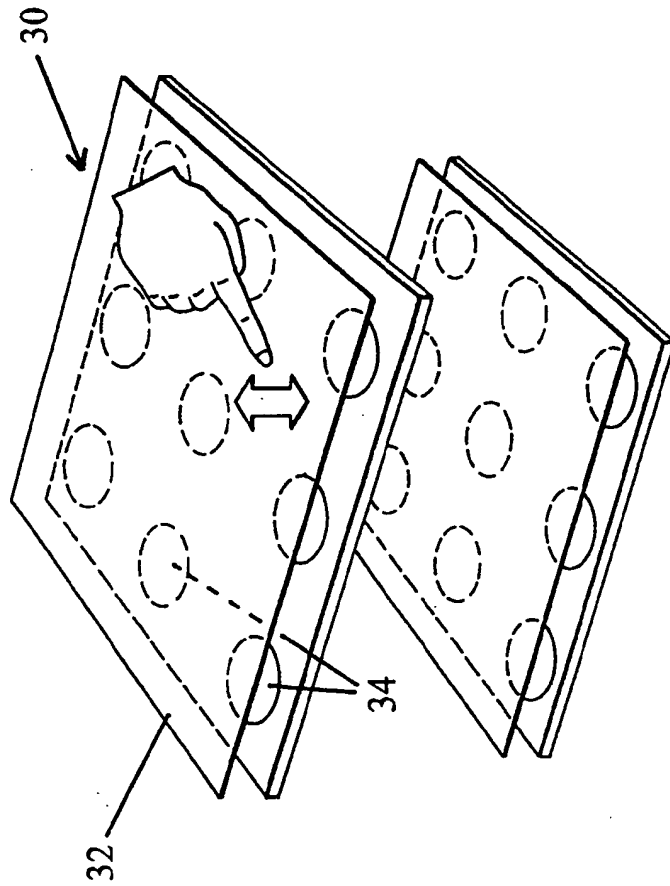
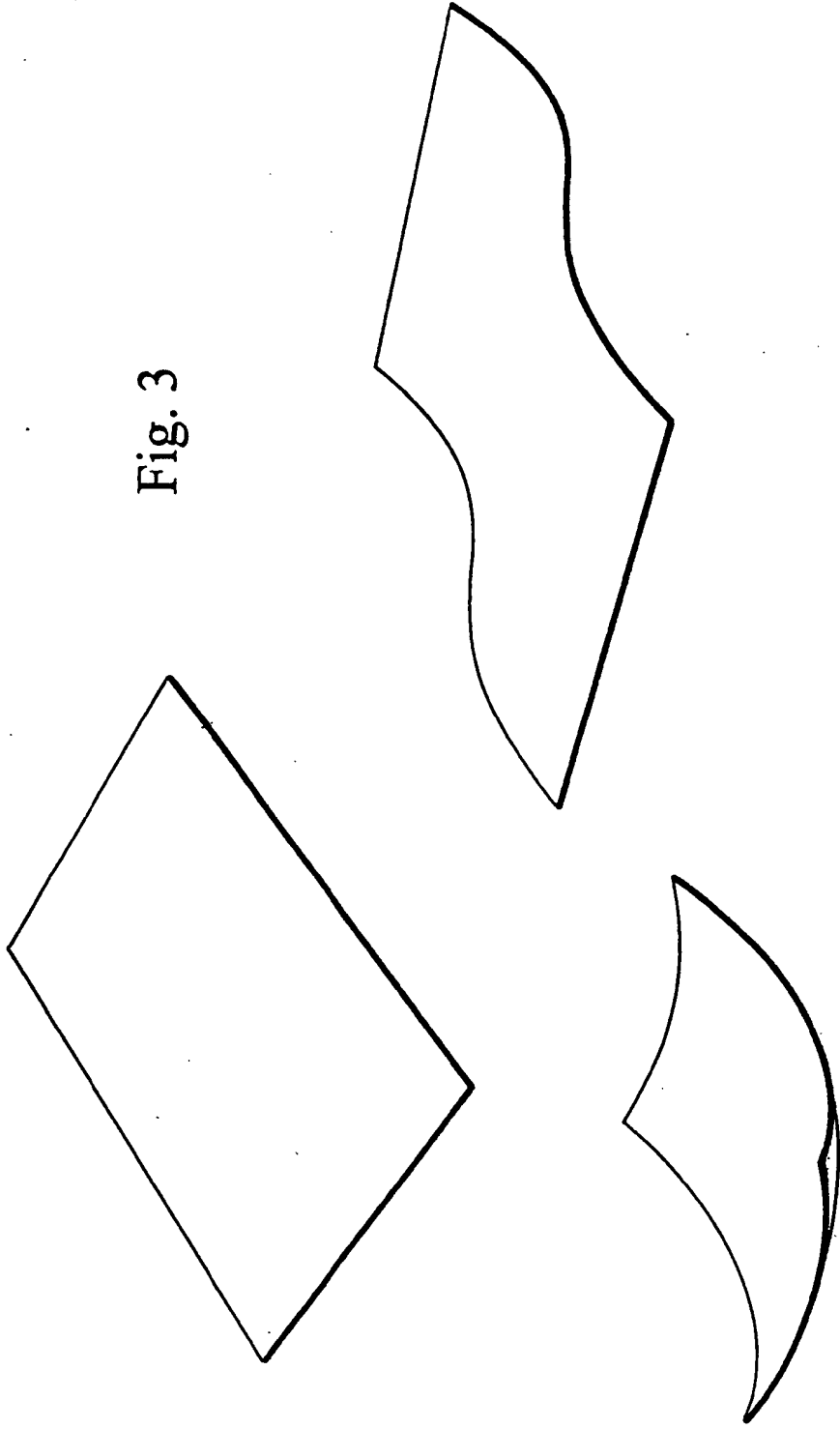


Fig. 2

Fig. 3



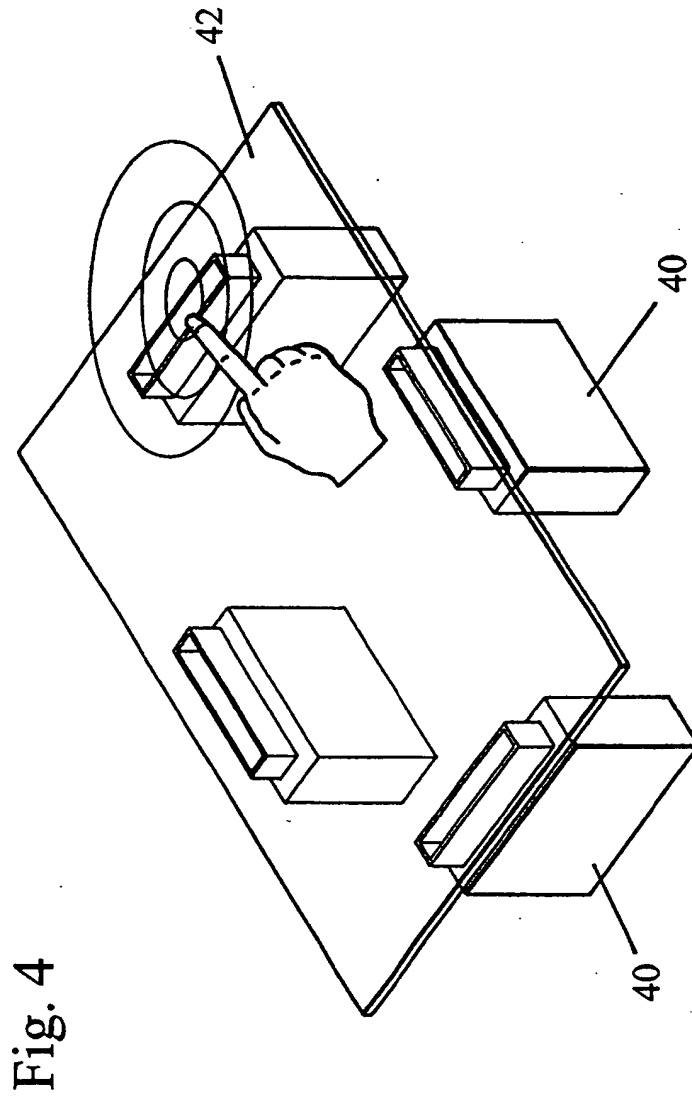


Fig. 4



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- **Bubb, Peter, Dr.**
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- **Hafner, Ernst**
88709 Hagnau (DE)
- **Albrecht, Stephan**
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(30) Priority: **11.09.2001 DE 10144634**

(71) Applicant: **TRW Automotive Electronics &
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(54) **Command input system**

(57) The command input system has a display screen and a touch-sensitive input field. On the input field, there is a spatial relationship with control options shown on the display field of the display screen. The input field conveys tactile feedback about the available and/or executed control actions. The command input system is especially well-suited for use in vehicles since it does not require constant eye contact with the display field.

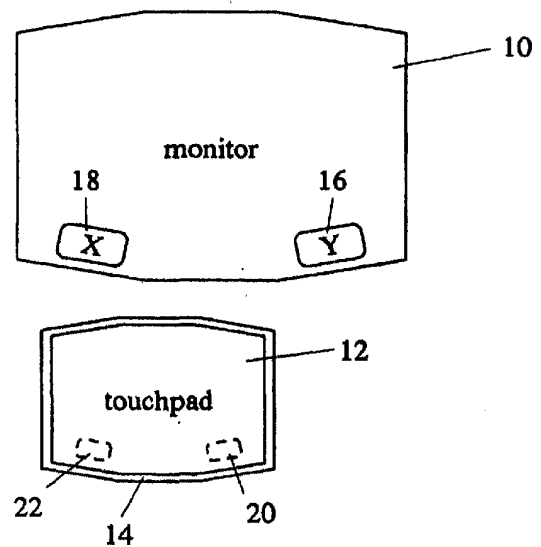


Fig. 1a



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 02 01 9878

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)
X	"TOUCH SENSITIVE OVERLAY WITH TACTILE FEEDBACK" IBM TECHNICAL DISCLOSURE BULLETIN, IBM CORP. NEW YORK, US, vol. 29, no. 2, July 1986 (1986-07), pages 761-763, XP002125446 ISSN: 0018-8689 Whole Document	1	G06F3/033 H01H13/70 G06F3/00
X	EP 1 014 295 A (TOKAI RIKA CO LTD) 28 June 2000 (2000-06-28) * page 2, column 1, line 5 - page 2, column 1, line 11 * * page 2, column 2, line 3 - page 2, column 2, line 19 * * page 3, column 3, line 4 - page 3, column 3, line 15 * * page 5, column 8, line 41 - page 5, column 8, line 53 * * page 6, column 9, line 2 - page 6, column 9, line 25 * * figures 3-22 *	1-7	
X	WO 01/54109 A (IMMERSION CORP) 26 July 2001 (2001-07-26) * abstract * * page 5, line 29 - page 6, line 40 * * page 9, line 15 - page 10, line 20 * * page 12, line 37 - page 15, line 11 * * page 17, line 5 - line 32 * * page 18, line 34 - page 19, line 2 * * figures 1,3-7 *	1,8,9	G06F H01H B41J
A	WO 97/18546 A (CIRQUE CORP) 22 May 1997 (1997-05-22) * page 14, line 28 - page 14, line 34 * * figures 4A,4B *	2-4	
-/--			
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 8 April 2004	Examiner Butler, M
<p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> <p>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</p> <p>& : member of the same patent family, corresponding document</p>			

EPO FORM 1503 03/82 (P04C01)



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 02 01 9878

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)
A	US 5 598 527 A (DEBRUS MARIE-HELENE ET AL) 28 January 1997 (1997-01-28) * page 6, column 4, line 58 - page 6, column 4, line 61 * * figure 2 *	1,5-7	
A	US 5 717 423 A (PARKER DAVID N) 10 February 1998 (1998-02-10) * column 6, line 40 - column 7, line 29 * * column 9, line 8 - column 10, line 42 * * column 11, line 61 - column 12, line 15 * * figures 1-18 *	1,8,9	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
The present search report has been drawn up for all claims.			
Place of search BERLIN		Date of completion of the search 8 April 2004	Examiner Butler, M
CATEGORY OF CITED DOCUMENTS		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	
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			

EPO FORM 1503 03/82 (P04/C01)

**CLAIMS INCURRING FEES**

The present European patent application comprised at the time of filing more than ten claims.

- Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:



The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-4

Command input system with a display screen displaying input options and a touch-sensitive input field, where a spatial correspondance exists between the displayed input options and the physical surface of the input field, as signalled by tactile feedback,

characterised in that the input field has a rim with a contour that palpably replicates the display screen.

2. Claims: 5-7

Command input system with a display screen displaying input options and a touch-sensitive input field, where a spatial correspondance exists between the displayed input options and the physical surface of the input field, as signalled by tactile feedback,

characterised in that the palpable structures are covered by a tensioned flexible foil.

3. Claims: 8-9

Command input system with a display screen displaying input options and a touch-sensitive input field, where a spatial correspondance exists between the displayed input options and the physical surface of the input field, as signalled by tactile feedback,

characterised in that the palpable structures are formed by active actuators.

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 02 01 9878

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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08-04-2004

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1014295 A	28-06-2000	JP 2000194483 A JP 2000194502 A EP 1014295 A2	14-07-2000 14-07-2000 28-06-2000
WO 0154109 A	26-07-2001	US 2001035854 A1 AU 2954301 A WO 0154109 A1 US 2003038776 A1 US 2002033795 A1	01-11-2001 31-07-2001 26-07-2001 27-02-2003 21-03-2002
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US 5717423 A	10-02-1998	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

Electronic Acknowledgement Receipt

EFS ID:	1279730
Application Number:	10699555
International Application Number:	
Confirmation Number:	3602
Title of Invention:	Human interface system
First Named Inventor/Applicant Name:	Beth Marcus
Customer Number:	20985
Filer:	William E. Hunter/mary ann reed
Filer Authorized By:	William E. Hunter
Attorney Docket Number:	19146-002001
Receipt Date:	27-OCT-2006
Filing Date:	31-OCT-2003
Time Stamp:	19:54:35
Application Type:	Utility

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Filed	19146002ids.PDF	516081	no	12

Warnings:

Information:

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2	Foreign Reference	19146002WO1991005303.pdf	492347	no	10
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3	Foreign Reference	19146002EP1293882.pdf	260443	no	13
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Total Files Size (in bytes):			1268871		
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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/699,555	10/31/2003	Beth Marcus	19146-002001	3602

20985 7590 10/05/2006
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P.O. BOX 1022
MINNEAPOLIS, MN 55440-1022

EXAMINER

OSORIO, RICARDO

ART UNIT PAPER NUMBER

2629

DATE MAILED: 10/05/2006

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

Office Action Summary	Application No. 10/699,555	Applicant(s) MARCUS ET AL.	
	Examiner RICARDO L. OSORIO	Art Unit 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 31 October 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) 1,3-21 and 23-55 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) 29,32-42 and 54 is/are allowed.
- 6) Claim(s) 1,5-19,23-28,30,31,43-46, 49-53 and 55 is/are rejected.
- 7) Claim(s) 3,4,20,21,47 and 48 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) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>10/31/03; 5/9/05; 5/15/06</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of species # 1 in the reply filed on 7/14/2006 is acknowledged. The traversal is on the ground(s) that Figures 4a-4b, 5a-5b, 6a-6b, and 7a-7b, are only illustrative of the above mentioned variations in the input elements disposed on the first and second assembly of the human interface device. This is found persuasive and all claims 1, 3-21, and 23-55 will be examined as follows.

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 –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 5, 6, 12, 13, 17-19, 24-28, 30, 31, 43, 49-53, and 55 are rejected under 35 U.S.C. 102(e) as being anticipated by Liebenow et al. (6,909,424).

Regarding claims 1, 12, 17, and 43, Liebenow teaches of a hand-held electronic device (Fig. 1, reference character 100) comprising a memory configured to store a plurality of applications, wherein each application is associated with a set of functions (Fig. 13, reference character 504); a processor configured to process a selected one of the plurality of applications (Fig. 13, reference character 502); a first input assembly having a plurality of input elements on a first surface configured to receive input from a human user through manipulation of the plurality of

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input elements, wherein at least one of the input elements on the first surface is configured to selectively map to one or more input functions, including more than one text input functions, of the set of functions associated with the selected one of the plurality of applications (col. 4, lines 33-43, col. 8, lines 45-67, and col. 9, lines 53-67); and a second input assembly having one or more input elements on a second surface configured to be manipulated by one or more of the human user's fingers, wherein each one of the input elements on the second surface is further configured to be selectively mapped to one or more input functions of the set of functions, or to a different shifting function, corresponding to the selected one of the plurality of applications wherein manipulation of one of the selectable active area causes the text symbol function of the one or more input elements of the first surface to change (col. 5, line 36-col. 6, line 17, col. 8, lines 45-67, and col. 9, lines 53-67) further wherein the plurality of input elements on the first surface and the one or more input elements on the second surface are arranged so as to substantially optimize a biomechanical effect of the human user's hand (see Figs. 3, 4, and 7, and col. 4, line 13-25).

Regarding claim 24, Liebenow further, teaches of a method for inputting data on a hand-held electronic device, wherein at least one of the input elements is further configured to map to a plurality of symbols in a data input mode, wherein each of the plurality of symbols is associated with a unique index position identifier (col. 4, lines 33-43, col. 8, lines 45-67, and col. 9, lines 53-67), and a second surface having one or more selection elements configured to be manipulated by one or more of the human user's fingers, wherein each selection element corresponds to one of the unique index position identifiers (col. 5, line 36-col. 6, line 17, col. 8,

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lines 45-67, and col. 9, lines 53-67), further wherein the plurality of input elements and the one or more selection elements are arranged to substantially optimize a biomechanical effect of the human user's hand (see Figs. 3, 4, and 7, and col. 4, line 13-25), the method comprising executing a selected application from a plurality of applications, wherein the selected application is associated with a set of functions; determining the index position identifier of a desired symbol to be inputted based on the functions associated with the selected application; pressing the selection element corresponding to the index position identifier of the desired symbol with any digit or object held in the human user's hand; and pressing the input element configured to map to the desired symbol with any digit or object held in the human user's hand (col. 4, lines 33-43, col. 5, line 36-col. 6, line 17, col. 8, lines 45-67, and col. 9, lines 53-67).

Regarding claim 28, Liebenow, further, teaches of a method of inputting data on a hand-held electronic device comprising a plurality of input elements in a thumb-manipulated assembly to substantially optimize a biomechanical effect of the human user's thumb and fingers (see Figs. 3, 4, and 7, and col. 4, line 13-25), wherein at least one input element is mapped to more than one text function, and one or more selection elements in a finger-manipulated input assembly, wherein each selection element is mapped to a unique shift position (col. 4, lines 33-43, col. 5, line 36-col. 6, line 17), the method comprising executing a selected text application from a plurality of applications, wherein the selected application is associated with a set of functions; pressing a desired selection element of the finger-manipulated input assembly with a human finger to select a desired shift position the selected text application; and pressing a desired input element of the thumb-manipulated input assembly with a human thumb to input a desired text

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character (col. 4, lines 33-43, col. 5, line 36-col. 6, line 17, col. 8, lines 45-67, and col. 9, lines 53-67).

Regarding claim 5, Liebenow, further, teaches that the processor receives signals generated by the input elements of first or second input assemblies when manipulated by the human use (Although not specifically mentioned, it is inherent that processor (Fig. 13, character 502) will receive the signals generated by the input elements since the selection is related to a specific software included in said processor and because the processor interprets the input signal and formulates a response or output related to the input).

Regarding claims 6, 13, and 19, Liebenow, further, teaches of an input controller, wherein the input controller receives signals generated by the input elements of first surface or active areas input assembly, or second input assemblies, when manipulated by the human user and converts the signals into a form suitable to be interpreted by the processor (Fig. 13, reference character 24).

Regarding claims 18 and 25, Liebenow teaches of physically or electronically labeling at least one input element of the first input assembly or the second input assembly so as to visually indicate an input function that can be selectively accessed by actuating the input element (see Figs 15 and 16).

Regarding claim 26, Liebenow teaches of that determining the index position identifier of the desired character to be inputted comprises locating the input element configured to map to the desired symbol; and counting from left to right the number of symbols preceding the desired symbol labeled on the located input element, wherein the index position identifier of the desired symbol is the number of symbols preceding the desired symbol plus one (see Figs. 15 and 16).

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Regarding claim 27, Liebenow teaches of at least one of the input elements or selection elements is further configured to map to a plurality of modes corresponding to the selected application executing on the hand-held electronic device, at least one of the modes is the data input mode, the method further comprising enabling the data input mode (see Fig. 2, and col. 8, lines 45-67, and col. 9, lines 53-67).

Regarding claim 30, Liebenow teaches of the selected one of the plurality of applications is a text application; and the one or more input elements on the second surface of the second input assembly comprises one or more selection elements, wherein manipulations of the one or more selection elements causes the input elements on first surface of the first input assembly to be selectively mapped from one text function to another text function (see Fig. 2, and col. 8, lines 45-67, and col. 9, lines 53-67).

Regarding claims 49-53, and 55, Liebenow teaches of the processor is further configured to be communicatively coupled to a host electronic device (col. 12, lines 31-40).

Regarding claims 7-11, 14-16, 23, 41, and 44-46, applicant admits in the REMARKS filed 7/14/2006, page 2, lines 13-15, that Figures 4a-4b, 5a-5b, 6a-6b, and 7a-7b, are only illustrative of the above mentioned variations in the input elements disposed on the first and second assembly of the human interface device.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have the limitations of claims 7-11, 14-16, 23, 41, and 44-46, as taught by applicant, in the device of Liebenow, which are related to Figures 4a-4b, 5a-5b, 6a-6b, and 7a-7b of the instant application, because they are obvious differences, or variations of the input

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elements disposed on the first and second assembly of the human interface device of Figures 3a-3d, as admitted by applicant.

Allowable Subject Matter

3. Claims 3, 4, 20, 21, 36, 37, 47, and 48 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

4. Claims 29, 32, and 54 are allowed.

The following is an examiner's statement of reasons for allowance: Claims 29, 32, and 54 are allowable since certain key features of the claimed invention are not taught or fairly suggested by the prior art. In claim 29, "wherein at least one of the input elements of the second input assembly is a selectively configurable sensing surface so as to provide a plurality of delineated active areas, further wherein one or more of the delineated active areas is mapped to one or more functions associated with the selected application". The prior art of record however singularly or in combination fails to anticipate or render the above underlined limitations obvious.

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

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ricardo L. Osorio whose telephone number is 571-272-7676. The examiner can normally be reached on Monday through Thursday from 7:00 A.M. to 5:30 P.M. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bipin Shalwala whose telephone number is 571-272-7681.

Any response to this action should be mailed to:

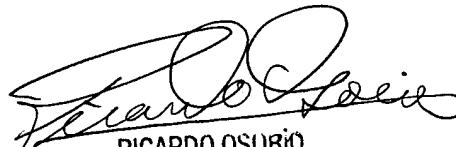
Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to: 571-273-8300 (for Technology Center 2600 only)

Hand-delivered responses should be brought to the Customer Service Window at the Randolph Building, 401, Dulany Street, Alexandria, VA 22314.

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).



RICARDO OSURIO
PRIMARY EXAMINER

Technology Division: 2629

RLO
October 1, 2006

Substitute Form PTO-1449 U.S. Department of Commerce Patent and Trademark Office Information Disclosure Statement by Applicant (Use several sheets if necessary) MAY 15 2006 37 CFR § 1.98(b)	Attorney's Docket No. 19146-002001	Application No. 10/699,555
	Applicant Beth Marcus, et al	
	Filing Date October 31, 2003	Group Art Unit 2673

U.S. Patent Documents

Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
RO	AA	5,365,589	11/15/1994	Howard A. Gutowitz			
	AB	5,432,510	7/11/1995	Walter S. Matthews			
	AC	5,782,642	7/21/1998	Michael Goren			
	AD	6,115,028	9/5/2000	Balakrishnan et al.			
	AE	6,219,731	4/17/2001	Howard A. Gutowitz			
	AF	6,228,709	5/8/2001	Wen-Yi Hsieh			
	AG	6,512,511	1/28/2003	Willner et al.			
	AH	6,573,844	6/3/2003	Venolia et al.			
	AI	6,606,486	8/12/2003	Cubbage et al.			
	AJ	6,654,733	11/25/2003	Goodman et al.			
	AK	6,703,963	3/9/2004	Timothy B. Higginson			
	AL	6,738,045	5/18/2004	Hinkley et al.			
	AM	6,741,235	5/25/2004	Michael Goren			
	AN	6,760,013	7/6/2004	Willner et al.			
	AO	6,865,718	3/8/2005	Levi Montalcini			
	AP	6,885,317	4/26/2005	Howard A. Gutowitz			
	AQ	6,885,318	4/26/2005	Matthew J. Bickerton			
	AR	6,911,608	6/28/2005	David H. Levy			
	AS	6,980,200	12/27/2005	Michael Goren			
↓	AT	RE37723	6/4/2002	Michael Goren			

Foreign Patent Documents or Published Foreign Patent Applications

Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation	
							Yes	No
	AU							

Other Documents (include Author, Title, Date, and Place of Publication)

Examiner Initial	Desig. ID	Document

Examiner Signature /Ricardo Osorio/	Date Considered 10/01/2006
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EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Substitute Form PTO-1449 (Modified) Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 19146-002001	Application No. 10/699,555
	Applicant Beth Marcus, et al		
	Filing Date October 31, 2003		Group Art Unit 2673

Other Documents (include Author, Title, Date, and Place of Publication)

Examiner Initial	Desig. ID	Document
RO	AHH	Andriy Pavlovych, Wolfgang Stürzlinger: Less-Tap: A Fast and Easy-to-learn Text Input Technique for Phones. Graphics Interface 2003, 97-104 http://www.graphicsinterface.org/cgi-bin/DownloadPaper?name=2003/170/paper170.pdf
	AII	Scott MacKenzie, Hedy Kober, Derek Smith, Terry Jones, Eugene Skepner, LetterWise: prefix-based disambiguation for mobile text input, Proceedings of the 14th annual ACM symposium on User interface software and technology, November 11-14, 2001, Orlando, Florida
	AJJ	H. Kober, E. Skepner, T. Jones, H. Gutowitz, S. MacKenzie, 2001. Linguistically Optimized Text Entry on a Cell Phone. In Proceedings of the CHI 2001. http://www.eatoni.com/research/chi.pdf
	AKK	Mikael Goldstein and Didier Chincholle The Finger-Joint-Gesture Wearable Keypad. Ericsson Radio Systems.
	ALL	Rosenberg, R. (1998). Computing without Mice and Keyboards: Text and Graphic Input Devices for Mobile Computing. Ph.D. Thesis, Dept. of Computer Science, University College, London, 1998. http://www.obscure.org/rosenberg/
	AMM	MacKay, B., Dearman, D., Inkpen, K., and Watters, C. 2005. Walk 'n scroll: a comparison of software-based navigation techniques for different levels of mobility. In Proceedings of the 7th international Conference on Human-Computer interaction with Mobile Devices & Services (Salzburg, Austria, September 19 - 22, 2005). MobileHCI '05, vol. 111. ACM Press, New York, NY, 183-190. http://portal.acm.org/citation.cfm?id=1085808&coll=GUIDE&dl=GUIDE&CFID=66591340&CFTOKEN=6294934
	ANN	Kranz, M., Holleis, P., Schmidt, A. "DistScroll - a new one-handed interaction device". In Proceedings of the 5th International Workshop on Smart Appliances and Wearable Computing, June 10, 2005. http://www.hcilab.org/documents/DistScrollAnewOneHandedInteractionDevice-KranzHolleisSchmidt-IWSAWC2005.pdf
	AOO	Daniel Fällman, Andreas Lund, Mikael Wiberg, ScrollPad: Tangible Scrolling with Mobile Devices, Proceedings of the Proceedings of the 37th Annual Hawaii International Conference on System Sciences (HICSS'04) - Track 9, p.90286.3, January 05-08, 2004. http://portal.acm.org/citation.cfm?id=963347&coll=GUIDE&dl=GUIDE&CFID=66483658&CFTOKEN=36023921 http://daniel.fallman.org/resources/papers/fallman-hicss37.pdf
	APP	Chipman, L. E., Bederson, B. B., and Golbeck, J. A. 2004. SlideBar: analysis of a linear input device. Behav. Inf. Tech. 23, 1 (Jan. 2004), 1-9. http://portal.acm.org/citation.cfm?id=993182.993184# http://www.cs.umd.edu/Library/TRs/CS-TR-4471/CS-TR-4471.pdf
	AQQ	Orientation-based interaction for Mobile Devices. J. Darnauer, S. Garrity and T. Jim, Stanford University. http://hci.stanford.edu/srk/cs377a-mobile/project/final/darnauer-garrity-kim.pdf
	ARR	Rekimoto, J. Tilting operations for small screen interfaces. Proceedings of the 9th annual ACM symposium on User Interface software and technology, pp. 167-168, November 06-08, 1996, Seattle. http://portal.acm.org/citation.cfm?id=237115&coll=GUIDE&dl=GUIDE&CFID=66483658&CFTOKEN=36023921

Examiner Signature /Ricardo Osorio/	Date Considered 10/01/2006
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	Applicant Beth Marcus, et al		
	Filing Date October 31, 2003	Group Art Unit 2673	

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
RO	ASS	Hinckley, K., Pierce, J., Horvitz, E., Sinclair, M. Foreground and Background Interaction with Sensor-enhanced Mobile Devices, ACM TOCHI (Transactions on Computer-Human Interaction) Special Issue on Sensor-Based Interaction, 12 (1), March 2005, pp. 31-52. http://portal.acm.org/citation.cfm?id=1057240&coll=GUIDE&dl=GUIDE&CFID=66591340&CFTOKEN=6294934
	ATT	Hinckley, K., Cutrell, E., Bathiche, S., and Muss, T. 2002. Quantitative analysis of scrolling techniques. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems: Changing Our World, Changing Ourselves (Minneapolis, Minnesota, USA, April 20 - 25, 2002). CHI '02. ACM Press, New York, NY, 65-72. http://doi.acm.org/10.1145/503376.503389
	AUU	Harrison, B. L., Fishkin, K. P., Gujar, A., Mochon, C., and Want, R. 1998. Squeeze me, hold me, tilt me! An exploration of manipulative user interfaces. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (Los Angeles, California, United States, April 18 - 23, 1998). C. Karat, A. Lund, J. Coutaz, and J. Karat, Eds. Conference on Human Factors in Computing Systems. ACM Press/Addison-Wesley Publishing Co., New York, NY, 17-24. http://portal.acm.org/citation.cfm?id=274647&coll=Portal&dl=GUIDE&CFID=66588306&CFTOKEN=73460863&CFID=66588306&CFTOKEN=73460863#
	AVV	Kiyokuni Kawachiya, Hiroshi Ishikawa, NaviPoint: an input device for mobile information browsing, Proceedings of the SIGCHI conference on Human factors in computing systems, p.1-8, April 18-23, 1998, Los Angeles, California, United States http://portal.acm.org/citation.cfm?id=274645&coll=Portal&dl=GUIDE&CFID=66588306&CFTOKEN=73460863
	AWW	Hinkley, K., Pierce, J., Sinclair, M., and Horvitz, E. Sensing Techniques for Mobile Interaction. UIST 2000: ACM Symposium on User Interface Software and Technology, pp. 91-100. http://portal.acm.org/citation.cfm?id=354417&coll=GUIDE&dl=GUIDE&CFID=66483658&CFTOKEN=36023921
	AXX	Baillie, L., Kunczler, H., and Anegg, H. 2005. Rolling, rotating and imagining in a virtual mobile world. In Proceedings of the 7th international Conference on Human Computer interaction with Mobile Devices & Services (Salzburg, Austria, September 19 - 22, 2005). MobileHCI '05, vol. 111. ACM Press, New York, NY, 283-286. http://doi.acm.org/10.1145/1085777.1085833
	AYY	Amy K. Karlson, Benjamin B. Bederson, John SanGiovanni, 2004. AppLens and LaunchTile: Two Designs for One-Handed Thumb Use on Small Devices http://hcil.cs.umd.edu/trs/2004-37/2004-37.html
	AZZ	Virpi Roto, Nokia Research. Browsing on Mobile Phones. http://www.research.att.com/~rijana/WF12_Paper1.pdf
	AAAA	Qualcomm.Slingshot http://wireless.ign.com/articles/657/657041p1.html
	ABBB	GamePad http://www.mobilemag.com/content/100/345/C5578/
↓	ACCC	Kyocera Candid KX16 http://www.mobilemag.com/content/100/340/C4392/

Examiner Signature /Ricardo Osorio/	Date Considered 10/01/2006
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		Applicant Beth Marcus, et al	
		Filing Date October 31, 2003	Group Art Unit 2673

Other Documents (include Author, Title, Date, and Place of Publication)

Examiner Initial	Desig. ID	Document
RO	ADDD	XEG Mobile Phone Pad http://us.gizmodo.com/gadgets/cellphones/gaming-on-the-go-with-xeg-136414.php http://www.ahabaranews.com/en/news-10615-XEG%2C+the+mobile+phone+pad.html
	AEEE	Samsung Game Pad http://www.cellphonemall.net/wireless/store/accessorydetail.asp?id=23198&phoneid=334
	AFFF	Thumbscript http://www.thumbscript.com/index.html http://www.thumbscript.com/howitworks.html http://www.thumbscript.com/technotes.html
	AGGG	Exideas http://www.exideas.com/ME/index.html http://www.exideas.com/ME/HardKey.html
	AHHH	NE-Ware http://www.n-e-ware.com/Downloads/KeyStick/330/KSUserManual330_01.pdf
	AIII	Synaptics http://www.synaptics.com/products/pdf/mobiletouch_pb.pdf
	AJJJ	Atrua: sensor company http://www.atrua.com/s-mobilephones.html
	AKKK	Varatouch: sensor company http://www.esato.com/news/article.php?id=388
	ALLL	Eleksen www.eleksen.com
	AMMM	SHARP Vodafone ZTCJ01 http://www.slashphone.com/93/3123.html
	ANNN	The GamePad http://www.kotaku.com/gaming/cell-phones/killer-cell-phone-game-controller-130968.php
	AOOO	Sony Clie game controller PEGA-GC10 http://www.palminfocenter.com/view_story.asp?ID=4295
	APPP	Bluetooth GPS http://mobilitytoday.com/news/005986/mobility_buyGPSnow_i-Blue_bluetooth_GPS
	AQQQ	Alphagrip http://www.alphagrips.com/AlphagripAG5UsersManual.pdf
	ARRR	Tegic - T9 http://www.tegic.com/pdfs/salessheets/T9%20Adaptive%20Text%20Input%20Sales%20Sheet%201.pdf http://www.tegic.com/pdfs/salessheets/T9%20Adaptive%20Text%20Input%20Sales%20Sheet%202.pdf http://www.tegic.com/pdfs/salessheets/T9%20Adaptive%20Text%20Input%20Sales%20Sheet%203.pdf http://www.tegic.com/pdfs/salessheets/Sloppy%20Type%20Sales%20Sheet.pdf
	ASSS	Zicorp - eZiTap http://www.zicorp.com/eZiTap.htm
✓	ATTT	Motorola - iTAP http://news.zdnet.co.uk/hardware/mobile/0,39020360,39118435,00.htm

Examiner Signature /Ricardo Osorio/	Date Considered 10/01/2006
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EXAMINER: Initials citation considered. 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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	Applicant Beth Marcus, et al		Filing Date October 31, 2003
			Group Art Unit 2673

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
RO	AUUU	DigitWireless: FastTap http://www.digitwireless.com/flash/download/fastap.pdf
	AVVV	Microth KeyWheel http://www.microth.com/circumscrip/overview.asp
	AWWW	Yuvee; special keypad layout www.yuvee.com http://www.yuvee.com/builtin1.shtml http://www.yuvee.com/built_in_b.shtml http://www.yuvee.com/testdrive2.shtml
	AXXX	Twiddler http://www.handykey.com/ http://www.handykey.com/Keymap.pdf
	AYYY	Sengital Ltd. Tilt sensor replacement for PDA http://sengital.manufacturer.globalsources.com/si/6008823523892/ProductDetail/PDA-keyboard/product_id-1001050135/action-GetProduct.htm
	AZZZ	Howard.co.kr - The mouse phone http://www.howard.co.kr/computer/mouse/mousephone.htm
	AAAAA	Nokia 6620 with a control stick http://nds2.nokia.com/files/support/nam/phones/guides/6620_US_en.PDF
	ABBBB	Sega into cell phones http://www.phoneyworld.com/newspage.aspx?n=1745
	ACCCC	Prevalent Devices LLC http://www.prevalentdevices.com/manual3-5-06.pdf
	ADDDD	M. Kolsch, M. Turk, 2002. Keyboards without Keyboards: A Survey of Virtual Keyboards. UCSB Technical Report 2002-21, July 12, 2002. http://www.cs.ucsb.edu/research/tech_reports/reports/2002-21.pdf
	AEEEE	Jeong-Hoon Shin and Kwang-Seok Hong. An improved alphanumeric input algorithm using gloves. http://www.complexity.org.au/conference/upload/shin01/shin01.pdf
	AFFFF	C. Metzger, M. Anderson, T. Starner, 2004. FreeDigger: A Contact-Free Device for Gesture Control. Eighth IEEE International Symposium on Wearable Computers (ISWC'04) pp. 18-21. http://www.wirelessrerc.gatech.edu/projects/development/D1files/iswc04-freedigiter.pdf
	AGGGG	Rakkolainen, I. (2003). MobiVR - a novel user interface concept for mobile computing. In: Bieber, K. & Kirste, T. (eds.), Proceedings of the 4th International Workshop on Mobile Computing, IMC 2003, 17-18 June 2003, Rostock, Germany, pp. 107-112. http://www.cs.tut.fi/~ira/IMC2003.pdf
	AHHHH	Lumsden, J., Gammell, A. (2004). Mobile Note Taking: Investigating the Efficacy of Mobile Text Entry. In Proc. of Mobile Human-Computer Interaction (MobileHCI 2004), Glasgow, UK, Sept. 2004: In S. Brewster and M. Dunlop (Eds.). Mobile Human-Computer-Interaction - MobileHCI 2004, Lecture Notes in Computer Science, Vol. 3160, Berlin: Springer, 156-168.
↓	AIIII	MacKenzie, I. S., & Soukoreff, R. W. Phrase sets for evaluating text entry techniques. Extended Abstracts of the ACM Conference on Human Factors in Computing Systems - CHI 2003, pp. 754-755 New York: ACM

Examiner Signature <p style="text-align: center;">/Ricardo Osorio/</p>	Date Considered <p style="text-align: center;">10/01/2006</p>
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EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Substitute Form PTO-1449 (Modified) Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 19146-002001	Application No. 10/699,555
	Applicant Beth Marcus, et al		Filing Date October 31, 2003
			Group Art Unit 2673

Other Documents (include Author, Title, Date, and Place of Publication)

Examiner Initial	Desig. ID	Document
RO	AJJJ	MacKenzie, I. S. (2002). KSPC (keystrokes per character) as a characteristic of text entry techniques. Proceedings of the Fourth International Symposium on Human-Computer Interaction with Mobile Devices, pp. 195-210. Heidelberg, Germany: Springer-Verlag
	AKKK	Soukoreff, R. W. and MacKenzie, I. S. (2004). Recent Developments in Text-Entry Error Rate Measurement. CHI 2004, Late Breaking Results Paper, Vienna Austria, April 24-29, 2004.
	ALLL	Lee, S. and Hong S.H.. Chording as a Text Entry Method in Mobile Phones. In Proceedings of the MobileHCI 2004: 6th International Symposium, Glasgow, UK, September 13-16, 2004.
	AMMM	Green, N., Kruger, J., Faldu, C., and St. Amant, R. 2004. A reduced QWERTY keyboard for mobile text entry. In CHI '04 Extended Abstracts on Human Factors in Computing Systems (Vienna, Austria, April 24 - 29, 2004). CHI '04. ACM Press, New York, NY, 1429-1432. http://portal.acm.org/citation.cfm?id=986082&coll=GUIDE&dl=GUIDE&CFID=66591340&CFTOKEN=6294934
	ANNN	Partridge, K., Chatterjee, S., Sazawal, V., Borriello, G., and Want, R. TiltType: accelerometer-supported text entry for very small devices, Proceedings of the 15th annual ACM symposium on User interface software and technology, October 27-30, 2002, Paris, France
	AOOO	Mikael Goldstein, Didier Chincholle, Morten Back (2000). Assessing Two New Wearable Input Paradigms: The Finger-Joint-Gesture Palm-Keypad-Glove-and-the-Invisible-Phone-Clock: Personal and Ubiquitous Computing, Volume 4, Issue 2/3.
	APPP	Bartlett, J. F. 2000. Rock 'n' Scroll Is Here to Stay. IEEE Comput. Graph. Appl. 20, 3 (May. 2000), 40-45. http://portal.acm.org/citation.cfm?id=618728&coll=Portal&dl=GUIDE&CFID=66588306&CFTOKEN=73460863#
	AQQQ	Eslambolchilar, P., Murray-Smith, R. (2004). Tilt-Based Automatic Zooming and Scaling in Mobile Devices - A state-space implementation. In Proc. of Mobile Human-Computer Interaction (MobileHCI 2004), Glasgow, UK, Sept. 2004: In S. Brewster and M. Dunlop (Eds.). Mobile Human-Computer-Interaction - MobileHCI 2004, Lecture Notes in Computer Science, Vol. 3160, Berlin: Springer, 120-131.
	ARRR	Zhai, S., Smith, B.A., and Selker, T. Improving Browsing Performance: A study of four input devices for scrolling and pointing tasks, Proceedings of the IFIP TC13 International Conference on Human-Computer Interaction, p.286-293, July 14-18, 1997.
	ASSS	Wobbrock, J. O., Forlizzi, J., Hudson, S. E. and Myers, B. A. WebThumb: interaction techniques for small-screen browsers. Proc. UIST, ACM Press (2002), 205-208.
	ATTT	Lee, S., Hong, S. H., and Jeon, J. W. 2002. Designing a universal keyboard using chording gloves. SIGCAPH Comput. Phys. Handicap. , 73-74 (Jun. 2002), 142-147. http://doi.acm.org/10.1145/960201.957230
	AUUU	Pirhonen, A., Brewster, S., and Holguin, C. 2002. Gestural and audio metaphors as a means of control for mobile devices. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems: Changing Our World, Changing Ourselves (Minneapolis, Minnesota, USA, April 20 - 25, 2002). CHI '02. ACM Press, New York, NY, 291-298. http://doi.acm.org/10.1145/503376.503428
↓	AVVV	Kjeldskov, J. and Graham, C. (2003). A Review of Mobile HCI Research Methods. In Proc. of Mobile Human-Computer Interaction (MobileHCI 2003), Udine Italy, Sept. 2003: In L. Chittaro (Ed.). Mobile Human-Computer-Interaction - MobileHCI 2003, Lecture Notes in Computer Science, Vol. 2795, Berlin: Springer, 317-335.

Examiner Signature /Ricardo Osorio/	Date Considered 10/01/2006
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EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Substitute Form PTO-1449 (Modified) Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 19146-002001	Application No. 10/699,555
	Applicant Beth Marcus, et al		Filing Date October 31, 2003
			Group Art Unit 2673

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
RO	AV	Donner, J. (2005). Research Approaches to Mobile Use in Developing World: A Review of the Literature. International Conference on Mobile Communication and Asian Modernities City University of Hong Kong, June 7-8 2005.
	AW	Min, Lin and Sears, Andrew (2005). Graphics Matter: A Case Study of Mobile Phone Keypad Design for Chinese Input. CHI 2005, Late Breaking Results: Posters, Portland, Oregon. April 2-7, 2005.
	AX	MacKenzie, S., & Soukoreff, W. (2002). Text entry for mobile computing: Models and methods, theory and practice. Human-Computer Interaction. 17. p. 147--198. http://www.yorku.ca/mack/hci3-2002.pdf
	AY	Starner, T. "Keyboards Redux: Fast Mobile Text Entry". Pervasive Computing, July - September 2004, Pp. 97-101. http://www.cc.gatech.edu/fac/Thad.Starner/p/magazine/2004-3-keyboard-redux.pdf
	AZ	Lee Butts , Andy Cockburn, An evaluation of mobile phone text input methods, Third Australasian conference on User interfaces, p.55-59, January 01, 2002, Melbourne, Victoria, Australia http://www.crpit.com/confpapers/CRPITV7Butts.pdf
	AAA	Chording and Tilting - Daniel Wigdor (thesis) - 2004- describes chordtap and tilttap (also covered in depth in the paper-referenced below)- http://www.dgp.toronto.edu/~dwigdor/research/thesis/submitted.html
	ABB	Wigdor, D. and Balakrishnan, R. "A Comparison of Consecutive and Concurrent Input Text Entry Techniques for Mobile Phones", Conference on Human Factors, April 24-29, 2004, Volume 6, Number 1, pp. 81-88 http://portal.acm.org/citation.cfm?id=985703 http://www.dgp.toronto.edu/~ravin/papers/chi2004_concurrenttextinput.pdf
	ACC	Oniszcak, A., & MacKenzie, I. S. (2004). A comparison of two input methods for keypads on mobile devices. Proceedings of NordiCHI 2004, pp. 101-104. New York: ACM. http://www.yorku.ca/mack/nordichi2004.pdf
	ADD	K. Lyons. Everyday wearable computer use: A case study of an expert user. In Proceedings of Mobile HCI 2003, pages 61-75, 2003. http://www.cc.gatech.edu/ccg/publications/everyday_case.pdf
	AEE	K. Lyons, T. Starner, D. Plaisted, J. Fusia, A. Lyons, A. Drew, E. W. Looney, 2004. "Twiddler Typing: One-Handed Chording Text Entry for Mobile Phones," Proc. Conf. Human Factors in Computing Systems (SIGCHI 01), ACM Press, 2004, pp. 671-678. http://www.cc.gatech.edu/fac/Thad.Starner/p/030_10_MTE/twiddler-chi04.pdf
	AFF	Daniel Wigdor , Ravin Balakrishnan, TiltText: using tilt for text input to mobile phones, Proceedings of the 16th annual ACM symposium on User interface software and technology, p.81-90, November 02-05, 2003, Vancouver, Canada http://portal.acm.org/citation.cfm?id=964705 http://www.dgp.toronto.edu/~ravin/papers/uist2003_tilttext.pdf
↓	AGG	M. D. Dunlop and A. Crossan, "Dictionary based text entry method for mobile phones", published in Brewster, S.A., and Dunlop, M.D., (editors). Proceedings of Second Workshop on Human Computer Interaction with Mobile Devices, August 1999. http://www.cis.strath.ac.uk/~mdd/research/publications/99dunlopcrossan.pdf

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EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

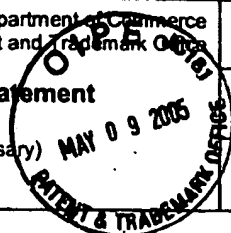
Substitute Form PTO-1449 (Modified) Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 19146-002001	Application No. 10/699,555
	Applicant Beth Marcus, et al		
	Filing Date October 31, 2003	Group Art Unit 2673	

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
RO	AWWWW	Kjeldskov, J. Stage, J. (2004). New Techniques for Usability Evaluation of Mobile Systems. International Journal of Human-Computer Studies, May 2004, 60 (5-6): 599--620.

Examiner Signature /Ricardo Osorio/	Date Considered 10/01/2006
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form (PTO-1449)

Substitute Form PTO-1449 (Modified) Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 19146-002001	Application No. 10/699,555
		Applicant Beth Marcus, et al	



U.S. Patent Documents							
Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
RO	AA	2003/020692	1/30/2003	Griffin, et al.			
	AB	2003/193418	10/16/2003	Shi			
	AC	2002/163504	11/7/2002	Pallakoff			
	AD	2003/169188	9/11/2003	Chang et al.			
	AE	2003/061103	3/27/2003	Kanai			
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

Foreign Patent Documents or Published Foreign Patent Applications								
Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation	
							Yes	No
RO	AL	1103883	5/30/2001	EPO				
RO	AM	0585730	3/9/1994	EPO				
RO	AN	03/042805	5/22/2003	WIPO				
	AO							
	AP							

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
	AQ	
	AR	
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Examiner Signature /Ricardo Osorio/	Date Considered 10/01/2006
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

10/31/2003

Substitute Form PTO-1449 (Modified) Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 16300-002001	Application No. to be assigned
	Applicant Beth Marcus, et al		
	Filing Date October 31, 2003	Group Art Unit to be assigned	

U.S. Patent Documents							
Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
RO	AA	4,793,312	12/27/1988	Doinaga et al.			
	AB	4,867,028	09/19/1989	Peter S. Jones			
	AC	4,891,777	01/02/1990	James M. Lapeyre			
	AD	4,896,554	01/30/1990	Craig F. Culver			
	AE	4,912,462	03/27/1990	Washizuka et al.			
	AF	5,189,416	02/23/1993	Mark D. Estes			
	AG	5,473,325	12/05/1995	Peter J. McAlindon			
	AH	5,512,919	04/30/1996	Yoshitsugu Araki			
	AI	5,612,690	03/18/1997	David Levy			
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	AK	5,859,629	01/12/1999	Bruce Tognazzini			
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	AQ	6,232,956	05/15/2001	Daniel S. Mailman			
	AR	6,377,685	04/23/2002	Ravi C. Krishnan			
	AS	6,520,699	02/18/2003	Toshiyasu Abe			
	AT	6,541,715	04/01/2003	Philip Swanson			
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Foreign Patent Documents or Published Foreign Patent Applications								
Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation	
							Yes	No
	AW							

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Substitute Form PTO-1449 (Modified) Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 16300-002001	Application No. to be assigned
	Applicant Beth Marcus, et al		
	Filing Date October 31, 2003	Group Art Unit to be assigned	

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
RO	AX	Buxton, "A Directory of Sources for Input Technologies", 10/1/2003, http://www.billbuxton.com/InputSources.html
	AY	"Introducing the Dvorak Keyboard", http://www.mwbrooks.com/dvorak/
	AZ	Innovative Ergonomic Solutions, Cirque Pocket Keyboard, http://www.iesproducts.com/key-misc-pocket.html
	AAA	Buxton, "Human Input to Computer Systems: Theories, Techniques and Technology", http://billbuxton.com/inputManuscript.html
	ABB	Buxton, "An Introduction to Human Input to Computers", 6 April 1999, http://www.billbuxton.com/input01.Introduction.pdf
	ACC	Unidentified and Undated Document discussing alternative designs to QWERTY Keyboard, pages 2-10
	ADD	
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Examiner Signature /Ricardo Osorio/	Date Considered 10/01/2006
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Notice of References Cited	Application/Control No. 10/699,555	Applicant(s)/Patent Under Reexamination MARCUS ET AL.	
	Examiner RICARDO L. OSORIO	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-2004/0208681	10-2004	Dechene, Joseph Fernand	400/472
*	B US-6,947,028	09-2005	Shkolnikov, Mark	345/156
*	C US-6,107,988	08-2000	Phillipps, John Quentin	345/156
*	D US-6,909,424	06-2005	Liebenow et al.	345/169
*	E US-5,515,305	05-1996	Register et al.	708/145
*	F US-6,297,752	10-2001	Ni, Xuan	341/22
	G US-			
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	I US-			
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FOREIGN PATENT DOCUMENTS

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
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NON-PATENT DOCUMENTS

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)				
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*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.



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Bib Data Sheet

CONFIRMATION NO. 3602

SERIAL NUMBER 10/699,555	FILING OR 371(c) DATE 10/31/2003 RULE	CLASS 345	GROUP ART UNIT 2629	ATTORNEY DOCKET NO. 19146-002001
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APPLICANTS
 Beth Marcus, Bedford, MA;
 W. David Lee, Newton, MA;

**** CONTINUING DATA ******* *NO* *RLO*

**** FOREIGN APPLICATIONS ******* *NO* *RLO*

IF REQUIRED, FOREIGN FILING LICENSE GRANTED SMALL ENTITY ****
**** 02/02/2004**

Foreign Priority claimed <input type="checkbox"/> yes <input checked="" type="checkbox"/> no	STATE OR COUNTRY MA	SHEETS DRAWING 9	TOTAL CLAIMS 29	INDEPENDENT CLAIMS 6
35 USC 119 (a-d) conditions met <input type="checkbox"/> yes <input checked="" type="checkbox"/> no <input type="checkbox"/> Met after Allowance				
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TITLE
Human interface system

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		<input type="checkbox"/> 1.18 Fees (Issue)
		<input type="checkbox"/> Other _____
		<input type="checkbox"/> Credit

Index of Claims



Application/Control No.

10/699,555

Examiner

RICARDO L. OSORIO

Applicant(s)/Patent under Reexamination

MARCUS ET AL.

Art Unit

2629

✓	Rejected
=	Allowed

—	(Through numeral) Cancelled
÷	Restricted

N	Non-Elected
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Claim		Date	
Final	Original		
	1	✓	10/1/06
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EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S177	342343	(input or pointing or interface) adj (apparatus or system or device)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/09/30 11:59
S178	9133	S177 and (multiface\$1 or double adj (face\$1 or side\$1) or dual adj (face\$1 or side\$1) or two adj (side\$1 or face\$1) or two-sided or double-sided)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/09/30 12:49
S179	2296	S178 and (front or first) adj (side or face)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/09/30 12:51
S180	1675	S179 and (rear or back or second) adj (side or face)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/09/30 12:06
S181	2902	S178 and (front or first) adj (side or \$3face)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/09/30 12:52
S182	1815	S181 and (rear or back or second) adj (side or face)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/09/30 12:06
S183	1845	S182 biomechanical near3 hand	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/09/30 12:07
S184	0	S182 and biomechanical near3 hand	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/09/30 12:07

EAST Search History

S18 5	66	S182 and ergonomic	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/09/30 12:07
S18 6	19	("4933514" "5049862" "5241303" "5268816" "5268817" "5276589" "5548478" "5638257" "5995025" "6006243" "6020878" "6025986" "6047196" "6259597" "6427078" "6445932" "6587700").PN. OR ("6747635").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2006/09/30 12:34
S18 7	36	("5128981" "5189632" "5241284" "5257257" "5291542" "5337346" "5375230" "5378935" "5416435" "5422656" "5471655" "5491718" "5517552" "5570369" "5581244" "5584054" "5615384" "5797089"). PN. OR ("6445932").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2006/09/30 12:35
S18 8	23	("20010030704" "20010031074" "20010047479" "20020001400" "20020011972" "4993068" "5280527" "5764789" "5845016" "5966112" "6028581" "6070796" "6219793" "6243155" "6327376" "6445932" "6456279" "6476374" "6484260" "6539101" "6587873" "6594505" "6657538").PN. OR ("7068254").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2006/09/30 12:37
S18 9	35	("4597681" "4661005" "5029260" "5129747" "5137384" "5156475" "5339097" "5360280" "5424728" "5426449" "5576733" "5612691" "5620267" "5660488" "5689253" "5711624" "5716149" "5731808" "5767463" "5775822" "5874906" "5892499" "D323817" "D362432" "D362434").PN. OR ("6132118"). URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2006/09/30 12:43
S19 0	75	("2498105" "3972628" "4780707" "4862165" "4917517" "5137384" "5157381" "5160919" "5287090" "5296871" "5355147" "D302426" "D328597").PN. OR ("5576733"). URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2006/09/30 12:46
S19 1	10462	S177 and (multiface\$1 or double adj (\$4face\$1 or side\$1) or dual adj (\$4face\$1 or side\$1) or two adj (side\$1 or \$4face\$1) or two-sided or double-sided)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/09/30 12:50

EAST Search History

S19 2	2585	S191 and (front or first) adj (side or face)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/09/30 12:51
S19 3	3456	S191 and (front or first) adj (side or \$face)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/09/30 12:52
S19 4	3456	S193 and (front or first) adj (side or \$face)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/09/30 12:52
S19 5	15	S194 and biomechanical	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/09/30 12:53
S19 6	171	S194 and ergonomic\$3	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/09/30 12:54
S19 7	15	S194 and biomechanical\$3	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/09/30 12:53
S19 8	0	S197 and ergonomic\$3	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/09/30 12:53
S19 9	105	S196 not S185	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/09/30 12:54

EAST Search History

S20 0	15	S199 and 345/156-173.ccls.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/09/30 13:04
S20 1	2	"6947028".pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/09/30 13:04
S20 2	7	("20020057259" "20020097227" "5818437" "5854624" "6164853" "6573883").PN. OR ("6947028"). URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2006/09/30 13:07

Attorney's Docket No.: 19146-002001

OFFICIAL COMMUNICATION FACSIMILE:

OFFICIAL FAX NO: (571) 273-8300

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Number of pages including this page 5

Applicant : Beth Marcus, et al
Serial No. : 10/699,555
Filed : October 31, 2003

Art Unit : 2629
Examiner : Ricardo Osorio

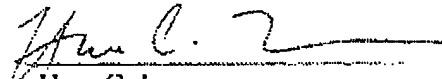
Title : Human Interface System

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

A RESPONSE TO RESTRICTION REQUIREMENT dated July 14, 2006 is attached.

Respectfully submitted,

Date: July 14, 2006


Hwa C. Lee

Fish & Richardson P.C.
12390 El Camino Real
San Diego, California 92130
Telephone: (858) 678-5070
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Attorney's Docket No.: 19146-002001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Beth Marcus, et al
Serial No. : 10/699,555
Filed : October 31, 2003
Title : HUMAN INTERFACE SYSTEM

Art Unit : 2629
Examiner : Ricardo Osorio
Conf. No. : 3602

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

RESPONSE TO RESTRICTION REQUIREMENT

Responsive to the action mailed June 14, 2006, applicant elects the invention of Group 1 drawn to species 1 of the embodiment of Figs. 3a-3d. The election is made with traverse.

CERTIFICATE OF TRANSMISSION BY FACSIMILE

I hereby certify that this correspondence is being transmitted by facsimile to the Patent and Trademark Office on the date indicated below.

July 14, 2006
Date of Transmission

Signature *Rita H. Jennings*

Rita H. Jennings
Typed or Printed Name of Person Signing Certificate

Applicant : Beth Marcus, et al
Serial No. : 10/699,555
Filed : October 31, 2003
Page : 2 of 4

Attorney's Docket No.: 19146-002001

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REMARKS

The Office Action identified the following allegedly patentably distinct species: Figs. 3a-3d directed to species 1; Figs. 4a-4b directed to species 2; Figs. 5a-5b directed to species 3; Figs. 6a-6b directed to species 4, and Figs. 7a-7b directed to species 5. See Office Action at page 2 ¶ 1. Claims 1, 3-6, 9-21, 23-55 fall within Group 1 drawn to species 1. Claim 8 falls within Group 2 drawn to species 4. Claim 7 falls within Group 3 drawn to species 5. No claims fall within species 2 or species 3. Claims 2 and 22 were cancelled in the previous preliminary amendment. Claims 1, 12, 17, 24, 28, 29, and 43 are generic to all species. Applicants elect Group 1 drawn to the species 1 of Figs. 3a-3d with traverse. See Office Action at page 2 ¶ 1.

Traversing Restriction/Election Under 37 C.F.R. § 1.143

Applicants request reconsideration of the restriction requirement pursuant to 37 C.F.R. § 1.143 and respectfully request that the requirement be withdrawn since the Office Action fails to clearly outline the reasons for holding that the alleged distinct species are present.

The Office Action alleges that Figures 3a-3b, 4a-4b, 5a-5b, 6a-6b, 7a-7b comprise 5 patentably distinct species. The Examiner has the burden to concisely state, "[t]he particular reasons relied on ... for holding that the inventions as claimed are independent or distinct." See M.P.E.P. § 808.01. However, the Office Action fails to state any such reasons, apparently basing the restriction solely on the cited Figures. See Office Action at page 2 ¶ 1. As such, Applicants respectfully request that Examiner concisely state the particular reasons for holding the inventions independent and distinct.

Each of the figures cited in the Office Action depicts a hand-held electronic device wherein a second input assembly of the device includes different types of input elements: Figures 3a-3b depict a "pressure sensitive pad," Figures 4a-4b depict a "touch pad," Figures 5a-5b depict "two dimensional rockers," Figures 6a-6b depict a "D-pad and two contact sensors," Figures 7a-7b depict "rotary dials." See Specification at page 8 lines 13-22. The specification discloses, "a flexible and efficient human interface and input system ... that utilize[s] the opposed thumb and finger ergonomics inherent in the hand..." See Specification at page 5 lines 20-23. The human interface implemented as a device having two input assemblies: "...the first input assembly 340 on the front-side surface 312 and the second input assembly 350 on the back-

Applicant : Beth Marcus, et al
Serial No. : 10/699,555
Filed : October 31, 2003
Page : 3 of 4

Attorney's Docket No.: 19146-002001

side surface 314, left-side surface 316 and right-side surface 318, is configured to take advantage of the biomechanics of the hand..." See Specification at page 13 lines 19-23; emphasis added.

The first and second assemblies can include a number of various input elements. For example in Figures 3a-b, the specification describes implementing the second input assembly 350 to include a pressure sensor pad 354. See *id.* at page 11, lines 2-28. However, the input elements 352 and 354 disposed on the first and second assemblies of Figure 3a-b can include a other suitable input elements including, for example, a pressure sensitive pad, a touch pad, rockers, a D-pad, and/or rotary dials. See *id.* at page 12 lines 3-8. Any of the disclosed input elements may be used on the second surface: "[i]t is to be understood that the input elements [on the second surface] ... could be analog and/or digital buttons, keys, rockers (which may be a one or more position buttons or an analog joystick-type button), sliders, dials or touch pads ... positional sensors (such as rotary encodes, linear potentiometers and the like) or other sensors or combinations of them." See *id.*; emphasis added. Thus, the Figures 4a-4b, 5a-5b, 6a-6b, and 7a-7b, are only illustrative of the above mentioned variations in the input elements disposed on the first and second assembly of the human interface device.

For at least these reasons, the election/restriction of species requirement is improper and should be withdrawn.

Upon the allowance of generic claims 1, 12, 17, 24, 28, 29, and 43, Applicants reserve the right to consideration of claims to additional species which depend from or otherwise require all the limitations of an allowable generic claim as provided by 37 CFR 1.141.

Applicant : Beth Marcus, et al
Serial No. : 10/699,555
Filed : October 31, 2003
Page : 4 of 4


Attorney's Docket No.: 19146-002001

CONCLUSION

Please apply any charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

Date: July 14, 2006



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Reg. No. 52,196

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/699,555	10/31/2003	Beth Marcus	19146-002001	3602

20985 7590 06/14/2006
FISH & RICHARDSON, PC
P.O. BOX 1022
MINNEAPOLIS, MN 55440-1022

EXAMINER

OSORIO, RICARDO

ART UNIT PAPER NUMBER

2629

DATE MAILED: 06/14/2006

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

Office Action Summary	Application No. 10/699,555	Applicant(s) MARCUS ET AL.	
	Examiner RICARDO L. OSORIO	Art Unit 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 1 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 31 October 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) 1-55 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) _____ is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) 1-55 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-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: _____.

DETAILED ACTION

Election/Restrictions

1. This application contains claims directed to the following patentably distinct species: Figs. 3a-3d are directed to species 1; Figs. 4a-4b are directed to species 2; Figs. 5a-5b are directed to species 3; Figs. 6a-6b are directed to species 4, and Figs. 7a-7b are directed to species 5. Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, there are no generic claims.

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which depend from or otherwise require all the limitations of an allowable generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

Applicant is advised that the reply to this requirement to be complete must include (i) an election of a species or invention to be examined even though the requirement be traversed (37 CFR 1.143) and (ii) identification of the claims encompassing the elected invention.

The election of an invention or species may be made with or without traverse. To reserve a right to petition, the election must be made with traverse. If the reply does not distinctly and

Art Unit: 2629

specifically point out supposed errors in the restriction requirement, the election shall be treated as an election without traverse.

Should applicant traverse on the ground that the inventions or species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the inventions or species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C.103(a) of the other invention.

2. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ricardo L. Osorio whose telephone number is 571-272-7676. The examiner can normally be reached on Monday through Thursday from 7:00 A.M. to 5:30 P.M. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bipin Shalwala whose telephone number is 571-272-7681.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

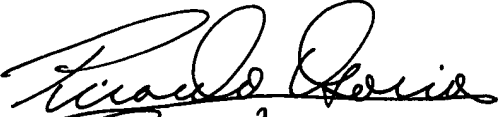
or faxed to: 571-273-8300 (for Technology Center 2600 only)

Hand-delivered responses should be brought to the Customer Service Window at the Randolph Building, 401, Dulany Street, Alexandria, VA 22314.

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

Art Unit: 2629

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).


Ricardo Osorio
Technology Division: 2629
PRIMARY EXAMINER

RLO
June 12, 2006



JFW

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Beth Marcus, et al
Serial No. : 10/699,555
Filed : October 31, 2003
Title : HUMAN INTERFACE SYSTEM
Art Unit : 2673
Examiner : Unknown

MAIL STOP AMENDMENT

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

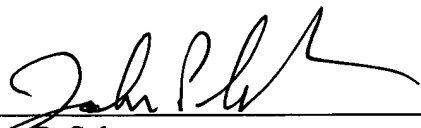
INFORMATION DISCLOSURE STATEMENT

Applicants request consideration of the references listed on the attached PTO-1449 form. Under 37 C.F.R. § 1.98 (a)(2)(ii), only copies of foreign patent documents and/or non-patent literature are enclosed. Copies of any listed U.S. patents or U.S. patent application publications can be provided upon request.

This statement is being filed within three months of the filing date of the application or before the receipt of a first Office Action on the merits. Please apply any charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

Date: May 10, 2006



John P. Schnurer
Reg. No. 52,196

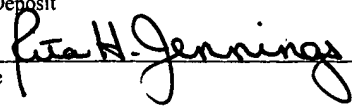
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CERTIFICATE OF MAILING BY FIRST CLASS MAIL

I hereby certify under 37 CFR §1.8(a) that this correspondence is being deposited with the United States Postal Service as first class mail with sufficient postage on the date indicated below and is addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Date of Deposit May 10, 2005

Signature 

Typed or Printed Name of Person Signing Certificate Rita H. Jennings

Substitute Form PTO-1449 U.S. Department of Commerce Patent and Trademark Office Information Disclosure Statement by Applicant (Use several sheets if necessary) MAY 15 2006 37 CFR § 1.986	Attorney's Docket No. 19146-002001	Application No. 10/699,555
	Applicant Beth Marcus, et al	
	Filing Date October 31, 2003	Group Art Unit 2673

U.S. Patent Documents

Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	AA	5,365,589	11/15/1994	Howard A. Gutowitz			
	AB	5,432,510	7/11/1995	Walter S. Matthews			
	AC	5,782,642	7/21/1998	Michael Goren			
	AD	6,115,028	9/5/2000	Balakrishnan et al.			
	AE	6,219,731	4/17/2001	Howard A. Gutowitz			
	AF	6,228,709	5/8/2001	Wen-Yi Hsieh			
	AG	6,512,511	1/28/2003	Willner et al.			
	AH	6,573,844	6/3/2003	Venolia et al.			
	AI	6,606,486	8/12/2003	Cubbage et al.			
	AJ	6,654,733	11/25/2003	Goodman et al.			
	AK	6,703,963	3/9/2004	Timothy B. Higginson			
	AL	6,738,045	5/18/2004	Hinkley et al.			
	AM	6,741,235	5/25/2004	Michael Goren			
	AN	6,760,013	7/6/2004	Willner et al.			
	AO	6,865,718	3/8/2005	Levi Montalcini			
	AP	6,885,317	4/26/2005	Howard A. Gutowitz			
	AQ	6,885,318	4/26/2005	Matthew J. Bickerton			
	AR	6,911,608	6/28/2005	David H. Levy			
	AS	6,980,200	12/27/2005	Michael Goren			
	AT	RE37723	6/4/2002	Michael Goren			

Foreign Patent Documents or Published Foreign Patent Applications

Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation	
							Yes	No
	AU							

Other Documents (include Author, Title, Date, and Place of Publication)

Examiner Initial	Desig. ID	Document

Examiner Signature	Date Considered
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EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Substitute Form PTO-1449 (Modified)	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 19146-002001	Application No. 10/699,555
Information Disclosure Statement by Applicant (Use several sheets if necessary)		Applicant Beth Marcus, et al	
		Filing Date October 31, 2003	Group Art Unit 2673
(37 CFR §1.98(b))			

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
	AHH	Andriy Pavlovych, Wolfgang Stürzlinger: Less-Tap: A Fast and Easy-to-learn Text Input Technique for Phones. Graphics Interface 2003, 97-104 http://www.graphicsinterface.org/cgi-bin/DownloadPaper?name=2003/170/paper170.pdf
	AII	Scott MacKenzie , Hedy Kober , Derek Smith , Terry Jones , Eugene Skepner, LetterWise: prefix-based disambiguation for mobile text input, Proceedings of the 14th annual ACM symposium on User interface software and technology, November 11-14, 2001, Orlando, Florida
	AJJ	H. Kober, E. Skepner, T. Jones, H. Gutowitz, S. MacKenzie, 2001. Linguistically Optimized Text Entry on a Cell Phone. In Proceedings of the CHI 2001. http://www.eatoni.com/research/chi.pdf
	AKK	Mikael Goldstein and Didier Chincholle The Finger-Joint-Gesture Wearable Keypad. Ericsson Radio Systems.
	ALL	Rosenberg, R. (1998). Computing without Mice and Keyboards: Text and Graphic Input Devices for Mobile Computing. Ph.D. Thesis, Dept. of Computer Science, University College, London, 1998. http://www.obscure.org/rosenberg/
	AMM	MacKay, B., Dearman, D., Inkpen, K., and Watters, C. 2005. Walk 'n scroll: a comparison of software-based navigation techniques for different levels of mobility. In Proceedings of the 7th international Conference on Human Computer interaction with Mobile Devices & Services (Salzburg, Austria, September 19 - 22, 2005). MobileHCI '05, vol. 111. ACM Press, New York, NY, 183-190. http://portal.acm.org/citation.cfm?id=1085808&coll=GUIDE&dl=GUIDE&CFID=66591340&CFTOKEN=6294934
	ANN	Kranz, M., Holleis, P., Schmidt, A. "DistScroll – a new one-handed interaction device". In Proceedings of the 5th International Workshop on Smart Appliances and Wearable Computing, June 10, 2005. http://www.hcilab.org/documents/DistScrollAnewOneHandedInteractionDevice-KranzHolleisSchmidt-IWSAWC2005.pdf
	AOO	Daniel Fällmana , Andreas Lund , Mikael Wiberg, ScrollPad: Tangible Scrolling with Mobile Devices, Proceedings of the Proceedings of the 37th Annual Hawaii International Conference on System Sciences (HICSS'04) - Track 9, p.90286.3, January 05-08, 2004. http://portal.acm.org/citation.cfm?id=963347&coll=GUIDE&dl=GUIDE&CFID=66483658&CFTOKEN=36023921 http://daniel.fallman.org/resources/papers/fallman-hicss37.pdf
	APP	Chipman, L. E., Bederson, B. B., and Golbeck, J. A. 2004. SlideBar: analysis of a linear input device. Behav. Inf. Tech. 23, 1 (Jan. 2004), 1-9. http://portal.acm.org/citation.cfm?id=993182.993184# http://www.cs.umd.edu/Library/TRs/CS-TR-4471/CS-TR-4471.pdf
	AQQ	Orientation-based interaction for Mobile Devices. J. Darnauer, S. Garrity and T. Jim, Stanford University. http://hci.stanford.edu/srk/cs377a-mobile/project/final/darnauer-garrity-kim.pdf
	ARR	Rekimoto, J. Tilting operations for small screen interfaces. Proceedings of the 9th annual ACM symposium on User Interface software and technology, pp. 167-168, November 06-08, 1996, Seattle. http://portal.acm.org/citation.cfm?id=237115&coll=GUIDE&dl=GUIDE&CFID=66483658&CFTOKEN=36023921

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Form PTO-1449 (Modified) Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 19146-002001	Application No. 10/699,555
	Applicant Beth Marcus, et al		
	Filing Date October 31, 2003		Group Art Unit 2673

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
	ASS	Hinckley, K., Pierce, J., Horvitz, E., Sinclair, M. Foreground and Background Interaction with Sensor-enhanced Mobile Devices, ACM TOCHI (Transactions on Computer-Human Interaction) Special Issue on Sensor-Based Interaction, 12 (1), March 2005, pp. 31-52. http://portal.acm.org/citation.cfm?id=1057240&coll=GUIDE&dl=GUIDE&CFID=66591340&CFTOKEN=6294934
	ATT	Hinckley, K., Cutrell, E., Bathiche, S., and Muss, T. 2002. Quantitative analysis of scrolling techniques. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems: Changing Our World, Changing Ourselves (Minneapolis, Minnesota, USA, April 20 - 25, 2002). CHI '02. ACM Press, New York, NY, 65-72. http://doi.acm.org/10.1145/503376.503389
	AUU	Harrison, B. L., Fishkin, K. P., Gujar, A., Mochon, C., and Want, R. 1998. Squeeze me, hold me, tilt me! An exploration of manipulative user interfaces. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (Los Angeles, California, United States, April 18 - 23, 1998). C. Karat, A. Lund, J. Coutaz, and J. Karat, Eds. Conference on Human Factors in Computing Systems. ACM Press/Addison-Wesley Publishing Co., New York, NY, 17-24. http://portal.acm.org/citation.cfm?id=274647&coll=Portal&dl=GUIDE&CFID=66588306&CFTOKEN=73460863&CFID=66588306&CFTOKEN=73460863#
	AVV	Kiyokuni Kawachiya, Hiroshi Ishikawa, NaviPoint: an input device for mobile information browsing, Proceedings of the SIGCHI conference on Human factors in computing systems, p.1-8, April 18-23, 1998, Los Angeles, California, United States http://portal.acm.org/citation.cfm?id=274645&coll=Portal&dl=GUIDE&CFID=66588306&CFTOKEN=73460863
	AWW	Hinkley, K., Pierce, J., Sinclair, M., and Horvitz, E. Sensing Techniques for Mobile Interaction. UIST 2000: ACM Symposium on User Interface Software and Technology, pp. 91-100. http://portal.acm.org/citation.cfm?id=354417&coll=GUIDE&dl=GUIDE&CFID=66483658&CFTOKEN=36023921
	AXX	Baillie, L., Kunczier, H., and Anegg, H. 2005. Rolling, rotating and imagining in a virtual mobile world. In Proceedings of the 7th international Conference on Human Computer interaction with Mobile Devices & Services (Salzburg, Austria, September 19 - 22, 2005). MobileHCI '05, vol. 111. ACM Press, New York, NY, 283-286. http://doi.acm.org/10.1145/1085777.1085833
	AYY	Amy K. Karlson, Benjamin B. Bederson, John SanGiovanni, 2004. AppLens and LaunchTile: Two Designs for One-Handed Thumb Use on Small Devices http://hcil.cs.umd.edu/trs/2004-37/2004-37.html
	AZZ	Virpi Roto, Nokia Research. Browsing on Mobile Phones. http://www.research.att.com/~rjana/WF12_Paper1.pdf
	AAAA	Qualcomm.Slingshot http://wireless.ign.com/articles/657/657041p1.html
	ABBB	GamePad http://www.mobilemag.com/content/100/345/C5578/
	ACCC	Kyocera Candid KX16 http://www.mobilemag.com/content/100/340/C4392/

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	Applicant Beth Marcus, et al		
	Filing Date October 31, 2003		Group Art Unit 2673

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
	ADDD	XEG Mobile Phone Pad http://us.gizmodo.com/gadgets/cellphones/gaming-on-the-go-with-xeg-136414.php http://www.akihabaranews.com/en/news-10615-XEG%2C+the+mobile+phone+pad.html
	AEEE	Samsung Game Pad http://www.cellphonemall.net/wireless/store/accessorydetail.asp?id=23198&phoneid=334
	AFFF	Thumbscript http://www.thumbscript.com/index.html http://www.thumbscript.com/howitworks.html http://www.thumbscript.com/technotes.html
	AGGG	Exideas http://www.exideas.com/ME/index.html http://www.exideas.com/ME/HardKey.html
	AHHH	NE-Ware http://www.n-e-ware.com/Downloads/KeyStick/330/KSUserManual330_01.pdf
	AIII	Synaptics http://www.synaptics.com/products/pdf/mobiletouch_pb.pdf
	AJJJ	Atrua: sensor company http://www.atrua.com/s-mobilephones.html
	AKKK	Varatouch: sensor company http://www.esato.com/news/article.php?id=388
	ALLL	Eleksen www.eleksen.com
	AMMM	SHARP Vodafone ZTCJ01 http://www.slashphone.com/93/3123.html
	ANNN	The GamePad http://www.kotaku.com/gaming/cell-phones/killer-cell-phone-game-controller-130968.php
	AOOO	Sony Clie game controller PEGA-GC10 http://www.palminfocenter.com/view_story.asp?ID=4295
	APPP	Bluetooth GPS http://mobilitytoday.com/news/005986/mobility_buyGPSnow_i-Blue_bluetooth_GPS
	AQQQ	Alphagrip http://www.alphagrips.com/AlphagripAG5UsersManual.pdf
	ARRR	Tegic - T9 http://www.tegic.com/pdfs/salessheets/T9%20Adaptive%20Text%20Input%20Sales%20Sheet%201.pdf http://www.tegic.com/pdfs/salessheets/T9%20Adaptive%20Text%20Input%20Sales%20Sheet%202.pdf http://www.tegic.com/pdfs/salessheets/T9%20Adaptive%20Text%20Input%20Sales%20Sheet%203.pdf http://www.tegic.com/pdfs/salessheets/Sloppy%20Type%20Sales%20Sheet.pdf
	ASSS	Zicorp - eZiTap http://www.zicorp.com/eZiTap.htm
	ATTT	Motorola - iTAP http://news.zdnet.co.uk/hardware/mobile/0,39020360,39118435,00.htm
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Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
	AUUU	DigitWireless: FastTap http://www.digitwireless.com/flash/download/fastap.pdf
	AVVV	Microth KeyWheel http://www.microth.com/circumscript/overview.asp
	AWWW	Yuvee; special keypad layout www.yuvee.com http://www.yuvee.com/builtin1.shtml http://www.yuvee.com/built_in_b.shtml http://www.yuvee.com/testdrive2.shtml
	AXXX	Twiddler http://www.handykey.com/ http://www.handykey.com/Keymap.pdf
	AYYY	Sengital Ltd. Tilt sensor replacement for PDA http://sengital.manufacturer.globalsources.com/si/6008823523892/ProductDetail/PDA-keyboard/product_id-1001050135/action-GetProduct.htm
	AZZZ	Howard.co.kr - The mouse phone http://www.howard.co.kr/computer/mouse/mousephone.htm
	AAAAA	Nokia 6620 with a control stick http://nds2.nokia.com/files/support/nam/phones/guides/6620_US_en.PDF
	ABBBB	Sega into cell phones http://www.phoneyworld.com/newspage.aspx?n=1745
	ACCCC	Prevalent Devices LLC http://www.prevalentdevices.com/manual3-5-06.pdf
	ADDDD	M. Kolsch, M. Turk, 2002. Keyboards without Keyboards: A Survey of Virtual Keyboards. UCSB Technical Report 2002-21, July 12, 2002. http://www.cs.ucsb.edu/research/tech_reports/reports/2002-21.pdf
	AEEEE	Jeong-Hoon Shin and Kwang-Seok Hong. An improved alphanumeric input algorithm using gloves. http://www.complexity.org.au/conference/upload/shin01/shin01.pdf
	AFFFF	C. Metzger, M. Anderson, T. Starnier, 2004. FreeDigiter: A Contact-Free Device for Gesture Control. Eighth IEEE International Symposium on Wearable Computers (ISWC'04) pp. 18-21. http://www.wirelessrrc.gatech.edu/projects/development/D1files/iswc04-freedigiter.pdf
	AGGGG	Rakkolainen, I. (2003). MobiVR - a novel user interface concept for mobile computing. In: Bieber, K. & Kirste, T. (eds.), Proceedings of the 4th International Workshop on Mobile Computing, IMC 2003, 17-18 June 2003, Rostock, Germany, pp. 107-112. http://www.cs.tut.fi/~ira/IMC2003.pdf
	AHHHH	Lumsden, J., Gammell, A. (2004). Mobile Note Taking: Investigating the Efficacy of Mobile Text Entry. In Proc. of Mobile Human-Computer Interaction (MobileHCI 2004), Glasgow, UK, Sept. 2004; In S. Brewster and M. Dunlop (Eds.). Mobile Human-Computer-Interaction - MobileHCI 2004, Lecture Notes in Computer Science, Vol. 3160, Berlin: Springer, 156--168.
	AIIII	MacKenzie, I. S., & Soukoreff, R. W. Phrase sets for evaluating text entry techniques. Extended Abstracts of the ACM Conference on Human Factors in Computing Systems - CHI 2003, pp. 754-755 New York: ACM

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Information Disclosure Statement by Applicant (Use several sheets if necessary)		Applicant Beth Marcus, et al	
		Filing Date October 31, 2003	Group Art Unit 2673
(37 CFR §1.98(b))			

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
	AJJJ	MacKenzie, I. S. (2002). KSPC (keystrokes per character) as a characteristic of text entry techniques. Proceedings of the Fourth International Symposium on Human-Computer Interaction with Mobile Devices, pp. 195-210. Heidelberg, Germany: Springer-Verlag
	AKKKK	Soukoreff, R. W. and MacKenzie, I. S. (2004). Recent Developments in Text-Entry Error Rate Measurement. CHI 2004, Late Breaking Results Paper, Vienna Austria, April 24-29, 2004.
	ALLL	Lee, S. and Hong S.H.. Chording as a Text Entry Method in Mobile Phones. In Proceedings of the MobileHCI 2004: 6th International Symposium, Glasgow, UK, September 13-16, 2004.
	AMMMM	Green, N., Kruger, J., Faldu, C., and St. Amant, R. 2004. A reduced QWERTY keyboard for mobile text entry. In CHI '04 Extended Abstracts on Human Factors in Computing Systems (Vienna, Austria, April 24 - 29, 2004). CHI '04. ACM Press, New York, NY, 1429-1432. http://portal.acm.org/citation.cfm?id=986082&coll=GUIDE&dl=GUIDE&CFID=66591340&CFTOKEN=6294934
	ANNNN	Partridge, K., Chatterjee, S., Sazawal, V., Borriello, G., and Want, R. TiltType: accelerometer-supported text entry for very small devices, Proceedings of the 15th annual ACM symposium on User interface software and technology, October 27-30, 2002, Paris, France
	AOOOO	Mikael Goldstein, Didier Chincholle, Morten Back (2000). Assessing Two New Wearable Input Paradigms: The Finger-Joint-Gesture Palm-Keypad Glove and the Invisible Phone-Clock. Personal and Ubiquitous Computing, Volume 4, Issue 2/3.
	APPPP	Bartlett, J. F. 2000. Rock 'n' Scroll Is Here to Stay. IEEE Comput. Graph. Appl. 20, 3 (May. 2000), 40-45. http://portal.acm.org/citation.cfm?id=618728&coll=Portal&dl=GUIDE&CFID=66588306&CFTOKEN=73460863#
	AQQQQ	Eslambolchilar, P., Murray-Smith, R. (2004). Tilt-Based Automatic Zooming and Scaling in Mobile Devices - A state-space implementation. In Proc. of Mobile Human-Computer Interaction (MobileHCI 2004), Glasgow, UK, Sept. 2004: In S. Brewster and M. Dunlop (Eds.). Mobile Human-Computer-Interaction - MobileHCI 2004, Lecture Notes in Computer Science, Vol. 3160, Berlin: Springer, 120-131.
	ARRRR	Zhai, S., Smith, B.A., and Selker, T. Improving Browsing Performance: A study of four input devices for scrolling and pointing tasks, Proceedings of the IFIP TC13 International Conference on Human-Computer Interaction, p.286-293, July 14-18, 1997.
	ASSSS	Wobbrock, J. O., Forlizzi, J., Hudson, S. E. and Myers, B. A. WebThumb: interaction techniques for small-screen browsers. Proc. UIST, ACM Press (2002), 205-208.
	ATTTT	Lee, S., Hong, S. H., and Jeon, J. W. 2002. Designing a universal keyboard using chording gloves. SIGCAPH Comput. Phys. Handicap. , 73-74 (Jun. 2002), 142-147. http://doi.acm.org/10.1145/960201.957230
	AUUUU	Pirhonen, A., Brewster, S., and Holguin, C. 2002. Gestural and audio metaphors as a means of control for mobile devices. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems: Changing Our World, Changing Ourselves (Minneapolis, Minnesota, USA, April 20 - 25, 2002). CHI '02. ACM Press, New York, NY, 291-298. http://doi.acm.org/10.1145/503376.503428
	AVVVV	Kjeldskov, J. and Graham, C. (2003). A Review of Mobile HCI Research Methods. In Proc. of Mobile Human-Computer Interaction (MobileHCI 2003), Udine Italy, Sept. 2003: In L. Chittaro (Ed.). Mobile Human-Computer-Interaction - MobileHCI 2003, Lecture Notes in Computer Science, Vol. 2795, Berlin: Springer, 317-335.

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	AV	Donner, J. (2005). Research Approaches to Mobile Use in Developing World: A Review of the Literature. International Conference on Mobile Communication and Asian Modernities City University of Hong Kong, June 7-8 2005.
	AW	Min, Lin and Sears, Andrew (2005). Graphics Matter: A Case Study of Mobile Phone Keypad Design for Chinese Input. CHI 2005, Late Breaking Results: Posters, Portland, Oregon. April 2-7, 2005.
	AX	MacKenzie, S., & Soukoreff, W. (2002). Text entry for mobile computing: Models and methods, theory and practice. Human-Computer Interaction. 17. p. 147--198. http://www.yorku.ca/mack/hci3-2002.pdf
	AY	Starner, T. "Keyboards Redux: Fast Mobile Text Entry". Pervasive Computing, July - September 2004, Pp. 97-101. http://www.cc.gatech.edu/fac/Thad.Starner/p/magazine/2004-3-keyboard-redux.pdf
	AZ	Lee Butts , Andy Cockburn, An evaluation of mobile phone text input methods, Third Australasian conference on User interfaces, p.55-59, January 01, 2002, Melbourne, Victoria, Australia http://www.crpit.com/confpapers/CRPITV7Butts.pdf
	AAA	Chording and Tilting – Daniel Wigdor (thesis) – 2004- describes chordtap and tilttap (also covered in depth in the paper referenced below)- http://www.dgp.toronto.edu/~dwigdor/research/thesis/submitted.html
	ABB	Wigdor, D. and Balakrishnan, R. "A Comparison of Consecutive and Concurrent Input Text Entry Techniques for Mobile Phones", Conference on Human Factors, April 24-29, 2004, Volume 6, Number 1, pp. 81-88 http://portal.acm.org/citation.cfm?id=985703 http://www.dgp.toronto.edu/~ravin/papers/chi2004_concurrenttextinput.pdf
	ACC	Oniszczyk, A., & MacKenzie, I. S. (2004). A comparison of two input methods for keypads on mobile devices. Proceedings of NordiCHI 2004, pp. 101-104. New York: ACM. http://www.yorku.ca/mack/nordichi2004.pdf
	ADD	K. Lyons. Everyday wearable computer use: A case study of an expert user. In Proceedings of Mobile HCI 2003, pages 61--75, 2003. http://www.cc.gatech.edu/ccg/publications/everyday_case.pdf
	AEE	K. Lyons, T. Starner, D. Plaisted, J. Fusia, A. Lyons, A. Drew, E. W. Looney, 2004. "Twiddler Typing: One-Handed Chording Text Entry for Mobile Phones," Proc. Conf. Human Factors in Computing Systems (SIGCHI 01), ACM Press, 2004, pp. 671–678. http://www.cc.gatech.edu/fac/Thad.Starner/p/030_10_MTE/twiddler-chi04.pdf
	AFF	Daniel Wigdor , Ravin Balakrishnan, TiltText: using tilt for text input to mobile phones, Proceedings of the 16th annual ACM symposium on User interface software and technology, p.81-90, November 02-05, 2003, Vancouver, Canada http://portal.acm.org/citation.cfm?id=964705 http://www.dgp.toronto.edu/~ravin/papers/uist2003_tilttext.pdf
	AGG	M. D. Dunlop and A. Crossan, "Dictionary based text entry method for mobile phones", published in Brewster, S.A., and Dunlop, M.D., (editors). Proceedings of Second Workshop on Human Computer Interaction with Mobile Devices, August 1999. http://www.cis.strath.ac.uk/~mdd/research/publications/99dunlopcrossan.pdf

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		Applicant Beth Marcus, et al	
		Filing Date October 31, 2003	Group Art Unit 2673
Information Disclosure Statement by Applicant (Use several sheets if necessary)			
(37 CFR §1.98(b))			

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
	AWWWW	Kjeldskov, J. Stage, J. (2004). New Techniques for Usability Evaluation of Mobile Systems. International Journal of Human-Computer Studies, May 2004, 60 (5-6): 599--620.

Examiner Signature	Date Considered
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APR 17 2006

Attorney's Docket No.: 19146-002001

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OFFICIAL FAX NO: (571) 273-8300

Number of pages including this page 19

Applicant : Beth Marcus, et al
Serial No. : 10/699,555
Filed : October 31, 2003

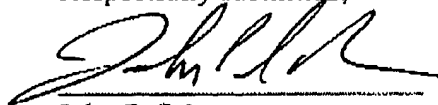
Art Unit : 2629
Examiner : Richard Hjerpe

Title : Human Interface System

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

Attached to this facsimile communication cover sheet is SUPPLEMENTAL
PRELIMINARY AMENDMENT, faxed this 17th day of April, 2006, to the United States
Patent and Trademark Office.

Respectfully submitted,



John P. Schnurer
Reg. No. 52,196

Date: April 17, 2006

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Attorney's Docket No.: 19146-002001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant :	Beth Marcus, et al	Art Unit :	2629
Serial No. :	10/699,555	Examiner :	Richardo Osorio
Filed :	October 31, 2003		
Title :	HUMAN INTERFACE SYSTEM		

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

SUPPLEMENTAL PRELIMINARY AMENDMENT

Prior to examination, please amend the application as indicated on the following pages.

CERTIFICATE OF TRANSMISSION BY FACSIMILE

I hereby certify that this correspondence is being transmitted by facsimile to the Patent and Trademark Office on the date indicated below.

April 17, 2006

 Date of Transmission

Rita H. Jennings

 Signature

Rita H. Jennings

 Typed or Printed Name of Person Signing Certificate

Applicant : Beth Marcus, et al
Serial No. : 10/699,555
Filed : October 31, 2003
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Amendments to the Claims:

This listing of claims replaces all prior versions and listings of claims in the application:

Listing of Claims:

1. (Previously Presented) A hand-held electronic device comprising:

- a memory configured to store a plurality of applications, wherein each application is associated with a set of functions;
- a processor configured to process a selected one of the plurality of applications;
- a first input assembly having a plurality of input elements on a first surface configured to receive input from a human user through manipulation of the plurality of input elements, wherein at least one of the input elements on the first surface is configured to selectively map to one or more input functions of the set of functions associated with the selected one of the plurality of applications; and
- a second input assembly having one or more input elements on a second surface configured to be manipulated by one or more of the human user's fingers, wherein at least one of the input elements on the second surface is further configured to be selectively mapped to one or more input functions of the set of functions corresponding to the selected one of the plurality of applications, further wherein the plurality of input elements on the first surface and the one or more input elements on the second surface are arranged so as to substantially optimize a biomechanical effect of the human user's hand.

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2. (Cancelled).

3. (Previously Presented) The hand-held electronic device of claim 1, wherein at least one of the input elements of the second input assembly is a sensor pad configured to selectively represent a plurality of delineated active areas, wherein manipulation of a delineated active area causes the input function of one or more input elements of the first input assembly to change.

4. (Previously Presented) The hand-held electronic device of claim 3, further comprising a shape changing media configured relative to the sensor pad so as to permit the human user to tactilcly discriminate between the plurality of delineated active areas.

5. (Previously Presented) The hand-held electronic device of claim 1, wherein the processor receives signals generated by the input elements of first or second input assemblies when manipulated by the human user.

6. (Previously Presented) The hand-held electronic device of claim 1 further comprising an input controller, wherein the input controller receives signals generated by the input elements of first or second input assemblies when manipulated by the human user and converts the signals into a form suitable to be interpreted by the processor.

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7. (Previously Presented) The hand-held electronic device of claim 1, wherein at least one of the input elements of the second input assembly is a rotary sensor.

8. (Previously Presented) The hand-held electronic device of claim 1, wherein at least one of the input elements of second input assembly is a D-pad.

9. (Previously Presented) The hand-held electronic device of claim 1, further comprising at least one palpable detent, wherein the detent is associated with at least one of the input elements of the first or second input assemblies so as to provide tactile feedback to the human user when the human user manipulates the input element associated with the palpable detent.

10. (Previously Presented) The hand-held electronic device of claim 1 further comprising one or more vibratory or force producing units, at least one of the vibratory or force producing units configured to provide tactile feedback upon the human user's manipulation of at least one of the input elements of the first or second input assemblies.

11. (Previously Presented) The hand-held electronic device of claim 10, wherein at least one of the vibratory units provide tactile feedback in response to events occurring in the selected application running on the processor.

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12. (Previously Presented) A hand-held electronic device comprising:

- a memory configured to store a plurality of applications, wherein each application is associated with a set of functions;
- a processor configured to process a selected one of the plurality of applications, wherein the set of functions associated with the selected application includes a plurality of text symbol functions and a plurality of shifting functions;
- a first surface having a plurality of input elements configured to receive input from a human user through manipulation of the plurality of input elements, wherein at least one of the input elements of the first surface is further configured to selectively map to more than one text symbol function; and
- a second surface having one or more input elements, wherein at least one of the input elements of the second surface having one or more selectable active areas configured to be manipulated by one or more of the human user's fingers, each selectable active area configured to selectively map to a different shifting function, wherein manipulation of one of the selectable active area causes the text symbol function of the one or more input elements of the first surface to change, further wherein the plurality of input elements of the first surface and the one or more input elements of the second surface are arranged so as to substantially optimize a biomechanical effect of the human user's hand.

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13. (Previously Presented) The hand-held electronic device of claim 12 further comprising a controller, wherein the controller receives signals generated by the human user's manipulation of the input elements of the first surface or active areas.

14. (Previously Presented) The hand-held electronic device of claim 13 further comprising a dome cap positioned above at least one input element of the first surface or the second surface and capable of providing tactile feedback to the human user when the input element associated with the dome cap is manipulated.

15. (Previously Presented) The hand-held electronic device of claim 13 further comprising one or more vibratory units capable of providing tactile feedback.

16. (Previously Presented) The hand-held electronic device of claim 13 further comprising one or more force producing units capable of providing tactile feedback.

17. (Previously Presented) A method for configuring a human interface and input system for use with a hand-held electronic device configured to run a plurality of applications, each application associated with a set of functions, the method comprising:
disposing on a first surface a first input assembly having a plurality of input elements configured to receive input from a human user through manipulation of the plurality of input elements, wherein at least one of the input elements of the first input assembly is further

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configured to map to more than one input function associated with a selected one of the plurality of applications;

disposing on a second surface a second input assembly having one or more input elements configured to be manipulated by one or more of the human user's fingers, wherein at least one of the input elements of the second input assembly is further configured to selectively map to one or more input functions associated with the selected application; and

arranging the plurality of input elements of the first input assembly and the one or more input elements of the second input assembly to substantially optimize a biomechanical effect of the human user's hand.

18. (Previously Presented) The method of claim 17 further comprising:
physically or electronically labeling at least one input element of the first input assembly or the second input assembly so as to visually indicate an input function that can be selectively accessed by actuating the input element.

19. (Previously Presented) The method of claim 17 further comprising
connecting a controller to the input elements of the first input assembly or the second input assembly, wherein the controller is configured to receive signals generated by a manipulation of one or more of the input elements of first input assembly or the second input assembly.

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20. (Previously Presented) The method of claim 19, wherein at least one input element of second input assembly having a plurality of active areas configurable by the controller to form a plurality of delineated active areas.

21. (Previously Presented) The method of claim 20 further comprising positioning a shape changing media relative to the one input element of second input assembly having a plurality of active areas so as to permit the human user to tactilely discriminate between the plurality of delineated active areas.

22. (Cancelled)

23. (Previously Presented) The method of claim 17 further comprising positioning a palpable detent with at least one input element of the first input assembly or the second input assembly so as to provide tactile feedback when manipulated by the human user.

24. (Currently Amended) A method for inputting data on a hand-held electronic device having a first surface with a plurality of input elements configured to receive input from a human user through manipulation of the plurality of input elements, wherein at least one of the input elements is further configured to map to a plurality of symbols in a data input mode, wherein each of the plurality of symbols is associated with a unique index position identifier, and a second surface having one or more selection elements configured to be manipulated by one or

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more of the human user's fingers, wherein each selection element corresponds to one of the unique index position identifiers, further wherein the plurality of input elements and the one or more selection elements are arranged to substantially optimize a biomechanical effect of the human user's hand, the method comprising:

executing a selected application from a plurality of applications, wherein the selected application is associated with a set of functions;

determining the index position identifier of a desired symbol to be inputted based on the functions associated with the selected application;

pressing the selection element corresponding to the index position identifier of the desired symbol with any digit or object held in the human user's hand; and

pressing the input element configured to map to the desired symbol with any digit or object held in the human user's hand. ~~(page 14, lines 2-27).~~

25. (Previously Presented) The method of claim 24, wherein each input element is physically or electronically labeled indicating each symbol that is mapped to by the input element and a positional order in which each symbol can be selectively accessed by actuating the input element.

26. (Previously Presented) The method of claim 24, wherein determining the index position identifier of the desired character to be inputted comprises:

locating the input element configured to map to the desired symbol; and

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counting from left to right the number of symbols preceding the desired symbol labeled on the located input element, wherein the index position identifier of the desired symbol is the number of symbols preceding the desired symbol plus one.

27. (Previously Presented) The method of claim 24, wherein at least one of the input elements or selection elements is further configured to map to a plurality of modes corresponding to the selected application executing on the hand-held electronic device, at least one of the modes is the data input mode, the method further comprising enabling the data input mode.

28. (Previously Presented) A method for a human user to input data on a hand-held electronic device using an interface and input system comprising a plurality of input elements in a thumb-manipulated assembly to substantially optimize a biomechanical effect of the human user's thumb and fingers, wherein at least one input element is mapped to more than one text function, and one or more selection elements in a finger-manipulated input assembly, wherein each selection element is mapped to a unique shift position, the method comprising:

executing a selected text application from a plurality of applications, wherein the selected application is associated with a set of functions;

pressing a desired selection element of the finger-manipulated input assembly with a human a finger to select a desired shift position the selected text application; and

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pressing a desired input element of the thumb-manipulated input assembly with a human thumb to input a desired text character.

29. (Previously Presented) A hand-held electronic device comprising:

- a memory configured to store a plurality of applications, wherein each application is associated with a set of functions;
- a processor configured to process a selected one of the plurality of applications;
- a first input assembly disposed on a first surface of the electronic device, wherein the first input assembly comprises a plurality of input elements configured to be actuated by a human user's hand, wherein at least one of the input elements of the first input assembly is configured to map to one or more input functions of the set of functions associated with the selected one of the plurality of applications; and
- a second input assembly disposed on a second surface so as to substantially optimize a biomechanical effect of the human user's hand, wherein the second input assembly comprises one or more input elements configured to be manipulated by one or more of the human user's fingers, wherein at least one of the input elements of the second input assembly is a selectively configurable sensing surface so as to provide a plurality of delineated active areas, further wherein one or more of the delineated active areas is mapped to one or more functions associated with the selected application, further wherein the memory is further configured to store for each application a mapping of the selectively configurable sensing surface to the plurality of delineated active areas.

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30. (Previously Presented) The hand-held electronic device of claim 1, wherein the selected one of the plurality of applications is a text application; and the one or more input elements on the second surface of the second input assembly comprises one or more selection elements, wherein manipulations of the one or more selection elements causes the input elements on the first surface of the first input assembly to be selectively mapped from one text function to another text function.

31. (Previously Presented) The hand-held electronic device of claim 1, wherein the selected one of the plurality of application is a game application, and at least one of the plurality of input elements of the first input assembly and at least one of the input elements of the second input assembly are each configured to selectively map to one or more game functions.

32. (Previously Presented) The hand-held electronic device of claim 29, further comprising: an input controller, wherein the input controller receives a plurality of signals generated by the input elements of the first input assembly and the second input assembly when manipulated by the human user, and converts the plurality of signals into a form suitable to be interpreted by the processor.

33. (Previously Presented) The hand-held electronic device of claim 32, wherein at least one input element of the first input assembly or the second input assembly is configured to

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map to one or more input functions associated with the selected application that control a cursor on a screen.

34. (Previously Presented) The hand-held electronic device of claim 32, wherein the selected one of the plurality of applications is a game application.

35. (Previously Presented) The hand-held electronic device of claim 34, wherein at least one input element of the first input assembly or the second input assembly is configured to map to one or more input functions associated with the game application that control a game character on a screen.

36. (Currently Amended) The hand-held electronic device of claim 34, wherein the input controller is further configured to interpret a movement of the human user's finger sliding across two or more delineated active areas as a change in the mapped function of the two or more delineated active areas, wherein the mapped function is at least one of a speed control, a size control, a weapon fire control, and a position control. ~~(page 16, lines 4-30).~~

37. (Currently Amended) The hand-held electronic device of claim 34, wherein the input controller is further configured to interpret a pressure applied by the human user's finger on a selected one of the delineated active areas as a change in the mapped function of the selected delineated active area, wherein the mapped function is at least one of a speed control, a size control, a weapon fire, and position control. ~~(page 16, lines 4-30).~~

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38. (Previously Presented) The hand-held electronic device of claim 34, wherein at least one of the functions mapped to the input element of the first input assembly is a game function that is substantially optimized for actuation by the human user's thumb.

39. (Previously Presented) The hand-held electronic device of claim 38, wherein the game function that is substantially optimized for actuation by the human user's thumbs comprises a directional control.

40. (Previously Presented) The hand-held electronic device of claim 34, wherein at least one of the functions mapped to the delineated active areas is a game function that is substantially optimized for actuation by one or more of the human user's fingers.

41. (Previously Presented) The hand-held electronic device of claim 40, wherein the game function that is substantially optimized for actuation by one or more of the human user's fingers comprises a weapon fire control.

42. (Previously Presented) The hand-held electronic device of claim 40, wherein the game function that is substantially optimized for actuation by one or more of the human user's fingers comprises a game character jump control.

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43. (Previously Presented) A method for configuring a human interface and input system for use with a hand-held electronic device configured to run a plurality of applications, each application associated with a set of functions, the method comprising:

disposing on a first surface a first input assembly having a plurality of input elements configured to receive input from a human user's hand through manipulation of the plurality of input elements, wherein at least one of the input elements of the first input assembly is further configured to map to more than one input function associated with a selected one of the plurality of applications;

disposing on a second surface a second input assembly having one or more input elements configured to be manipulated by one or more of the human user's fingers, wherein at least one of the input elements of the second input assembly is further configured to selectively map to one or more input functions associated with the selected application; and

mapping the set of functions of the selected application to the one or more input elements of the first input assembly and the second input assembly to substantially optimize a biomechanical effect of the human user's hand.

44. (Previously Presented) The method of claim 43, wherein the selected application is at least one of a scrolling application, a text application and a game application.

45. (Previously Presented) The method of claim 44 further comprising: physically or electronically labeling at least one input element of the first input assembly or the second input

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assembly so as to visually indicate an input function that can be selectively accessed by actuating the input element.

46. (Previously Presented) The method of claim 44 further comprising connecting a controller to the input elements of the first input assembly or the second input assembly, wherein the controller is configured to receive signals generated by a manipulation of one or more of the input elements of first input assembly or the second input assembly.

47. (Previously Presented) The method of claim 46, wherein at least one input element of second input assembly having a plurality of active areas configurable by the controller to form a plurality of delineated active areas.

48. (Previously Presented) The method of claim 47 further comprising positioning a shape changing media relative to the one input element of second input assembly having a plurality of active areas so as to permit the human user to tactilely discriminate between the plurality of delineated active areas.

49. (Previously Presented) The hand-held electronic device of claim 1, wherein the processor is further configured to be communicatively coupled to a host electronic device.

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50. (Previously Presented) The hand-held electronic device of claim 12, wherein the processor is further configured to be communicatively coupled to a host electronic device.

51. (Previously Presented) The method of claim 19, wherein the controller is further configured to be communicatively coupled to a host electronic device.

52. (Previously Presented) The method of claim 24, wherein the hand-held electronic device is further configured to be communicatively coupled to a host electronic device.

53. (Previously Presented) The method of claim 28, wherein the hand-held electronic device is further configured to interface with a host electronic device.

54. (Previously Presented) The hand-held electronic device of claim 29, wherein the processor is further configured to interface with a host electronic device.

55. (Previously Presented) The method of claim 43, wherein the hand-held electronic device is configured to interface with a host electronic device.

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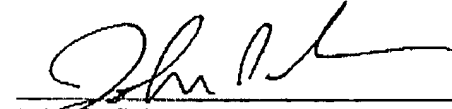
REMARKS

Claims 1, 3-21, 23-55 are pending. Claims 24 and 36-37 have been amended to correct typographical issues. No new matter has been added.

No fees are believed to be due. Please apply any other required fees, or any credits to deposit account 06-1050, referencing the attorney docket number shown above.

Respectfully submitted,

Date: April 17, 2006



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10/1099 555

PATENT APPLICATION FEE DETERMINATION RECORD
Effective October 1, 2003

Application or Docket Number
16300-02001

CLAIMS AS FILED - PART I

	(Column 1)	(Column 2)
TOTAL CLAIMS	28	
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	28 minus 20 =	9
INDEPENDENT CLAIMS	6 minus 3 =	3
MULTIPLE DEPENDENT CLAIM PRESENT <input type="checkbox"/>		

* 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	OR	RATE	FEE
BASIC FEE	385.00	OR	BASIC FEE	770.00
X5 9=	81	OR	X5 18=	
X43=	125	OR	X86=	
+145=		OR	+290=	
TOTAL	595	OR	TOTAL	

CLAIMS AS AMENDED - PART II

	(Column 1)	(Column 2)	(Column 3)
AMENDMENT A	3/27/06		
	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total	53	29	24
Independent	7	6	1
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>			

SMALL ENTITY OR **OTHER THAN SMALL ENTITY**

RATE	ADDITIONAL FEE	OR	RATE	ADDITIONAL FEE
X5 9=	600	OR	X5 18=	
X5 18=	100	OR	X86=	
+145=		OR	+290=	
TOTAL ADDIT. FEE	600	OR	TOTAL ADDIT. FEE	

4-17-06

	(Column 1)	(Column 2)	(Column 3)
AMENDMENT B			
	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total	53	53	0
Independent	7	7	0
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>			

RATE **ADDITIONAL FEE**

RATE	ADDITIONAL FEE	OR	RATE	ADDITIONAL FEE
X5 9=		OR	X5 18=	
X43=		OR	X86=	
+145=		OR	+290=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

	(Column 1)	(Column 2)	(Column 3)
AMENDMENT C			
	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total			
Independent			
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>			

RATE **ADDITIONAL FEE**

RATE	ADDITIONAL FEE	OR	RATE	ADDITIONAL FEE
X5 9=		OR	X5 18=	
X43=		OR	X86=	
+145=		OR	+290=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. 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.

Attorney's Docket No.: 19146-002001

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Number of pages including this page **2**

Applicant : Beth Marcus, et al
Serial No. : 10/699,555
Filed : October 31, 2003

Art Unit : 2629
Examiner : Richard Hjerpe

Title : Human Interface System

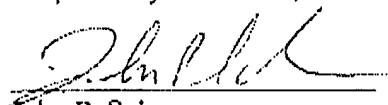
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Attached to this facsimile communication cover sheet is a Request To Correct Attorney Docket Number, faxed this 30th day of March, 2006, to the United States Patent and Trademark Office.

Respectfully submitted,

Date: 3/30/06


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Number of pages including this page 21

Applicant : Beth Marcus, et al
Serial No. : 10/699,555
Filed : October 31, 2003

Art Unit : 2673
Examiner : Unknown

Title : Human Interface System

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

Attached to this facsimile communication cover sheet is a Preliminary Amendment, faxed this 20th day of March, 2006, to the United States Patent and Trademark Office.

Respectfully submitted,



John P. Schnurer
Reg. No. 52,196

Date: March 20, 2006

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Attorney's Docket No.: 19146-002001

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Applicant : Beth Marcus, et al
Serial No. : 10/699,555
Filed : October 31, 2003
Title : HUMAN INTERFACE SYSTEM
Art Unit : 2673
Examiner : Unknown

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

PRELIMINARY AMENDMENT

Please amend the above-identified application as follows:

CERTIFICATE OF TRANSMISSION BY FACSIMILE

I hereby certify that this correspondence is being transmitted by facsimile to the Patent and Trademark Office on the date indicated below.

March 20, 2006
Date of Transmission

Rita H. Jennings
Signature

Rita H. Jennings
Typed or Printed Name of Person Signing Certificate

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01 FC:2201 600.00 DA
02 FC:2202 50.00 DA

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Filed : October 31, 2003
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Amendments to the Claims:

This listing of claims replaces all prior versions and listings of claims in the application:

Listing of Claims:

1. (Currently Amended) A hand-held electronic device comprising:
a memory configured to store a plurality of applications, wherein each application is associated with a set of functions;
a processor configured to process a selected one of the plurality of applications;
a first input assembly surface having a plurality of input elements on a first surface configured to receive input from a human user through manipulation of the plurality of input elements by one or both of the human user's thumbs or a stylus, wherein at least one of the input elements on the first surface is configured to selectively map further configured to provide selective access to one or more than one input functions of the set of functions associated with the selected one of the plurality of applications; and
a second input assembly surface having one or more selection input elements on a second surface configured to be manipulated by one or more of the human user's fingers, wherein manipulation of at least one of the a-selection input elements on the second surface is further configured to be selectively mapped to one or more input functions of the set of functions corresponding to the selected one of the plurality of applications causes the input function of one or more input elements to change, further wherein the plurality of input elements on the first

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surface and the one or more input elements on the second surface are arranged so as to substantially optimize a biomechanical effect of the human user's hand.

2. (Cancelled).

3. (Currently Amended) The hand-held electronic device of claim 1, wherein at least one of the ~~selection-input~~ elements of the second input assembly surface is a ~~pressure~~ sensor pad configured to selectively configurable to represent a plurality of delineated active areas, wherein manipulation of a delineated active area causes the input function of one or more input elements of the first input assembly to change.

4. (Currently Amended) The hand-held electronic device of claim 3, further comprising a shape changing media configured relative to the ~~pressure~~ sensor pad so as to permit the human user to tactily discriminate between the plurality of delineated active areas.

5. (Currently Amended) The hand-held electronic device of claim 1 ~~further comprising a processor~~, wherein the processor receives signals generated by the input elements ~~and selection elements of first or second input assemblies~~ when manipulated by the human user.

6. (Currently Amended) The hand-held electronic device of claim 1 further comprising an input controller, wherein the input controller receives signals generated by the

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input elements ~~and selection elements~~ of first or second input assemblies when manipulated by the human user and converts the signals into a form suitable to be interpreted by the [[a]] processor.

7. (Currently Amended) The hand-held electronic device of claim 1, wherein at least one of the ~~selection-input~~ elements of the second input assembly is a rotary sensor dial.

8. (Currently Amended) The hand-held electronic device of claim 1, wherein at least one of the ~~selection-input~~ elements of second input assembly is a D-pad.

9. (Currently Amended) The hand-held electronic device of claim 1, further comprising at least one palpable detent, wherein the detent is associated with at least one of the ~~input elements or selection elements of the first or second input assemblies~~ so as to provide tactile feedback to the human user when the human user manipulates the input element associated with the palpable detent.

10. (Currently Amended) The hand-held electronic device of claim 1 further comprising one or more vibratory or force producing units, at least one of the vibratory or force producing units configured to provide ~~capable of providing~~ tactile feedback upon the human user's manipulation of at least one of the input elements ~~or selection elements of the first or second input assemblies~~.

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11. (Currently Amended) The hand-held electronic device of claim 10, wherein at least one of the vibratory units provide tactile feedback in response to events occurring in the selected a software application running on [[a]] the processor.

12. (Currently Amended) A hand-held electronic device comprising:
a memory configured to store a plurality of applications, wherein each application is associated with a set of functions;

a processor configured to process a selected one of the plurality of applications, wherein the set of functions associated with the selected application includes a plurality of text symbol functions and a plurality of shifting functions;

a first surface having a plurality of input elements configured to receive input from a human user through manipulation of the plurality of input elements by one or both of the human user's thumbs or a stylus, wherein at least one of the input elements of the first surface is further configured to provide selective access- selectively map to more than one text symbol function; and

a second surface having one or more input elements, wherein at least one of the input elements of the second surface with one or more input element having one or more selectable active areas configured to be manipulated by one or more of the human user's fingers, each selectable active area configured to selectively map to a different shifting function, wherein manipulation of [[an]] one of the selectable active area causes the text symbol function of the one

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or more input elements of the first surface to change, further wherein the plurality of input elements of the first surface and the one or more input elements of the second surface are arranged so as to substantially optimize a biomechanical effect of the human user's hand.

13. (Currently Amended) The hand-held electronic device of claim 12 further comprising a controller, wherein the controller receives signals generated by the human user's manipulation of the input elements of the first surface or active areas.

14. (Currently Amended) The hand-held electronic device of claim 13 further comprising a dome cap ~~em~~ positioned above at least one input element of the first surface or the second surface and capable of providing tactile feedback to the human user when the input element associated with the dome cap is manipulated.

15. (Currently Amended) The hand-held electronic device of claim 13 further comprising one or more vibratory units capable of providing tactile feedback.

16. (Currently Amended) The hand-held electronic device of claim 13 further comprising one or more force producing units capable of providing tactile feedback.

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17. (Currently Amended) A method for configuring a human interface and input system for use with a hand-held electronic device configured to run a plurality of applications, each application associated with a set of functions, the method comprising:

disposing on a first surface a first input assembly having a plurality of input elements configured to receive input from a human user through manipulation of the plurality of input elements by one or both of the human user's thumbs or a stylus, wherein at least one of the input elements of the first input assembly is further configured to provide selective access map to more than one input function associated with a selected one of the plurality of applications; and

disposing on a second surface a second input assembly having one or more selection input elements configured to be manipulated by one or more of the human user's fingers, wherein manipulation of a selection element causes the input function of one or more input elements to change at least one of the input elements of the second input assembly is further configured to selectively map to one or more input functions associated with the selected application; and

arranging the plurality of input elements of the first input assembly and the one or more input elements of the second input assembly to substantially optimize a biomechanical effect of the human user's hand.

18. (Currently Amended) The method of claim 17 further comprising: , wherein physically or electronically labeling at least one each input element of the first input assembly or

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the second input assembly is labeled so as to visually indicate ~~indicating each an~~ input function that can be selectively accessed by actuating the input element.

19. (Currently Amended) The method of claim 17 further comprising connecting a controller to the input elements ~~and selection elements of the first input assembly or the second input assembly~~, wherein the controller is configured to receive ~~capable of receiving~~ signals generated by ~~the human user's a~~ manipulation of one or more of the input elements ~~or selection elements of first input assembly or the second input assembly~~.

20. (Currently Amended) The method of claim 19, wherein at least one ~~selection input element of second input assembly~~ having a plurality of active areas configurable by the controller to form a plurality of delineated active areas.

21. (Currently Amended) The method of claim 20 further comprising positioning a shape changing media relative to the one ~~selection input element of second input assembly~~ having a plurality of active areas so as to permit the human user to tactilely discriminate between the plurality of delineated active areas.

22. (Cancelled)

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23. (Currently Amended) The method of claim 17 further comprising positioning a palpable detent with at least one input element ~~or selection element of the first input assembly or the second input assembly~~ so as to provide tactile feedback when manipulated by the human user.

24. (Currently Amended) A method for inputting data on a hand-held electronic device having a first surface with a plurality of input elements configured to receive input from a human user through manipulation of the plurality of input elements ~~by one or both of the human user's thumbs or a stylus~~, wherein at least one of the input elements is further configured to ~~provide selective access map~~ to a plurality of symbols in a data input mode, wherein each of the plurality of symbols is associated with a unique index position identifier, and a second surface having one or more selection elements configured to be manipulated by one or more of the human user's fingers, wherein each selection element corresponds to one of the unique index position identifiers, ~~further wherein the plurality of input elements and the one or more selection elements are arranged to substantially optimize a biomechanical effect of the human user's hand~~, the method comprising:

~~executing a selected application from a plurality of applications, wherein the selected application is associated with a set of functions~~

~~determining the index position identifier of a desired symbol to be inputted based on the functions associated with the selected application;~~

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pressing the selection element corresponding to the index position identifier of the desired symbol with any digit or object held in the human user's hand finger; and

pressing the input element configured to ~~provide selective access map~~ to the desired symbol with any digit or object held in the human user's hand thumb or the stylus. (page 14, lines 2-27).

25. (Currently Amended) The method of claim 24, wherein each input element is physically or electronically labeled indicating each symbol that can be selectively accessed is mapped to by the input element and a positional order in which each symbol can be selectively accessed by actuating the input element.

26. (Currently Amended) The method of claim 24, wherein determining the index position identifier of the desired character to be inputted comprises:

locating the input element configured to map ~~provide selective access~~ to the desired symbol; and

counting from left to right the number of symbols preceding the desired symbol labeled on the located input element, wherein the index position identifier of the desired symbol is the number of symbols preceding the desired symbol plus one.

27. (Currently Amended) The method of claim 24, wherein at least one of the input elements or selection elements is further configured to ~~provide selective access map~~ to a plurality

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of modes corresponding to the selected application executing on the hand-held electronic device, at least one of the modes is the data input mode, the method further comprising enabling the data input mode.

28. (Currently Amended) A method for a human user to input data on a hand-held electronic device using an interface and input system comprising a plurality of input elements in a thumb-manipulated assembly to substantially optimize a biomechanical effect of the human user's thumb and fingers, wherein at least one input element is mapped to more than one text function, and one or more selection elements in a finger-manipulated input assembly, wherein each selection element is mapped to a unique shift position, the method comprising:

executing a selected text application from a plurality of applications, wherein the selected application is associated with a set of functions

pressing a desired selection element of the finger-manipulated input assembly with a human a finger to select a desired shift position the selected text application; and

pressing a desired input element of the thumb-manipulated input assembly with a human thumb to input a desired text character.

29. (Currently Amended) A hand-held electronic device comprising:

a memory configured to store a plurality of applications, wherein each application is associated with a set of functions;

a processor configured to process a selected one of the plurality of applications;

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a first input assembly disposed on a first surface of the electronic device, wherein the first input assembly comprises a plurality of input elements configured to be actuated by a human user's hand thumb, wherein at least one of the input elements of the first input assembly is configured to map to one or more input functions of the set of functions associated with the selected one of the plurality of applications; and

a second input assembly disposed on a ~~different second surface from the first input assembly~~ so as to substantially optimize a biomechanical effect of the human user's hand thumb and fingers, wherein the second input assembly comprises one or more input elements configured to be manipulated by one or more of the human user's fingers, wherein at least one of the input elements of the second input assembly is a selectively being a configurable sensing surface so as to provide a plurality of delineated active areas, further wherein one or more of the delineated active areas is mapped to one or more functions associated with the selected application, further wherein the memory is further configured to store for each application a mapping of the selectively configurable sensing surface to the plurality of delineated active areas; and

~~a memory comprising a mapping of the configurable sensing surface to the plurality of delineated active areas.~~

30. (New) The hand-held electronic device of claim 1, wherein the selected one of the plurality of applications is a text application; and the one or more input elements on the second surface of the second input assembly comprises one or more selection elements, wherein

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manipulations of the one or more selection elements causes the input elements on the first surface of the first input assembly to be selectively mapped from one text function to another text function.

31. (New) The hand-held electronic device of claim 1, wherein the selected one of the plurality of application is a game application, and at least one of the plurality of input elements of the first input assembly and at least one of the input elements of the second input assembly are each configured to selectively map to one or more game functions.

32. (New) The hand-held electronic device of claim 29, further comprising: an input controller, wherein the input controller receives a plurality of signals generated by the input elements of the first input assembly and the second input assembly when manipulated by the human user, and converts the plurality of signals into a form suitable to be interpreted by the processor.

33. (New) The hand-held electronic device of claim 32, wherein at least one input element of the first input assembly or the second input assembly is configured to map to one or more input functions associated with the selected application that control a cursor on a screen.

34. (New) The hand-held electronic device of claim 32, wherein the selected one of the plurality of applications is a game application.

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35. (New) The hand-held electronic device of claim 34, wherein at least one input element of the first input assembly or the second input assembly is configured to map to one or more input functions associated with the game application that control a game character on a screen.

36. (New) The hand-held electronic device of claim 34, wherein the input controller is further configured to interpret a movement of the human user's finger sliding across two or more delineated active areas as a change in the mapped function of the two or more delineated active areas, wherein the mapped function is at least one of a speed control, a size control, a weapon fire control, and a position control. (page 16, lines 4-30).

37. (New) The hand-held electronic device of claim 34, wherein the input controller is further configured to interpret a pressure applied by the human user's finger on a selected one of the delineated active areas as a change in the mapped function of the selected delineated active area, wherein the mapped function is at least one of a speed control, a size control, a weapon fire, and position control. (page 16, lines 4-30).

38. (New) The hand-held electronic device of claim 34, wherein at least one of the functions mapped to the input element of the first input assembly is a game function that is substantially optimized for actuation by the human user's thumb.

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39. (New) The hand-held electronic device of claim 38, wherein the game function that is substantially optimized for actuation by the human user's thumbs comprises a directional control.

40. (New) The hand-held electronic device of claim 34, wherein at least one of the functions mapped to the delineated active areas is a game function that is substantially optimized for actuation by one or more of the human user's fingers.

41. (New) The hand-held electronic device of claim 40, wherein the game function that is substantially optimized for actuation by one or more of the human user's fingers comprises a weapon fire control.

42. (New) The hand-held electronic device of claim 40, wherein the game function that is substantially optimized for actuation by one or more of the human user's fingers comprises a game character jump control.

43. (New) A method for configuring a human interface and input system for use with a hand-held electronic device configured to run a plurality of applications, each application associated with a set of functions, the method comprising:

disposing on a first surface a first input assembly having a plurality of input elements configured to receive input from a human user's hand through manipulation of the

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plurality of input elements, wherein at least one of the input elements of the first input assembly is further configured to map to more than one input function associated with a selected one of the plurality of applications;

disposing on a second surface a second input assembly having one or more input elements configured to be manipulated by one or more of the human user's fingers, wherein at least one of the input elements of the second input assembly is further configured to selectively map to one or more input functions associated with the selected application; and

mapping the set of functions of the selected application to the one or more input elements of the first input assembly and the second input assembly to substantially optimize a biomechanical effect of the human user's hand.

44. (New) The method of claim 43, wherein the selected application is at least one of a scrolling application, a text application and a game application.

45. (New) The method of claim 44 further comprising: physically or electronically labeling at least one input element of the first input assembly or the second input assembly so as to visually indicate an input function that can be selectively accessed by actuating the input element.

46. (New) The method of claim 44 further comprising connecting a controller to the input elements of the first input assembly or the second input assembly, wherein the controller is

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configured to receive signals generated by a manipulation of one or more of the input elements of first input assembly or the second input assembly.

47. (New) The method of claim 46, wherein at least one input element of second input assembly having a plurality of active areas configurable by the controller to form a plurality of delineated active areas.

48. (New) The method of claim 47 further comprising positioning a shape changing media relative to the one input element of second input assembly having a plurality of active areas so as to permit the human user to tactilely discriminate between the plurality of delineated active areas.

49. (New) The hand-held electronic device of claim 1, wherein the processor is further configured to be communicatively coupled to a host electronic device.

50. (New) The hand-held electronic device of claim 12, wherein the processor is further configured to be communicatively coupled to a host electronic device.

51. (New) The method of claim 19, wherein the controller is further configured to be communicatively coupled to a host electronic device.

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52. (New) The method of claim 24, wherein the hand-held electronic device is further configured to be communicatively coupled to a host electronic device.

53. (New) The method of claim 28, wherein the hand-held electronic device is further configured to interface with a host electronic device.

54. (New) The hand-held electronic device of claim 29, wherein the processor is further configured to interface with a host electronic device.

55. (New) The method of claim 43, wherein the hand-held electronic device is configured to interface with a host electronic device.

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REMARKS

Claims 1-29 were pending prior to this preliminary amendment. Claims 1, 3-21 and 23-29 have been amended. Claims 2 and 22 have been cancelled. New claims 30-55 have been added. No new matter has been added.

The specification supports the claim amendments. Support for amended claims 1 and 3-29 and new claims 30-55 can be found at least on page 5, lines 9-26; page 6, line 28 – page 7, line 3; page 7, lines 13-31; page 9, lines 17-22; page 10, line 9 – page 11, line 7; page 13, lines 28-29; page 15, lines 11-19; page 16, lines 4-30; page 19, line 6 – page 20, line 4; and page 21, lines 3-5; page 8, line 28 – page 9, line 11; page 9, line 14 – page 11, line 3; page 12, lines 9-12; page 13, lines 17-22; page 13, line 30 – page 14, line 27; page 20, lines 12-17; page 16, lines 4-30; page 17, lines 1-22; page 18, line 24 – page 19, line 11 and FIGS. 2-3 and 8.

A processor and a memory for storing and processing a selected one of a plurality of applications as recited in claims 1, 12, 17, 24, 28-29, and 43 are described at least on page 9, lines 16-30. A first input assembly and a second input assembly configured to selectively map to a selection of input functions as recited in claims 1, 12, 17, 24, 28-29, and 43 are described at least on page 10, line 9 – page 11, line 3; page 12, lines 9-11; page 13, line 30 – page 14, line 27; and FIG. 2. Arranging a plurality of input elements to substantially optimize biomechanics of the hand as recited in claims 1, 12, 17, 24, 28-29, and 43 was previously recited in cancelled claim 2 and 22 and supported in the specification at least on page 8, line 28 – page 9, line 11 and page 20, lines 12-17. Physically and electronically labeling input elements as recited in claims 18, 25, and 45 is described at least on page 12, line 9 – page 14, line 27. A text application selectively mapped to a plurality text functions as recited in claims 30 is described at least on page 13, line 30 – page 14, line 27. A game application as recited on claims 31, 34-42 and 44 is described at least on page 5, lines 9-26; page 7, lines 13-31; page 9, lines 17-22; page 10, line 27 – page 11, line 3; page 13, lines 28-29; page 15, lines 11-19; page 16, lines 4-30; page 19, line 6 – page 20, line 4; and page 21, lines 3-5. An input controller as recited in claims 32-33 and 46-48 is described at least on page 6, line 28 – page 7, line 3; page 10, line 9 – page 11, line 7; page

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16, lines 4-30; and page 17, lines 1-22. Support for new claims 49-55 can be found at least on page 18, line 24 - page 19, line 11 and FIG. 8.

Please apply the excess claims fee of \$650.00, and any other required fees, or any credits to deposit account 06-1050, referencing the attorney docket number shown above.

Respectfully submitted,

Date: March 20, 2006



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PATENT APPLICATION FEE DETERMINATION RECORD
Effective October 1, 2003

Application or Docket Number

16300-02001

CLAIMS AS FILED - PART I

(Column 1) (Column 2)

TOTAL CLAIMS	28	
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	28 minus 20 = *	9
INDEPENDENT CLAIMS	6 minus 3 = *	3
MULTIPLE DEPENDENT CLAIM PRESENT <input type="checkbox"/>		

* 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	OR	RATE	FEE
BASIC FEE	385.00	OR	BASIC FEE	770.00
X\$ 9=	81	OR	X\$18=	
X43=	125	OR	X86=	
+145=		OR	+290=	
TOTAL	595	OR	TOTAL	

CLAIMS AS AMENDED - PART II

(Column 1) (Column 2) (Column 3)

AMENDMENT A	3/27/06	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total	* 53	Minus	** 29	= 24
	Independent	* 7	Minus	*** 6	= 1
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>				

SMALL ENTITY OR OTHER THAN SMALL ENTITY

RATE	ADDITIONAL FEE	OR	RATE	ADDITIONAL FEE
X\$ 9=	600	OR	X\$18=	
X43=	100	OR	X86=	
+145=		OR	+290=	
TOTAL ADDIT. FEE	600	OR	TOTAL ADDIT. FEE	

(Column 1) (Column 2) (Column 3)

AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total	*	Minus	**	=
	Independent	*	Minus	***	=
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>				

RATE	ADDITIONAL FEE	OR	RATE	ADDITIONAL FEE
X\$ 9=		OR	X\$18=	
X43=		OR	X86=	
+145=		OR	+290=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

(Column 1) (Column 2) (Column 3)

AMENDMENT C		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total	*	Minus	**	=
	Independent	*	Minus	***	=
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>				

RATE	ADDITIONAL FEE	OR	RATE	ADDITIONAL FEE
X\$ 9=		OR	X\$18=	
X43=		OR	X86=	
+145=		OR	+290=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. 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.



IFW

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Beth Marcus, et al
Serial No. : 10/699,555
Filed : October 31, 2003
Title : HUMAN INTERFACE SYSTEM
Art Unit : 2673
Examiner : Unknown

MAIL STOP AMENDMENT

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

INFORMATION DISCLOSURE STATEMENT

Applicants request consideration of the references listed on the attached PTO-1449 form. Under 37 C.F.R. § 1.98 (a)(2)(ii), only copies of foreign patent documents and/or non-patent literature are enclosed. Copies of any listed U.S. patents or U.S. patent application publications can be provided upon request. A copy of a communication from a foreign patent office in a counterpart application is also enclosed.

This statement is being filed within three months of the filing date of the application or before the receipt of a first Office Action on the merits. Please apply any charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

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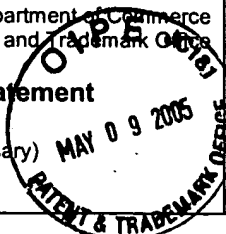
CERTIFICATE OF MAILING BY FIRST CLASS MAIL

I hereby certify under 37 CFR §1.8(a) that this correspondence is being deposited with the United States Postal Service as first class mail with sufficient postage on the date indicated below and is addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Date of Deposit: May 6, 2005
Handwritten signature of S. Gebhart
Signature

S. Gebhart
Typed or Printed Name of Person Signing Certificate

Substitute Form PTO-1449 (Modified)	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 19146-002001	Application No. 10/699,555
Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))		Applicant Beth Marcus, et al	
		Filing Date October 31, 2003	Group Art Unit 2673



U.S. Patent Documents							
Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	AA	2003/020692	1/30/2003	Griffin, et al.			
	AB	2003/193418	10/16/2003	Shi			
	AC	2002/163504	11/7/2002	Pallakoff			
	AD	2003/169188	9/11/2003	Chang et al.			
	AE	2003/061103	3/27/2003	Kanai			
	AF						
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Foreign Patent Documents or Published Foreign Patent Applications								
Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation	
							Yes	No
	AL	1103883	5/30/2001	EPO				
	AM	0585730	3/9/1994	EPO				
	AN	03/042805	5/22/2003	WIPO				
	AO							
	AP							

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
	AQ	
	AR	
	AS	
	AT	

Examiner Signature	Date Considered
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EXAMINER: Initials citation considered. 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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(54) **Input mode selection on a palmtop computer**

(57) A palmtop computer (100) for entering characters using one or more input modes (such as alpha, numeric, caps, punctuation). In one example, a physical sensor is coupled to select the input mode. The physical sensor may be in the form of a button (118, 122, 124, 126, 128), rocker switch (200), dial (402), pressure strip (302, 306), moveable bar (612, 814, 832), or accelerometer mounted to the device. The physical sensor may also be mounted to a pen (900, 1002). In another example, a ridge (502, 512) is formed on the digitizer pad (103) and positioned to define input regions (504, 506) associated with particular input modes. In another example, a border (602) is formed around the digitizer pad. The border includes a ridge (604, 606, 608, 610) coupled to select the input mode. The digitizer pad may also be textured (616). A first textured region (702) may be associated with one input mode and a second textured region (704) may be associated with another input mode.

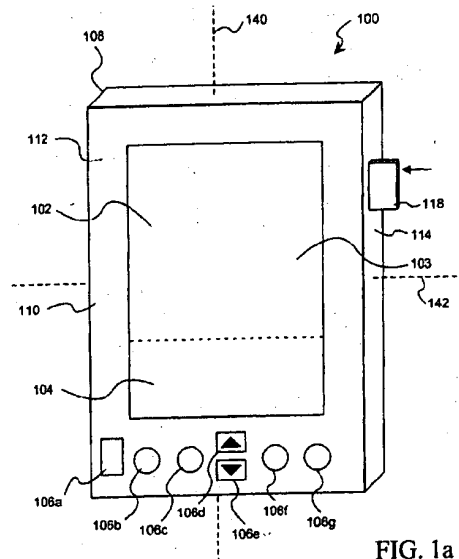


FIG. 1a

EP 1 103 883 A2

Description

[0001] The present invention relates to the field of palmtop computers and more particularly, though not solely, to the selection of input modes for entering alphanumeric characters on palmtop computers.

[0002] The palmtop computer has evolved as a portable device which provides for easy storage, organization, and recollection of information. Palmtop computers are small, compact computers that generally fit in the palm of a person's hand. The palmtop computer allows for easy operation, as a user simply holds the palmtop computer in one hand (the "non-writing hand") while entering information with the other hand (the "writing hand"). Because of the small size of the palmtop computer, the user may simply place the device in a pocket or briefcase when not in use.

[0003] When the user wishes to enter information, it is desirable to record the information promptly and accurately. Otherwise, a broad range of problems might occur when the user needs to recall the information. A busy professional might miss an important deadline or meeting. A grocery shopper might buy only a portion of the items needed to prepare a meal.

[0004] Conventional palmtop computers generally employ a digitizer pad upon which a user may write with a pen or finger. A handwriting recognition system is generally incorporated to recognize strokes and presses made by the user upon the digitizer pad as individual characters. The handwritten characters are then converted into a machine-readable format such as ASCII code.

[0005] One problem associated with conventional palmtop computers has been the poor performance of handwriting recognition systems. Characters input by the user are often improperly identified. For example, a user may attempt to write the number "1," but the letter "l" is recognized. Similar, the letter "s" may be confused for the number "5." When the user recalls what was entered, the palmtop computer returns the erroneous information. The user must then waste time and energy in attempting to ascertain what he originally wrote.

[0006] Techniques have been developed to differentiate between characters written on the digitizer pad. One way has been to provide for different "modes" of input. In one embodiment, one mode allows for only lowercase letters to be input ("alpha mode"), a second mode is for only uppercase letters ("caps mode"), a third mode is for only numbers ("numeric mode"), and a fourth mode is for punctuation ("punctuation mode"). When input modes are used, the number of possible characters which may be confused for a particular stroke is greatly reduced. For example, if alpha mode is selected, the recognition system will not recognize the letter "s" as the number "5." similarly, a lowercase "c" will not be recognized as an uppercase "C."

[0007] Selecting and switching among various input modes using conventional means takes time and effort

on the part of the user. The user must take some action to switch from one mode to another, in addition to the strokes and motions he would otherwise have to make to input the actual characters. For example, some conventional schemes involve the use of "mode change" strokes which the user makes on the digitizer pad to change input modes. These mode change strokes must be interspersed with strokes the user ordinarily would make to enter characters. Such systems present various problems. Additional time is required to make the mode change strokes. The mode change strokes themselves are often confused for input characters. Also, it is often not immediately clear to the user which input mode is being used. The particular mode may be displayed on a display area of the digitizer pad, but the user must still look at the device to determine which mode is active.

[0008] Thus, conventional methods for input mode selection introduce such discontinuities into the input activity that the quality of interaction is reduced. Users often compromise what is input for the ease of inputting it. For example, users may choose not to take the time to capitalize or punctuate when they enter notes because of the time and effort required to change modes. While such informal data entry may be acceptable for personal notes, it may not be acceptable if the user is creating or editing a document that is to be distributed to others.

[0009] The present invention relates to a palmtop computer. Characters may be entered using one or more input modes. The computer includes a casing and a digitizer pad coupled to the casing.

[0010] According to one aspect of the present invention, the computer includes a physical sensor coupled to select an input mode.

[0011] According to another aspect of the present invention, a ridge is formed on the digitizer pad. The ridge is positioned on the pad to define a first input region associated with one input mode and a second input region associated with another input mode.

[0012] According to yet another aspect of the present invention, a border is formed around the digitizer pad. The border includes a ridge coupled to select an input mode.

[0013] According to yet another aspect of the present invention, the digitizer pad has a first textured region associated with one input mode and a second textured region associated with another input mode.

[0014] According to yet another aspect of the present invention, a pen is incorporated. A physical sensor is mounted to the pen and coupled to select an input mode.

[0015] Particular embodiments of the present invention will now be described with reference to the accompanying drawings in which:-

Fig. 1a is a front view of a palmtop computer 100 constructed according to an exemplary embodiment of the present invention;

Fig. 1b is a top view of a plurality of mechanical buttons, mounted to palmtop computer 100, constructed according to a further exemplary embodiment of the present invention;

Figs. 2a, 2b and 2c are side views of a rocker switch 200, mounted to palmtop computer 100, constructed according to a further exemplary embodiment of the present invention;

Fig. 3 is a front view of a palmtop computer 300 incorporating pressure strips constructed according to a further exemplary embodiment of the present invention.

Fig. 4 is a side view of a dial, mounted to palmtop computer 100, constructed according to a further exemplary embodiment of the present invention;

Figs. 5a and 5b are front views of user input areas 500a and 500b of palmtop computers constructed according to further exemplary embodiments of the present invention;

Figs. 6a, 6b and 6c are front views of user input areas 600a, 600b and 600c of palmtop computers constructed according to further exemplary embodiments of the present invention;

Figs. 7a and 7b are front views of user input areas 700a and 700b of palmtop computers constructed according to further exemplary embodiments of the present invention;

Figs. 8a and 8b are partial front views of palmtop computers 800a and 800b with moveable bars constructed according to exemplary embodiments of the present invention;

Fig. 9 shows an exemplary pen 900 for use as part of a palmtop computer system constructed according to a further exemplary embodiment of the present invention; and

Figs. 10a and 10b show exemplary pens 1000a and 1000b for use as part of palmtop computer systems, constructed according to further exemplary embodiments of the present invention.

[0016] Fig. 1a shows a palmtop computer 100 which includes a casing 108 made of plastic or any suitable material. Casing 108 has a front panel 110, a left side panel 112, a right side panel 114 and a back panel. Fitted to front panel 110 is a touch sensitive digitizer pad 103 which is capable of detecting presses and movements of a pen or finger. In the embodiment of Fig. 1a, digitizer pad 103 covers a display screen 102 and a user input area 104. Display screen 102 displays information to a user. User input area 104 is used to input text. In one alternative embodiment, digitizer pad 103 covers only user input area 104. In another alternative embodiment, digitizer pad 103 covers a homogenous area which serves as both a display screen and user input area. Other assignments of areas to regions under digitizer pad 103 may be used as should be recognized by those skilled in the art.

[0017] In Fig. 1a, palmtop computer 100 includes a

plurality of mechanical buttons 106a-106g mounted to front panel 110. Buttons 106a-106g provide the user with various functions for operating palmtop computer 100. In the embodiment of Fig. 1a, button 106a is a power button. Buttons 106d and 106e are bi-directional scrolling buttons used to scroll up and down through information shown on display area 102.

[0018] Buttons 106b, 106c, 106f, and 106g are application buttons. In one example, application button 106b is used for a calendar application, application button 106c is used for an address book application, application button 106f is used for a to-do list application, and application button 106g is used for a note pad application. Other applications may be associated with these buttons as will be understood by one skilled in the art. In other exemplary embodiments, buttons 106b, 106c, 106f, and 106g, are generic application buttons which are programmable by the user. Various applications may be assigned to the buttons as designated by the user.

[0019] In one example of palmtop computer 100, when palmtop computer 100 is powered off, pressing any one of application buttons 106b, 106c, 106f, and 106g generates a hardware interrupt signal which is sent to a processor within palmtop computer 100. The hardware interrupt signal "wakes" the processor in the palmtop computer 100 from a "sleep" mode and causes the processor to execute code in a "wake-up" routine. In the wake-up routine, the processor checks a register to determine which application button was pressed.

[0020] When palmtop computer 100 powers up, the default input mode for inputting text in input area 104 is generally alpha mode, although other modes may be programmed by the user as the default input mode. These include but are not limited to caps mode, numeric mode, and punctuation mode.

Using the Non-Writing Hand

[0021] Several exemplary embodiments of the present invention provide for the selection of input modes using the non-writing hand. Some of these embodiments involve one or more physical sensors mounted on the casing of the palmtop computer. The physical sensors are preferably positioned along the sides of the casing to facilitate use by left-handed and right-handed persons. In some embodiments, physical sensors for both types of users are mounted on the same casing. In other embodiments, the physical sensor is positioned for use by either left-handed or right-handed users. For example, in one embodiment, the sensor is mounted on one side of the device for control by one hand, but the user can rotate the device 180 degrees to control the device with the other hand.

[0022] In Fig. 1a, a mechanical button 118 is mounted to casing 108 on right panel 114. The button 118 is preferably positioned along the length of right panel 114 proximate the position of the forefinger or middle finger

of a right-handed user's left hand when holding the device, to facilitate easy switching between modes. A left-handed user may use the same device and switch modes with the thumb of his right hand. In an alternative embodiment, button 118 is positioned along left panel 112 of casing 108, rather than right panel 114. Such is desirable for the left-handed user who holds palmtop computer 100 with his right hand. The user may then operate button 118 with the forefinger or middle finger of his right hand.

[0023] In one exemplary embodiment, button 118 is coupled to the processor within palmtop computer 100. Pressing button 118 sends a signal to the processor instructing the processor to select an input mode. In other exemplary embodiments, software programmed into the processor is used to identify the selection of input modes. In one example, pressing button 118 sends a signal to a register to change one or more status bits representing the particular input mode. Responsive to some external action like lifting the pen, the software checks the status bit and selects the input mode accordingly. In another example, the software simply checks the status bit periodically to determine the input mode. Other implementations for coupling button 118 to select input modes will be recognized by one skilled in the art.

[0024] Particular input modes are selected by pressing mechanical button 118. In one embodiment, successively pressing mechanical button 118 causes computer 100 to cycle through the available input modes: caps, numeric, punctuation, alpha, caps, numeric, etc. In another embodiment, specific combinations or sequences of motions cause system 100 to select particular modes. For example, a press and hold selects caps mode, similar to a "CAPS" key on a typewriter. A double press and hold selects numeric mode. When the button is released, the device returns to alpha mode. Other implementations may be used as should be recognized by the skilled artisan.

[0025] Fig. 1b is a top view of a plurality of mechanical buttons 122, 124, 126, 128 which are mounted to palmtop computer 100. The buttons are mounted along side panel 114 of casing 108, preferably proximate the user's fingers when holding the device. Each of the four mechanical buttons is assigned a particular input mode. In one example, button 122 is designated as alpha mode, button 124 is for caps mode, button 126 is for numeric mode, and button 128 is for punctuation mode. Each of the buttons is coupled to select input modes similar to button 118 of Fig. 1a. In this way, pressing any one of the buttons switches to the respective input mode assigned to that button.

[0026] Figs. 2a-2c illustrate another exemplary embodiment of a physical sensor constructed according to the present invention, in the form of a rocker switch 200. The rocker switch is preferably mounted on a side panel 114 or 112 of palmtop computer 100 and positioned along the side panel similar to mechanical button 118. The rocker switch 200 is coupled to select input modes

for palmtop computer 100, using techniques described above with respect to Figs. 1a and 1b.

[0027] In Fig. 2a, switch 200 sits in a neutral position 202 when not acted upon by external forces. As shown in Fig. 2b, the user may force the switch into an "up" position 204 by rocking the switch in one direction with his finger. As shown in Fig. 2c, the user may also force the switch into a "down" position 206 by rocking the switch in the opposite direction. When the user releases rocker switch 200, the switch springs back to neutral position 202 of Fig. 2a.

[0028] In one exemplary embodiment, alpha mode is selected as the input mode when rocker switch 200 is in neutral position 202. Moving rocker switch 200 to up position 204 changes modes to numeric mode. Rocking the switch 200 down switches to caps input mode. As shown in Fig. 2a, rocker switch 200 may also be pressed into panel 114 to define a "pressed" position 208. Pressing switch 200 in this manner selects another input mode, such as punctuation mode. The various switching configurations discussed above for mechanical button 118 are also applicable to rocker switch 200. Various other assignments of input modes to the available positions for rocker switch 200 are possible, as will be recognized by those skilled in the art.

[0029] In Fig. 3, another embodiment of a physical sensor for switching among input modes is shown. In particular, palmtop computer 300 includes a first pressure strip 302 mounted along first side panel 304 and a second pressure strip 306 mounted along second side panel 308. The pressure strips 302 and 306 are desirably located along the respective side panels such that one of the pressure strips is positioned under the user's fingers and the other pressure strip is positioned under the user's thumb when gripping the device.

[0030] In Fig. 3, the pressure strips 302 and 306 are coupled to select input modes for palmtop computer 300 using hardware and/or software, in similar fashion as described above with respect to the embodiments of Figs. 1a-b, and 2a-c. Preferably, the strips 302 and 306 are coupled such that the computer can detect the activation of both strips, corresponding to the user squeezing the sides of the device with his non-writing hand. In an alternative embodiment, only one pressure strip 302 is mounted on one side panel 304. Pressing the one strip 302, generally while gripping the other side panel 114, selects and switches between input modes.

[0031] In Fig. 4, a dial 402 is mounted to side panel 114 of palmtop computer 100. The dial 402 is positioned along the side panel similar to mechanical button 118 of Fig. 1 or rocker switch 200 of Figs. 2a and 2b. Dial 402 sits in a neutral position 404 when not acted upon by external forces. The dial is moveable to an "up" position 406 by pressing the switch in one direction, and also to a "down" position 408 by pressing the switch in the opposite direction. When the user releases dial 402, the dial returns to neutral position 202.

[0032] Fig. 4 is a side view of a dial 402, mounted to

palmtop computer 100, constructed according to an exemplary embodiment of the present invention. Dial 402 is coupled to select input modes for palmtop computer 100 using similar techniques as described above. Dial 402 rests in a neutral position when not acted upon by external forces. Dial 402 may be rotated in one direction to define an "up" position and in the opposite direction to define a "down" position. Preferably, the up and down positions are offset by about 15 degrees from neutral position. One or more springs are preferably incorporated to cause dial 402 to return to neutral position when the user releases the dial.

[0033] In Fig. 4, dial 402 is configured, in one example, so that neutral position is associated with alpha mode. Moving dial 402 to the up position changes modes to numeric mode, and moving dial 402 to the down position changes the input mode to caps mode. Similar to rocker switch 200, dial 402 may be pressed into side panel 114 to define a pressed position 410 for switching to another input mode, such as punctuation mode. Various other assignments of particular input modes to the available positions for dial 402 are possible, as will be recognized by those skilled in the art.

Haptic Feedback

[0034] In some of the following exemplary embodiments, the input area of the palmtop computer is divided into input mode regions for entering particular kinds of characters. Boundaries between these regions are often delineated by surface textures or ridges, described in more detail below. These boundaries are advantageous as they allow the user to "feel" his way from region to region as he moves a pen or his finger over the input area. The user can thus quickly and easily learn to associate particular input modes with the particular regions so that when using the device, the user will know the region in which he is entering characters without having to look at the device.

[0035] There are several variations on the haptic feedback technique. One variation involves ridges which serve as boundaries to differentiate between input mode regions or zones. In one embodiment, shown in Fig. 5a, a ridge 502 extends vertically across a user input area 500a of a palmtop computer from a top side 508 to a bottom side 510 of input area 500a. In this way, ridge 502 defines a first input zone 504 and a second input zone 506. In an alternative embodiment, (not shown) ridge 502 extends horizontally along input area 500a such that input zones 504 and 506 are defined on upper and lower sides of ridge 502. Ridge 502 is preferably molded as part of the digitizer pad of input area 500a, although ridge 502 may also be formed separately of some suitable material such as plastic and affixed to the digitizer pad by an adhesive.

[0036] In one implementation of input area 500a of Fig. 5a, first input zone 504 is designated as alpha mode, and second input zone 506 is designated as nu-

meric mode. The palmtop computer is programmed so that the regions of the digitizer pad underlying these input zones recognize characters of only that particular mode. Other designations of particular modes may be defined by the user as desired. In addition, a physical sensor such as mechanical button 118 of Fig. 1 may be incorporated to provide for other modes of input. For example, a user may press mechanical button 118 to switch the designations of input zones 504 and 506 from alpha mode and numeric mode to caps mode and punctuation mode, respectively.

[0037] Fig. 5b illustrates an input area 500b, constructed according to a further exemplary embodiment of the present invention, incorporating a second ridge 512 passing across input area 500b from a left side 514 to a right side 516. Thus, when second ridge 512 is used in conjunction with ridge 502, four input zones are defined. In one example, zone 504 is for alpha mode, zone 506 is for numeric mode, zone 518 is for caps mode, and zone 520 is for punctuation mode. Other designations may be made, as will be recognized by those skilled in the art.

[0038] Fig. 6a illustrates a user input area 600a with a border 602 formed around the input area. The border 602 includes a plurality of ridges 604, 606, 608, 610. A top ridge 604 is positioned along the top of input area 600a, and a bottom ridge 606 lies along the bottom of input area 600a. Left and right ridges 608 and 610 are positioned at the left and right sides of input area 600a, respectively. As shown in Fig. 6a, the ridges 604, 606, 608, 610 have stepped inner edges 612 to provide defined contact points for the user's pen or finger.

[0039] In Fig. 6a, each of the ridges is assigned a particular input mode. In one example, upper ridge 604 is assigned caps mode, and lower ridge 606 is assigned alpha mode. Left ridge 608 is assigned numeric mode, and right ridge 610 is assigned punctuation mode. Other assignments of particular modes to the individual ridges may be programmed by the user, as will be recognized by those skilled in the art. The user can then select the desired input mode by touching the appropriate ridge with the user's pen or finger.

[0040] In one example of the device shown in Fig. 6a, each ridge is made of a pressure sensitive material and coupled to the processor within the palmtop computer independently of the other ridges. Thus, when the user simply touches a particular ridge with a pen or finger, a signal is communicated from that ridge to the processor to select a particular input mode. Alternatively, the selection may be made using software programmed into the processor, as described above. In this example, the ridges may be connected to one another at their respective ends or moveable independent from one another.

[0041] In another example of the device shown in Fig. 6a, each ridge is made of plastic or some similar material and flexible or moveable in a direction away from the opposite ridge on the other side of the input area. In this example, the ridges are preferably not connected to one

another at their respective ends so the ridges can move independently of one another. Each of the ridges is positioned proximate to a pressure or contact sensor. The contact sensors are independently coupled to the palmtop computer processor. A spring or some other expandable device is preferably situated between each ridge and its associated sensor to separate the two during normal operation. To select an input mode, the user activates the appropriate sensor by touching the associated ridge and pressing it into contact with the sensor.

[0042] As shown in Fig. 6a, user input area 600a further includes a relatively smaller inner border 613 formed inside border 602. The inner border 613 may be molded as part of the digitizer pad of input area 600a or formed separately and affixed to the digitizer pad. Inner border 613 is preferably shaped with graded or angled sides similar to ridges 502 and 512 of Figs. 5a and 5b, as opposed to the stepped inner edges 612 of border 602. The inner border 613 thus provides haptic feedback, as the user feels a slight bump when he drags his pen or finger over the inner border towards border 602. In this way, the user can recognize when he is approaching border 602 and avoid inadvertently touching one of ridges 604, 606, 608, 610 when he does not want to change input modes.

[0043] Fig. 6b illustrates another exemplary user input area 600b incorporating border 602 of Fig. 6a for selecting input modes. Border 602 may be realized using the examples described above with respect to Fig. 6a. User input area 600b includes a textured region 616 formed around the input area proximate the ridges that comprise border 602. Textured region 616 provides haptic feedback similar to inner ridge 613. That is, the region provides a warning to the user when he drags his pen or finger close to any of the ridges. The user can recognize when he is approaching border 602 and avoid inadvertently touching one of the ridges to change input modes.

[0044] Fig. 6c illustrates yet another exemplary user input area 600c incorporating ridges. In particular, a top ridge 620 is positioned along the top side of input area 600c, and a bottom ridge 622 is positioned along the bottom of input area 600c. Left and right ridges 624 and 626 are positioned at the left and right sides of input area 600c, respectively. Unlike the stepped ridges of Figs. 6a and 6b, ridges 620, 622, 624, and 626 are shaped with slanted sides similar to ridges 502 and 512 of Figs. 5a and 5b. The ridges of Fig. 6c are preferably moveable independent of one another. Each of ridges 620, 622, 624, and 626 is assigned a particular input mode and coupled to select the mode in similar fashion to the ridges of Figs. 6a and 6b.

[0045] Other exemplary input areas 700a and 700b of palmtop computers constructed according to further embodiments of the present invention are shown in Figs. 7a and 7b, respectively. Input regions 700a and 700b have textured zones or regions to provide haptic feedback so the user can easily determine the region in

which he is writing without having to look at the palmtop computer.

[0046] In Fig. 7a, input area 700a is divided into two input regions, input region 702 and input region 704. The respective regions are demarcated by different textures. In one example, input region 704 has a smooth texture and input region 702 has a relatively rough texture. The palmtop computer is programmed to recognize characters entered in input region 702 as being of one particular mode, and those entered in input region 704 as those of another input mode. In one example, alpha mode is assigned to input region 702, and numeric mode is assigned to input region 704. Other assignments of particular modes to regions 702, 704 may be made as understood by those skilled in the art.

[0047] In Fig. 7b, input area 104 is divided into four regions to provide for additional input regions 706 and 708. Caps mode and punctuation mode are assigned to regions 706 and 708, respectively. Each of input regions 702, 704, 706 and 708 has a distinct texture to distinguish that region from the other regions. The surface textures of Fig. 7b provide haptic feedback as to the particular input region in which the user is writing, so the user can be looking at other things than the palmtop computer when entering characters.

[0048] Fig. 8a is a partial front view of a palmtop computer 800a constructed according to an exemplary embodiment of the present invention. The palmtop computer includes a casing 802 similar to casing 108 of palmtop computer 100 shown in Fig. 1. Fitted to casing 802 is a digitizer pad 803 having a left side 806 and a right side 808. A left trench 810 is formed in an inner wall of casing 802 proximate left side 806 of digitizer pad 803. The left trench 810 runs parallel to left side 806 of digitizer pad 803. Similarly, a right trench 812 is formed in an inner wall of casing 802 proximate to right side 808 of digitizer pad 803 and runs parallel to right side 808.

[0049] In Fig. 8a, a moveable bar 814 is positioned across digitizer pad 803 to define a first input region 804a and a second input region 804b. The palmtop computer 800a is programmed to recognize characters input in region 804a as being of one particular mode such as alpha mode, and characters input in region 804b as of another mode such as caps mode. The bar 814 is made of plastic or any suitably rigid material. In one embodiment, bar 814 is in contact with the user input area, while in other embodiments bar 814 is floating above user input area 804 by the positioning of trenches 810 and 812.

[0050] In Fig. 8a, bar 814 has a left end 816 which fits in left trench 810 and a right end 818 which fits in right trench 812. Two springs are situated on either side of left end 816 in left trench 810. Similarly, two springs are situated on either side of right end 818 in right trench 812. A first pressure sensor 820 is positioned in left trench 810 as shown in Fig. 8a, and a second pressure sensor 822 is positioned as shown in Fig. 8a. Each pressure sensor 820, 822 is coupled to select and switch between modes of input using techniques described

above.

[0051] As the user writes on digitizer pad 803 in input area 804a and input area 804b, he simply pushes bar 814 with his pen or finger in the appropriate direction to select a particular input mode. When the user releases the bar, it springs back to its position as shown in Fig. 8a. In one example, moving bar 814 in the "up" direction to activate pressure sensor 820 selects alpha mode for first input region 804a and caps mode for second input region 804b. Similarly, when bar 814 is pushed in the opposite direction to activate pressure sensor 822, numeric mode is selected for first input region 804a and punctuation mode is selected for second input region 804b. In another example, sensor 820 is used to cycle "up" through a series of input modes with successive presses (e.g., alpha, caps, numeric, punctuation, alpha, etc.), and sensor 822 is for cycling "down" through the input modes (e.g., alpha, punctuation, numeric, caps, alpha, etc.).

[0052] Fig. 8b is a partial front view of another palmtop computer 800b constructed according to an exemplary embodiment of the present invention. Palmtop computer 800b is similar to computer 800a of Fig. 8a in most respects although, in Fig. 8b, moveable bar 852 is positioned across digitizer pad 823 substantially perpendicular with respect to bar 814 of Fig. 8a. A top trench 854 is formed in an inner wall of casing 802 proximate a top side 856 of digitizer pad 803. Similarly, a bottom trench 858 is formed in an inner wall of casing 802 proximate to the bottom side 860 of digitizer pad 803.

[0053] In Fig. 8b, moveable bar 852 has ends which fit into trenches 854 and 858. By positioning the bar 852 in this manner, a first input region 862a and a second input region 864b of digitizer pad 803 are defined. Input regions 862 and 864 are designated for entering characters using particular modes of input, similar to input regions 804a and 804b of Fig. 8a. Springs and pressure sensors are positioned in trench 858 similar to trench 810 of Fig. 8a for selecting and switching among various input modes.

Pen Pressure

[0054] Fig. 9 illustrates an exemplary pen 900 for use as part of a palmtop computer system constructed in accordance with a further embodiment of the present invention. The pen 900 includes a retractable tip 902 which is shown in contact with the surface of digitizer pad 103 of the palmtop computer of Fig. 1. A switch 903 is mounted in an inner cavity 904 of pen 900. The switch 903 is in communication with the palmtop computer for selecting and switching among input modes. In one example, communications are supported by a wire coupled between the pen and the palmtop computer. In other examples, wireless communications devices such as RF transmitters and receivers are employed to achieve communications between the pen and palmtop computer.

[0055] When pressure is exerted on pen 900 against the surface of digitizer pad 103, as shown in Fig. 9, tip 902 temporarily retracts into inner cavity 904 of pen 900 until the pressure is released. Retraction of tip 902 activates the switch in inner cavity 904, causing a signal to be sent from pen 900 to the palmtop computer. The signal calls for a particular input mode or changes from one input mode to another. Alternatively, the number of presses may signal a particular input mode.

[0056] In an alternative embodiment, the magnitude of the pressure exerted on the pen controls which input mode is selected. In one example, a "hard" press signals the palmtop computer to change to caps mode. Two hard presses signals the palmtop computer to change to alpha mode. A relatively light press signifies numeric mode. Preferably, the presses are made by tapping the pen on the casing. In other embodiments, the presses are made while writing, preferably at the beginning of a stroke. In these examples, a pressure sensor is mounted in inner cavity 904 instead of the switch to differentiate between the magnitudes of presses.

Active Pens

[0057] In Fig. 10a, a button 1004 is mounted on a pen 1002. Button 1004 is preferably positioned near a writing end 1006 of the pen, as shown in Fig. 10a, such that button 1004 is proximate the user's fingers or thumb when he grips the pen.

[0058] Pressing the button toggles a switch inside pen 1002, causing a signal to be sent to the palmtop computer. Communications between the pen and the palmtop computer are established using techniques similar to those described above with respect to Figs. 9a and 9b. Successive presses of button 1004 cause the computer to cycle through the various input modes, similar to the implementation of mechanical button 118 of Figs. 1a and 1b. Other assignments of button presses and holds to select and switch input modes such as those described above with respect to other embodiments of the present invention, may be implemented as will be appreciated by one skilled in the art.

[0059] In an alternative embodiment, shown in Fig. 10b, a dial 1008 is mounted to the side of pen 1002 in place of button 1004. Rotating the dial causes the palmtop computer to cycle through the various input modes. Pressing dial 1008 selects a particular mode for inputting characters. Other techniques for assigning presses and rotations to select and switch input modes may be implemented as described above, particularly with reference to Figs. 4, 8a, 8b, and 9a.

Tilt Control

[0060] Another exemplary embodiment of a palmtop computer constructed according to the present invention provides for the selection of input modes by tilting the computer in one or more directions. To provide this

functionality, one or more accelerometers are preferably incorporated in the palmtop computer. The ADXL202 accelerometer manufactured by Analog Devices is one model which may be used, although other accelerometers may be used as will be appreciated by one skilled in the art.

[0061] In one embodiment, one or more ADXL202 accelerometers are mounted to casing 108 of palmtop computer 100 of Fig. 1. The accelerometer may be used in place of button 118. The accelerometer or accelerometers are positioned with respect to a longitudinal Y axis 140 and an X axis 142 substantially perpendicular to the Y axis for two-axis tilt sensing. In this way, for example, tilting the computer 100 in one direction (e.g., clockwise) with respect to Y axis 140 selects one input mode, while tilting the computer 100 in the other direction (e.g., counter-clockwise) with respect to Y axis 140 selects another input mode. Similarly, tilting palmtop computer 100 about X axis 142 in clockwise or counter-clockwise directions selects additional input modes. The inclusion and proper positioning of additional accelerometers allows for the selection of additional input modes by tilting the device with respect to the X, Y and other axes. Various assignments of particular input modes to tilting directions may be made, as will be recognized by one skilled in the art.

[0062] The accelerometer or accelerometers are coupled to select input modes using software and/or hardware configurations similar to those described above with respect to other exemplary embodiments of the present invention. Using the ADXL202 accelerometer, digital X and Y output pins are provided which identify the most recent mode selected. These outputs may be coupled directly to the processor within palmtop computer 100 to select and switch input modes. Alternatively, the bits output on the X and Y pins may be clocked and stored as status bits in a register for software-controlled switching.

Audio Feedback

[0063] In the exemplary embodiments described above, audio feedback may be used to signal an input mode change to the user. A speaker mounted to the casing of the palmtop computer serves this purpose. The user can turn on or turn off the speaker, depending on the desired operating environment. In one example, a "beep" is emitted through the speaker anytime the input mode changes. In another example, beeps having different frequencies from one another are associated with the various input modes. The user will know which input mode he has selected upon hearing the particular tone associated with that mode. Such audio feedback facilitates the "heads up" nature of palmtop computers constructed according to the present invention, as the user does not need to look at the device during operation to determine what input mode he has selected.

Conclusion

[0064] The exemplary embodiments described above reduce the task discontinuities associated with conventional palmtop computers which result from having to use specialized strokes to change input modes. The various techniques for selecting input modes and switching among these modes provides for fast, accurate, and easy entering of characters on a palmtop computer. Also, the techniques described above promote a more "heads up" interaction, as the user does not need to look at the palmtop computer when he wants to change modes. The quality of interaction is improved while maintaining the variety of symbols that can be input. Ultimately, the quality of and speed at which documents are produced on handheld devices is improved.

[0065] It should be understood that the particular embodiments described above are only illustrative of the principles of the present invention, and various modifications could be made by those skilled in the art without departing from the scope of the invention.

Claims

1. A palmtop computer (100) for entering characters using an input mode, the computer comprising:
 - a casing (108);
 - a digitizer pad (103) coupled to the casing; and
 - a physical sensor coupled to select the input mode.
2. A palmtop computer as claimed in claim 1, wherein the physical sensor is mounted to the casing.
3. A palmtop computer as claimed in claim 1 or claim 2, wherein the physical sensor is a button (118, 122, 124, 126, 128), or
 - a rocker switch (200), or
 - a dial (402), or
 - a pressure strip (302, 306), or
 - a moveable bar (612, 814, 852), or
 - an accelerometer.
4. A palmtop computer system including the palmtop computer (100) according to claim 1, and further comprising an input pen (900, 1002).
5. A palmtop computer system as claimed in claim 4, wherein the physical sensor is mounted to the pen (900, 1002).
6. A palmtop computer system as claimed in claim 5, wherein the physical sensor is mounted proximate a writing end of the pen (1002), or wherein the physical sensor is a retractable tip (902) of the pen.

7. A palmtop computer system as claimed in claim 5, wherein the physical sensor is a button (1004) or a dial (1008).
8. A palmtop computer (100) for entering characters using a first input mode and a second input mode, the palmtop computer comprising:
- a casing (108);
 - a digitizer pad (103) coupled to the casing; and
 - a ridge (502, 512) formed on the digitizer pad to define a first input region (504) associated with the first input mode and a second input region (506) associated with the second input mode.
9. A palmtop computer (100) for entering characters using an input mode comprising:
- a casing (108);
 - a digitizer pad (103) coupled to the casing; and
 - a border (602) formed around the digitizer pad, the border including a ridge (604, 606, 608, 610) coupled to select the input mode.
10. A palmtop computer (100) as claimed in claim 1, wherein the ridge (604, 606, 608, 610) includes pressure sensitive material and/or the ridge is moveable.
11. A palmtop computer (100) for entering characters comprising:
- a casing (108);
 - a digitizer pad (103) coupled to the casing and having a textured region (616).
12. A palmtop computer as claimed in claim 11, wherein characters are entered using a first input mode and a second input mode, and
- wherein the textured region of the digitizer pad is divided into a first textured region (702) associated with the first input mode and a second textured region (704) associated with the second input mode.
13. A palmtop computer (100) for entering characters using an input mode, the palmtop computer comprising:
- a casing (108)
 - a digitizer pad (103) coupled to the casing; and
 - an accelerometer coupled to select the input mode.

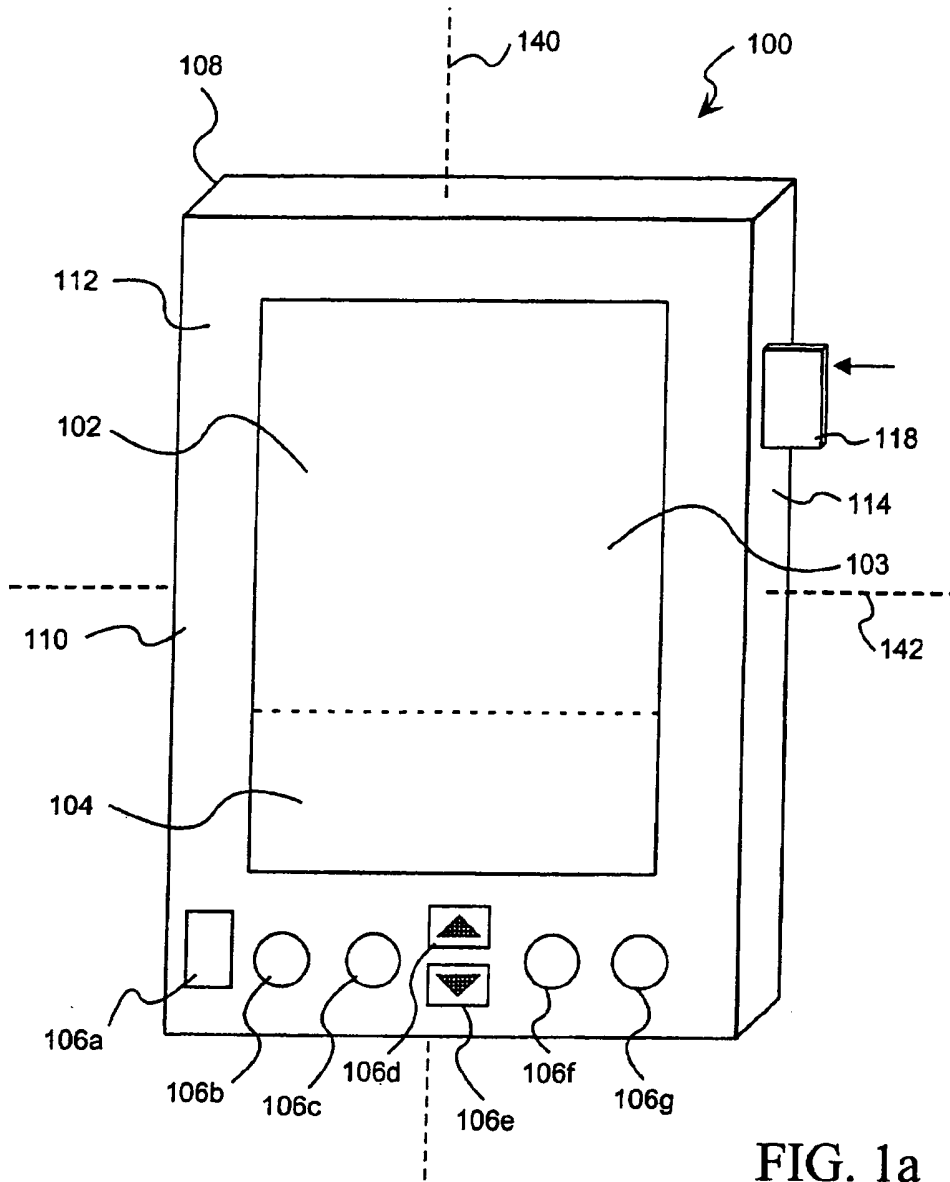


FIG. 1a

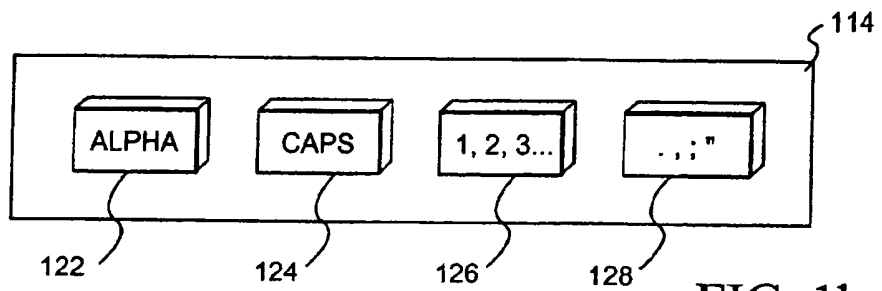


FIG. 1b

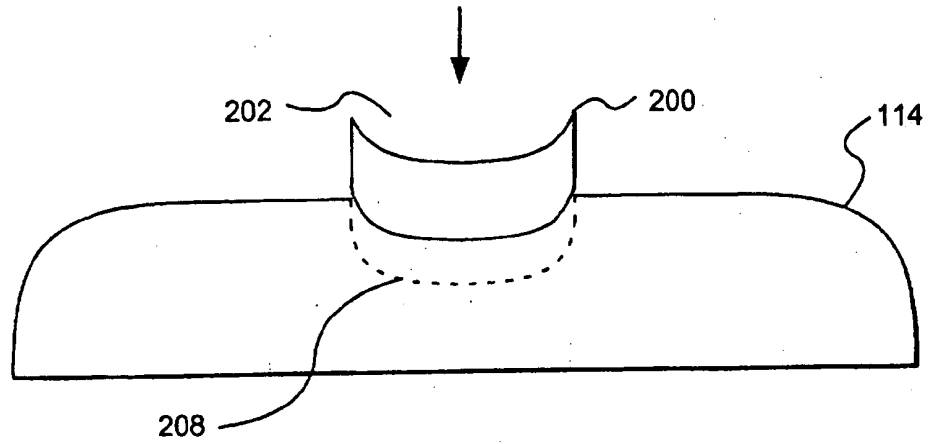


FIG. 2a

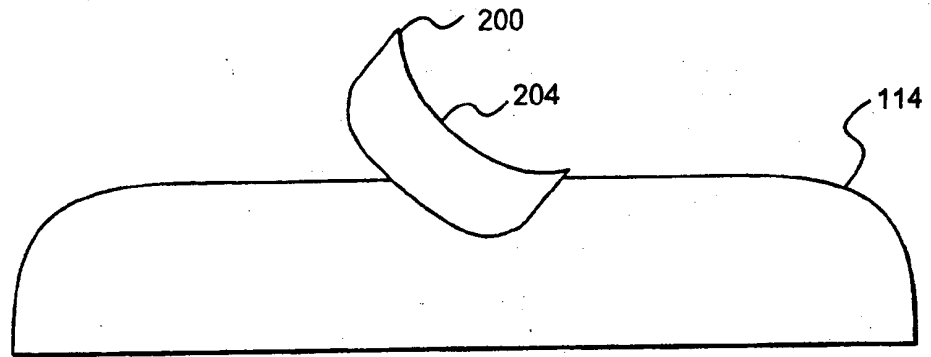


FIG. 2b

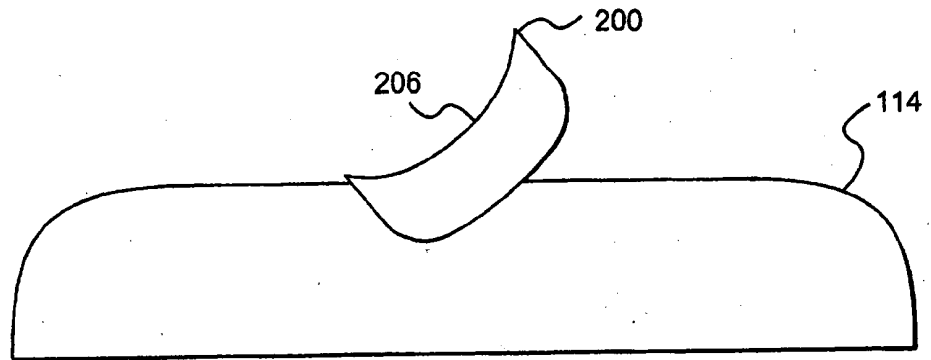


FIG. 2c

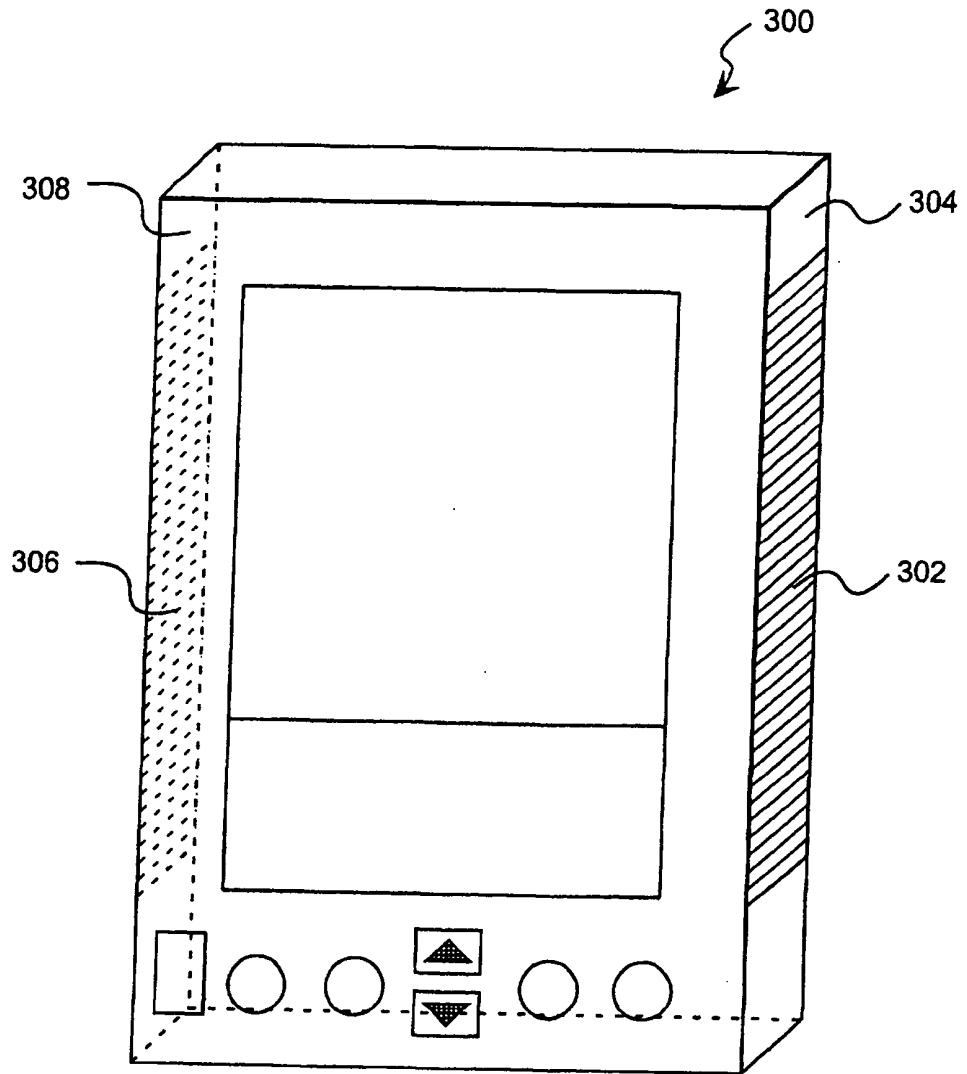


FIG. 3

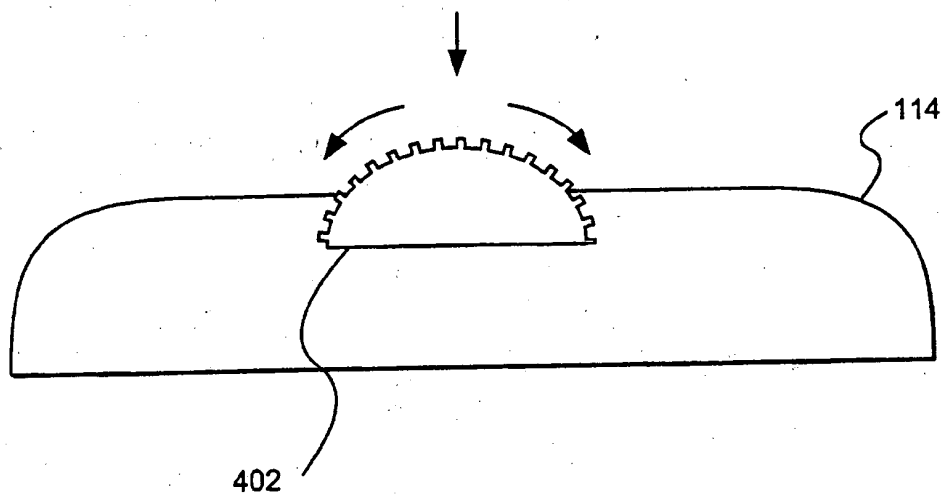


FIG. 4

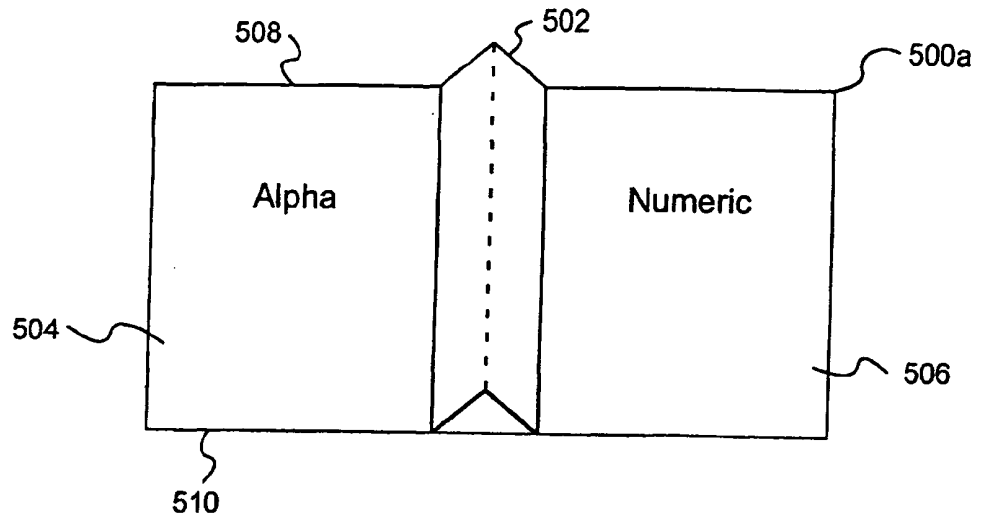


FIG. 5a

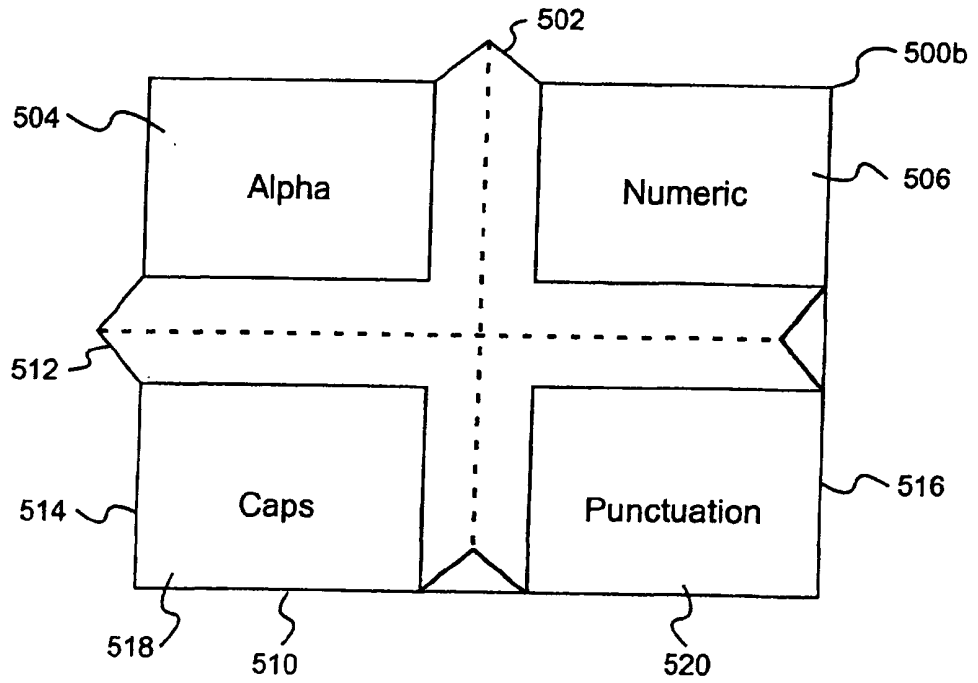


FIG. 5b

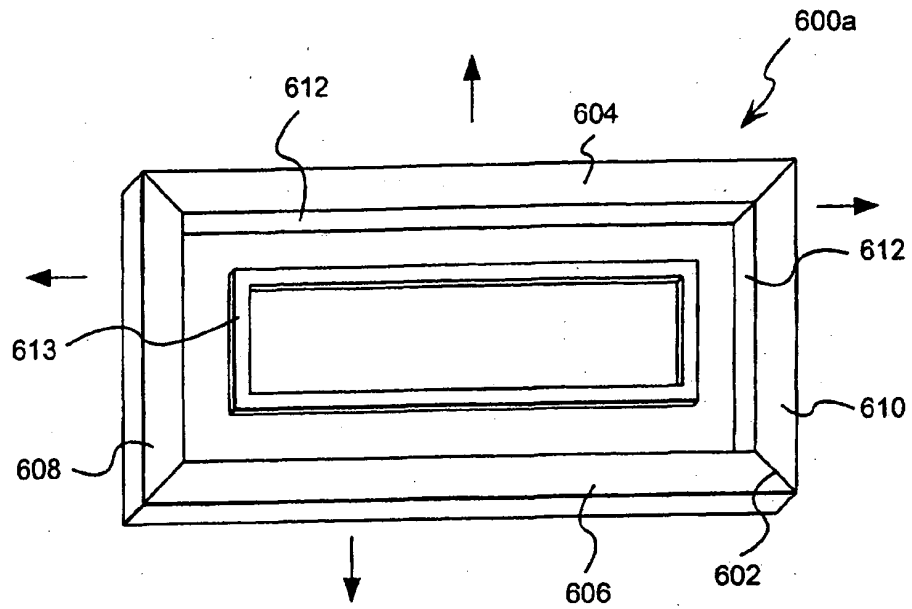


FIG. 6a

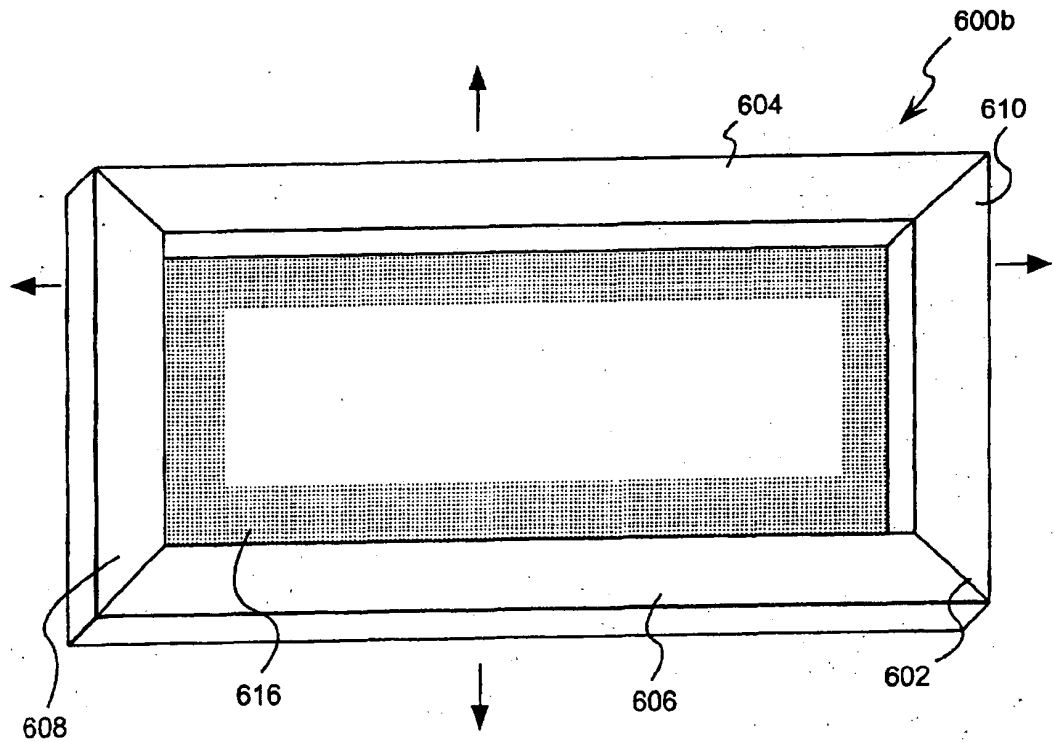


FIG. 6b

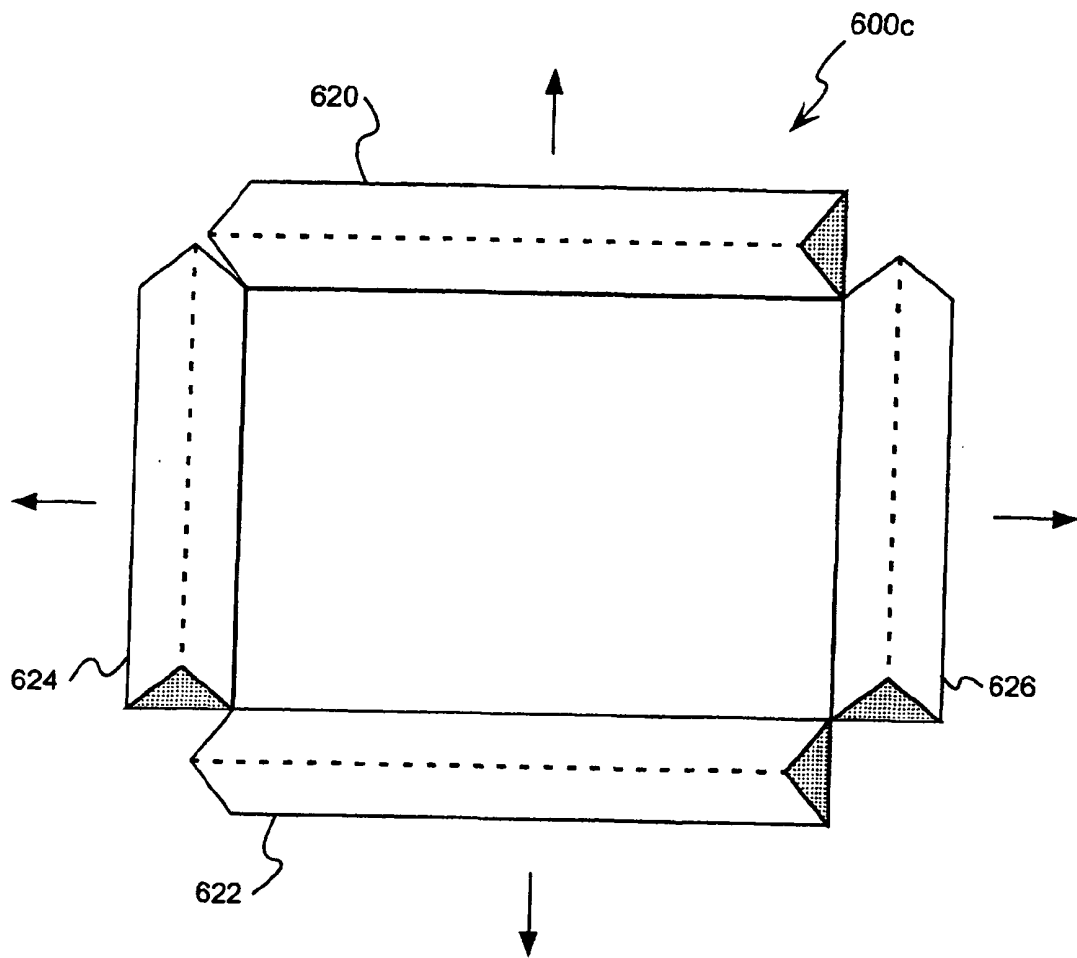


FIG. 6c

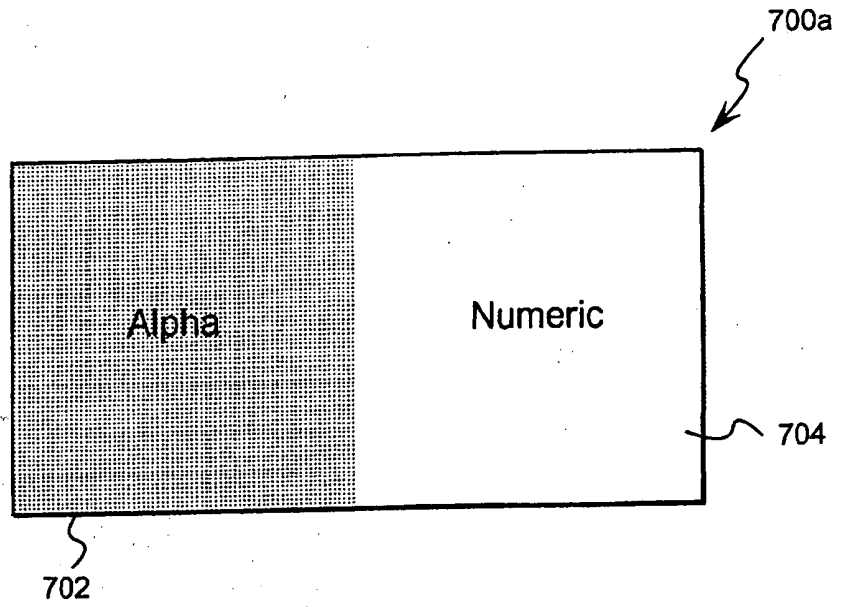


FIG. 7a

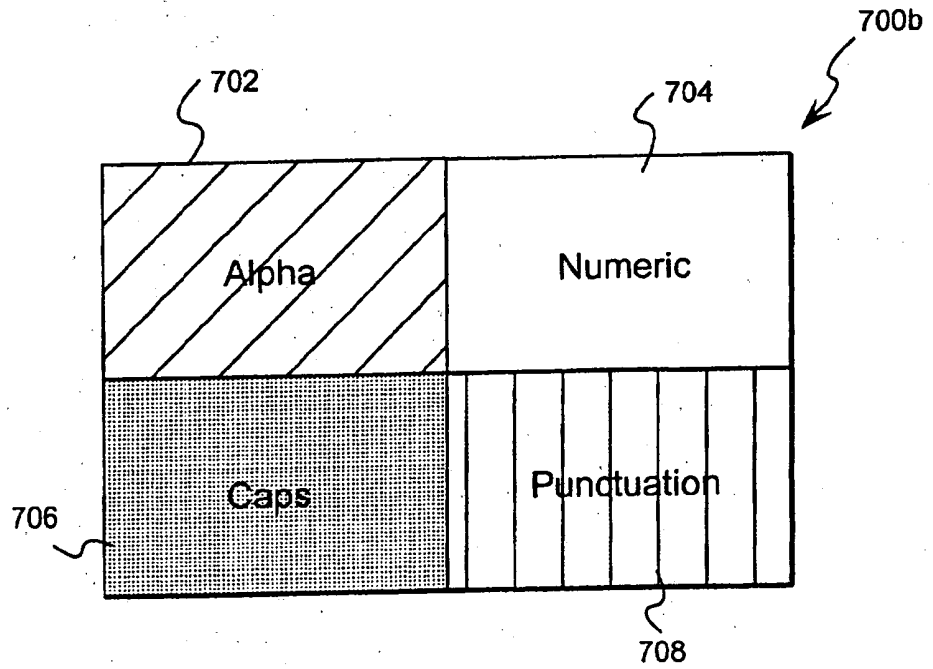


FIG. 7b

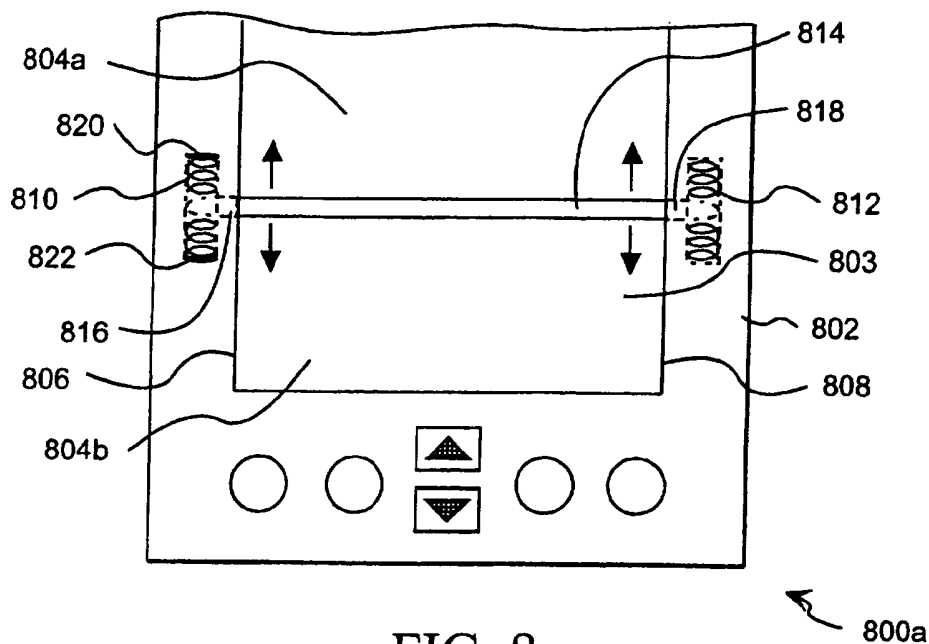


FIG. 8a

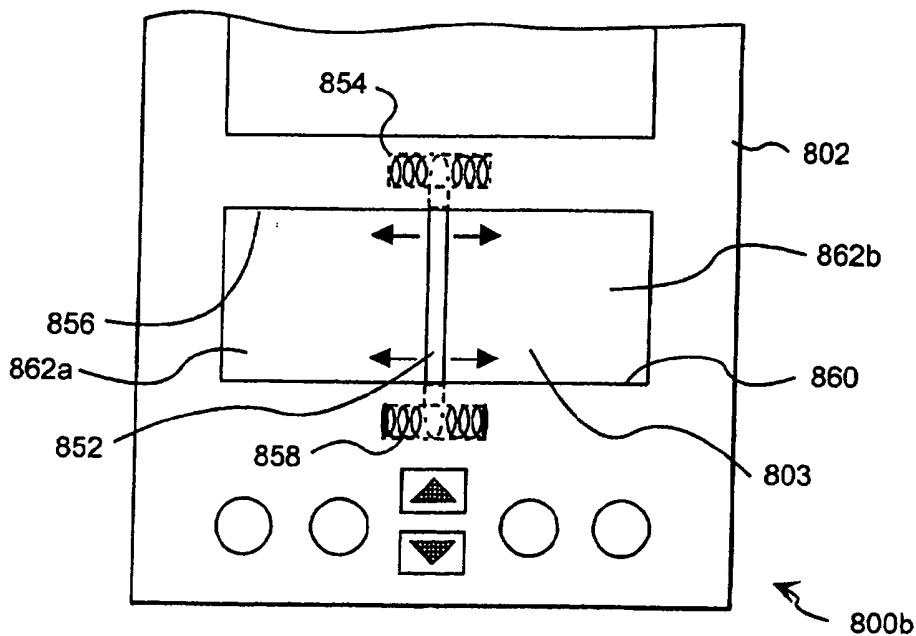


FIG. 8b

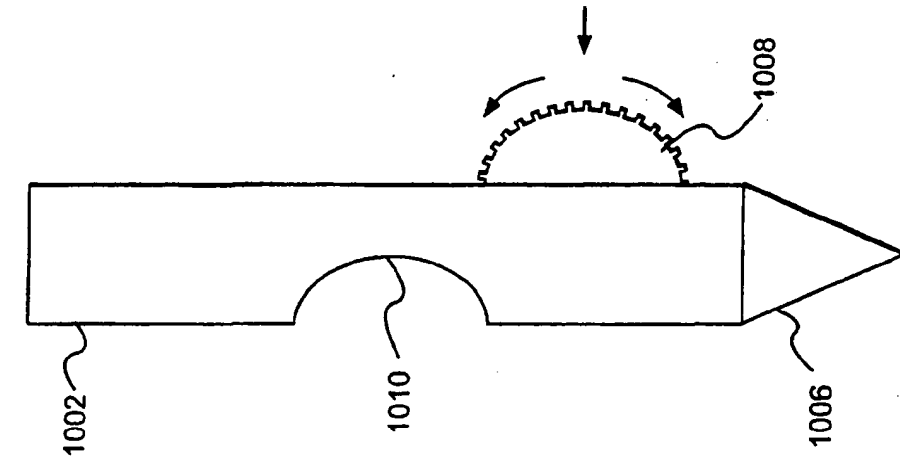


FIG. 10b

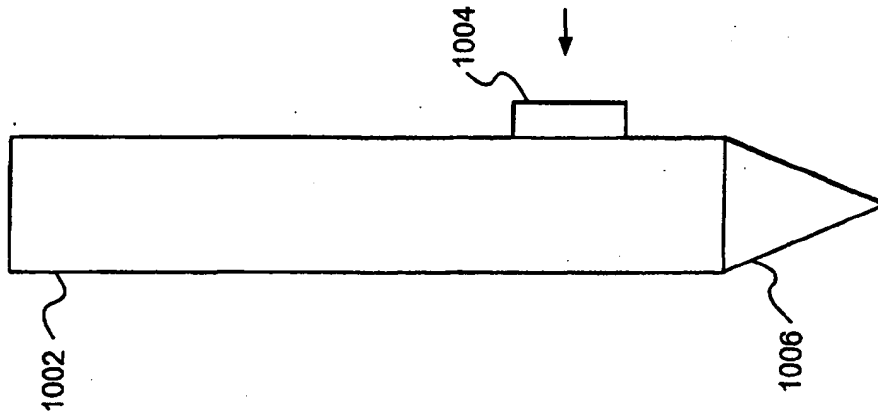


FIG. 10a

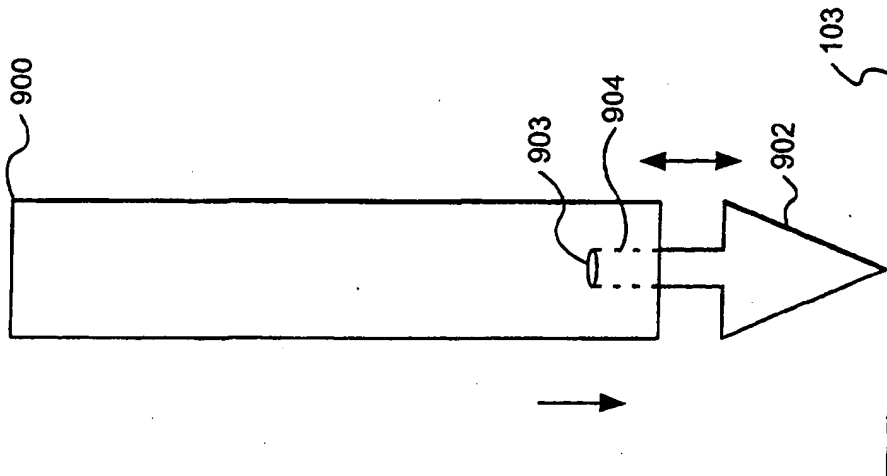


FIG. 9

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(54) **Input mode selection on a palmtop computer**

(57) A palmtop computer (100) for entering characters using one or more input modes (such as alpha, numeric, caps, punctuation). In one example, a physical sensor is coupled to select the input mode. The physical sensor may be in the form of a button (118, 122, 124, 126, 128), rocker switch (200), dial (402), pressure strip (302, 306), moveable bar (612, 814, 832), or accelerometer mounted to the device. The physical sensor may also be mounted to a pen (900, 1002). In another example, a ridge (502, 512) is formed on the digitizer pad (103) and positioned to define input regions (504, 506) associated with particular input modes. In another example, a border (602) is formed around the digitizer pad. The border includes a ridge (604, 606, 608, 610) coupled to select the input mode. The digitizer pad may also be textured (616). A first textured region (702) may be associated with one input mode and a second textured region (704) may be associated with another input mode.

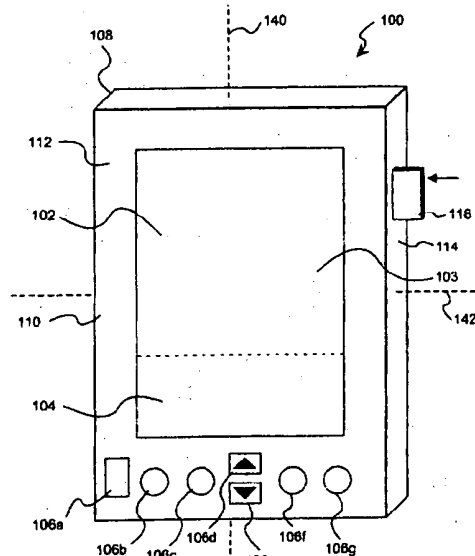


FIG. 1a

EP 1 103 883 A3



European Patent Office

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Application Number
EP 00 31 0527

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The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 7 June 2002	Examiner Taylor, P
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 A : member of the same patent family, corresponding document	

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07-06-2002

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Publication number:

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(54) Computer keyboard with dial for entering repetitive data and commands.

(57) A computer keyboard (10) with a dial (30) for entering repetitive commands and data units into a computer system. It is useful for many computer applications, such as programming and file editing, and affords the user an easier, comfortable and straightforward way of replacing repetitive single-key pressing to send bursts of unitary or inverse information to the system. The dial is rotatably mounted on the keyboard frame (12) and has an exposed operating surface (74) which the user may rotate endlessly with just one finger. A rotational transducer (40) senses dial rotation to generate an output signal representing incremental rotation amounts. The keyboard also includes a device (42) for modifying said repeated commands and data units if certain keys (32, 34) are pressed while the dial is being turned.

EP 0 585 730 A1

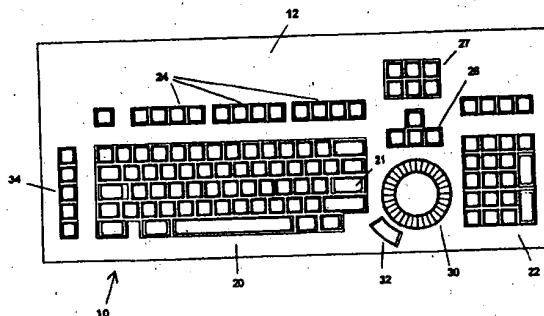


Fig. 1

Rank Xerox (UK) Business Services
(3.10/3.09/3.3.4)

Field of the Invention

This invention relates to computer input devices, in particular to keyboards. This invention relates to a new computer keyboard comprising additional non-binary means to improve the working condition of a keyboard operator and accelerate some tasks during operation of computer programmes.

A computer keyboard generally comprises a plurality of keys mounted on a substantially horizontal panel, for entering commands and data units (i.e. characters) into a computer or computer display terminal. Each key is mechanically engaged with a binary switch (i.e., on-off switch) configuring a switch array that is periodically scanned by an electronic circuit to sense the key's status and transmit a corresponding code (called scan code) to a computer system, when a change in the switch array status is detected.

Computer keyboards are used in almost any kind of computer application. Compared to other computer peripherals, computer keyboards have not evolved significantly from the first specimen up to the present state of the art, the only changes being limited to varying key layouts and modifications in key shapes and switching mechanisms. At the time of the present invention, we know of no significant keyboard improvements on operational features or functional enhancements.

Computer keyboards generally include: a first group of alphanumeric keys, used for entering textual, numeric and punctuation data, a second group of keys generally called "control keys", used for controlling some programme functions implemented in most of the contemporary programmes (e.g., HOME, END, PAGE UP, DELETE, etc.), a third group comprising general purpose keys, also known as "function keys" (generally labeled F1, F2, F3, etc.) and a fourth group comprising a set of four keys generally called "arrow keys", generally used to select an item from a list, control a cursor's position, etc. In almost all computer keyboards, a special control key generally labeled "ENTER" is also provided, usually used to communicate the computer that a certain data entry or control task is completed.

Background of the Invention

In normal operation of a computer keyboard, communication between operator and machine comprises tasks that may be grouped in two main groups:

1. Data entry tasks, and
2. Control and command tasks.

In operating many contemporary programmes using a computer keyboard, a significant portion of the tasks included in the second group require intensive use of a certain group of keys, generally in a repetitive fashion, in bursts of repeated activation of a single key. This group of keys mainly comprises the arrow keys, and secondly the control and function keys. Moreover, the repetitive bursts generally appear as a sequence of several bursts of repeated activation of keys that have functions inverse to each other (e.g., PAGE UP / PAGE DOWN, ARROW LEFT / ARROW RIGHT, SPACE FORWARD / BACK SPACE, etc.), usually within a successive approximation to a final state.

This phenomenon may be observed in almost any kind of modern computer application, but mainly in highly interactive applications running in personal computers, like programming, text editing, spreadsheet editing, etc. This is primarily because user interfaces had evolved from command line keyword oriented interfaces to more friendly, visual feedback interfaces controlled by a limited group of keys (or alternatively by another kind of computer input device e.g., a mouse).

For example, in former editing applications, a special screen area was assigned to enter programme commands by typing one or more keywords in it. However, contemporary editing applications tend to use a single key to switch a main menu displaying all available command options, and a particular command can be selected by typing the arrow keys repeatedly until a desired option is highlighted. This interface concept has been almost uniformly adopted in the software industry.

On the other hand, when tasks included in the first group are performed, this phenomenon is not as frequent, because the statistical distribution of alphanumeric keystrokes in most applications is substantially constant so that the probability of repeated keystrokes of the same key is far lower.

We have also noted that repeated activation of the same key in a computer keyboard causes an uncomfortable tension in the operator's hands and wrists that frequently causes fatigue in the operator and results in productivity loss. It is believed that this tension excess is due to the lack of movement compensation between fingers and other parts of the hand when performing repetitive typing. This belief is supported by the fact that this tension does not appear when typing a piece of text for instance, which normally has a relatively uniform letter probability distribution function.

A widely used approach for this problem is the auto-repeat method (generally known as "typematic") implemented in almost all computer keyboard application. The auto-repeat method consists in automatically

repeating the scan code corresponding to the key being pressed at a fixed rate, when the key is kept pressed at least for a pre-determined time period.

Although it represents an improvement, significant enough for it to become widely accepted, this method is not all that comfortable and efficient, mainly because the auto-repeat rate is given by a fixed time reference and hence it is not capable of providing speed and precision simultaneously. That is, a high auto-repeat rate sacrifices precision and a low one gives good precision but is slow. This unavoidable speed-precision trade-off leads the operator back to repetitive typing because usually it is the only way to get enough precision in most tasks. Moreover, throughout a certain computer operation session, different auto-repeat speeds are needed depending on the particular task being performed; this is a requirement not satisfied by the auto-repeat method which lacks this flexibility. Still another disadvantage of the auto-repeat method is that the initial period preceding the auto-repetition function produces some uncertainty in the number of repetitions generated. This is because if the delay is too short it may produce undesired keystrokes, and if it is too large, it produces an uncertainty about the instant in which the repetition will begin, reducing the chances of precise control even more.

This accumulation of effects leads average keyboard operators to perform, or at least complete, a lot of operations with repetitive typing, since it appears as mentally less distressing although, in the long run, it strains one physically and psychologically, perhaps unconsciously.

Consequently, there is a need of an improved computer keyboard, capable of performing this kind of operations more efficiently, to improve the work conditions of a computer keyboard operator and enhance productivity.

Disclosure of the Invention

It is a basic object of the present invention to improve the work condition of a computer keyboard operator, replacing vertical up and down finger and hand movements (due to repetitive typing) with a more ergonomic and comfortable movement.

Another object of the present invention is to reduce time spent in some tasks while operating a computer programme with a keyboard.

Another basic object of the present invention is to improve the user interface provided by a computer keyboard, by enhancing its command and data entering capabilities.

Another object of the present invention is to reduce the risk of hand, finger and wrist diseases associated with computer keyboard operation, by providing an improved and more ergonomic way of entering repetitive commands and data.

Another object of the present invention is to provide an improved keyboard having all the features stated above that can be manufactured at a substantially low incremental cost.

Another object of the present invention is to provide a computer keyboard having all the features stated above but substantially maintaining the format and operating characteristics of a conventional keyboard.

According to the invention, the improved keyboard having the features set forth above comprises a conventional keyboard in which the fixed time reference of the auto-repeat function has been replaced by a manually generated timing signal through operation of a dial engaged with a rotation transducer. The dial is rotatably mounted with its rotation axis substantially perpendicular to the keyboard plane, exposing one of its surfaces so as to be engagable by a finger of an operator's hand at a number of radial positions spaced from its centre, so that the sensitivity of the device, i.e., response per finger travel distance, depends on the radial position contacted. In other words, the farther the radial position of finger contact from the centre of the dial, the less sensitive the response to a given amount of finger travel.

A pulsing signal is derived from the output of the rotation transducer representing the angular speed of the dial measured in predetermined incremental angular units, plus an additional binary signal giving the sign of the rotation (i.e., clockwise or counterclockwise). The dial can be rotated endlessly and operated in combination with one or more keys for entering bursts of repeated commands and data units into a computer, the number of repetitions as well as the repetition rate being under tight control of the operator. Furthermore, the dial can be rotated back and forth to switch between two scan codes associated with each key, so that the scan code generated in repetition mode is dependent on the dial rotation direction, enabling fast switching between two different commands associated with a single key (useful for commands having inverse responses to each other).

Auxiliary keys may be used in combination with the dial for performing special functions. A pair of default scan codes can be generated when the dial is rotated without pressing any key, for fast issuing of very frequently used commands.

Brief Description of the Drawings

Figure 1 is a plan view of a personal computer keyboard incorporating a dial and other features according to a preferred embodiment of the invention.

5 Figure 2 is an enlarged perspective view of a portion of the keyboard of figure 1 including the dial.

Figure 3 is a cross-sectional view of the dial according to an embodiment of the invention.

Figure 4 is a time-chart showing binary signal waveforms and phase relationships at the output of the transducer associated with the dial.

Figure 5 is a block diagram of the keyboard of the invention, including the dial and associated transducer hardware according to a first embodiment of the invention.

Figure 6 is a flow-chart illustrating a programme routine embodying the operational aspects of the keyboard of the invention.

Figure 7 is a block diagram of the keyboard of the invention, including the dial and associated transducer hardware according to a second embodiment of the invention.

15 Figure 8 is a schematic representation of a possible trajectory of a finger point of contact through a plurality of radial positions.

Figure 9 is a plan view of the keyboard portion of figure 2, representing a particular arrangement according to a preferred embodiment of the invention.

20 Detailed Description of Embodiments

Figure 1 shows a preferred embodiment of a keyboard 10 according to the invention, based on a typical key layout widely used in PC keyboards. In particular, the keyboard 10 includes keyboard supporting frame 12, a main alphanumeric pad 20, a numeric panel 22 located to the right of panel 20, generic function-key panel 24 placed above the main panel 20, arrow key panel 26 and control key panel 27 placed between the main panel 20 and the numeric panel 22.

According to the present invention, the keyboard 10 includes a rotatable dial 30 mounted on the keyboard frame 12 with its rotation axis 29 oriented substantially perpendicular to the plane defined by the key panels, which may freely rotate with relatively little friction. In the preferred embodiment, the keyboard 30 also comprises an auxiliary key 32 for switching a pair of scan codes associated with very frequently used commands, specially shaped to be operated by the thumb of the operator's hand in a way that both dial 30 and key 32 can be simultaneously operated with the thumb and fingers of the same (e.g. right) hand. Also shown in figure 1 is an extra key set comprising auxiliary keys 34 used for switching special scan codes associated with special commands or functions. In the preferred embodiment, this set of keys 34 is placed on the left-hand side of the keyboard 10 so as to be operable by the other (left) hand of an operator.

Figure 2 shows a more detailed view of the dial 30 and the auxiliary keys 32, mounted on the keyboard frame 12 and surrounded by the main key panel 20, the arrow keys panel 26 and the numeric key panel 22, thus configuring an advantageous arrangement as will be explained further on herein. As illustrated in figure 40 3, the dial 30 is mounted over a stepped opening 31 in the top 13 of the keyboard housing. The opening 31 has a concentric outer step where dial 30 just fits in so as to keep dust from getting inside the keyboard housing 10.

Figure 3 also shows a preferred embodiment of the dial and rotational transducer advantageously using a single piece of material and taking advantage of computer keyboard structures well known in the art. The dial 30 may be manufactured as a knob 50 shaped with an elevated top flat portion 70 and a sloped conical peripheral portion 74 so as to approximately fit in a human palm for easy and reliable manipulation of the dial 30 with any or all fingers of the right hand of the operator. Since the conical portion 74 has been designed to enable precise and slow operation of the dial, it has proven useful to use a rugged surface or a plurality of protruding elements as radial strips or the like. However, for the central portion 70, a polished surface (e.g., acrylic) is preferable, since it allows a good tracking and at the same time provides a smooth and uniform contact surface.

Inside, the dial 30 comprises a shaft 52 posted on the centre of internal surface 54 of the knob part. The shaft 52 is mounted on a bushing 56, fixed to the bottom 62 of keyboard housing 10. The dial mounting preferably includes a circumferential recess 58 in the shaft 56 which receives a resilient latch 59 so that together they hold the dial 30 in place on the keyboard. This mountage has the advantages that, for one, it is easy to insert and remove, enabling nearly instant mounting in the keyboard manufacture and assembly process and, furthermore, features low static friction which gives it just the right resistance so that it can be easily and precisely turned by the operator with hardly any effort.

Going back to the shape of the dial 30, the conical portion 74 folds back at the outer edge and then downwards at a right angle to form a lower cylindrical skirt 57 which is supported above a printed circuit board 66. The bottom edge of the skirt 57 is slotted so as to form a continuous line of rectangular openings all the way round the skirt 57.

As is conventional, this circuit board 66 houses the electronics which interface the computer keyboard 10 with a port of the computer system. According to the preferred embodiment of this invention, the circuit board 66 also supports a pair of opto-couplers 68 (only one of which can be seen in figure 3) for sensing dial rotation. More precisely, the opto-couplers 68 are placed on the board 66 relative to the opening 31 so that the cylindrical skirt 56 fits into opto-coupler gaps. Thus, any rotation of the dial 30 results in passage of openings through the opto-coupler gaps. Each of the opto-couplers 68 issue pulse trains contains information regarding direction, rate of turn and incremental angle of turn.

Therefore, the slotted skirt 57 together with opto-couplers 68 form a rotational transducer 40 represented in the block diagram of figure 5. As the dial 30 is rotated, the opto-couplers 68 generate a pair of signals X1-X2 representing signed incremental rotational movement of dial 30. The opto-couplers 68 are mounted on printed circuit board 66, for instance by soldering, at two angularly spaced locations relative to the dial shaft 52 so as to generate synchronous quadrature pulse signals according to a widely known rotation transducer technique displayed in figure 4.

Every quarter-cycle of signals X1-X2 represents an elementary angle DA according to a predetermined resolution. As can be seen in figure 4, the variation of the signal status taken together in each quarter-cycle gives all the motion information. A change in the status of signals X1-X2 at two different points in time defines a transition and provides motion direction information as summarized in the following Table 1.

TABLE 1

X1 _n , X2 _n	X1 _{n+1} , X2 _{n+1}	Motion Direction
00	00	0
00	01	-1
00	10	+1
00	11	x
01	00	+1
01	01	0
01	10	x
01	11	-1
10	00	-1
10	01	x
10	10	0
10	11	+1
11	00	x
11	01	+1
11	10	-1
11	11	0

In Table 1, the column marked "X1_n, X2_n" represents the signal status prior to detection of the transition and the column marked "X1_{n+1}, X2_{n+1}" represents the status after transition. The third column shows the incremental signed value of the motion detected. Transitions marked with an "x" are not possible in the scheme of figure 5 and may be used as an error signal indicating a transducer malfunction.

Figure 5 shows a block diagram of a preferred embodiment of the electronic circuit onboard the keyboard 10. As shown in figure 5, signals X1-X2 are read by parallel inputs P0 and P1 of logic circuit means 42, which processes the signals to detect the dial rotation according to Table 1 and calculate the angular units rotated according to a predetermined resolution. The logic circuit 42 derives an internal timing signal for each rotation angular unit detected for triggering transmission of the corresponding scan codes when a key is pressed (or the default scan-codes if no key is pressed). The logic circuit 42 derives an additional internal binary signal indicative of the sign of the rotation, for selecting the corresponding scan code from the set of scan codes associated with each key according to the dial rotation direction, as explained further on herein.

In the preferred embodiment, the logic circuit 42 is the same means used for scanning key array 44 of keyboard 10, since it only requires the availability of input ports P0 and P1 and some extra programming to

include the transition detection routines and link them to the already available scan code generating means and routines (naturally built into the circuit 42). Circuit 42 can be embodied by means of a microcomputer such as the Motorola 6809 with associated hardware for scanning the key array 44 and transmitting scan codes to the computer system. It will be apparent to those skilled in the art that all accessory elements and means are well known in the industry and are common practice in manufacturing today's computer keyboards. For instance, the key array 44 of figure 5 represents the set of keys of a conventional keyboard, including main alphanumeric panel 20, numeric panel 22, generic function keys panel 24, arrow keys panel 26 and control keys panel 27. Arrays 44 and 34 are cross-scanned by respective lines connected to generic input ports P2 through Pn of circuit means 42.

Figure 6 is a flow diagram of the functions carried out by circuit means 42. The part of the diagram inside the dotted line shows a method similar to that used in a conventional keyboard, the only difference being that in a conventional keyboard, only a single scan code is associated with each key, generated when a key status change is detected. In the keyboard 10 of the invention, however, each key is associated with more than one scan code, the additional scan codes being generated by the dial rotation and depending on the dial rotation direction. The scan code generated when a key is pressed without rotating the dial is called "static scan code", while the additional scan codes defined for the corresponding dial rotation directions are called "dynamic scan codes". Each time a key array 44 status change is detected, circuit means 42 looks up in a table the new scan codes according to the new activation status of key array 44 (keys pressed or released) and fills in a one-dimensional data structure called "scan code vector". When a key is pressed from a released position, circuit means 42 generates the corresponding static scan code. If the key is held in an active position and the dial is rotated, circuit means 42 generates repeatedly the dynamic scan code present in the scan code vector, according to the dial rotation direction and upon detection of each incremental angular unit rotated by the dial.

Table 2 gives an example of a possible scan code assignment table to illustrate this principle.

TABLE 2

Key Label	Static Scan Code	Dynamic Scan Codes	
		(-)	(+)
TAB	21	33	21
SPACE	6B	7D	6B
AUX 1	-	9C	B4

If the keyboard in which the invention is to be practiced is a double code keyboard (i.e., a keyboard that generates a first scan code when a key is pressed and a second scan code when the key is released) as is the case for example of contemporary "PC" keyboards, almost the same scheme may be implemented, the difference being that two scan codes are generated for each dial rotation transducer transition detected, with a suitable delay in between, so as to simulate repeated keystrokes of the same key while maintaining full compatibility with existing applications.

Moreover, Table 2 can be further enhanced to contain not only single scan codes, but a combination of them, so as to simulate repeated keystrokes of a key combination or macro rather than of a single key. For example, "TAB" and "SHIFT + TAB" can be assigned to a certain key of group 34, respectively as the positive and negative dynamic scan codes, so as to use the dial as an option selector in applications that use these key combinations for that purpose.

Although Table 2 has been dimensioned to contain scan code information for each key (i.e., the static scan code and both dynamic scan codes), it may be enhanced to contain additional key-specific information. For example, for some particular keys, a different effective resolution (i.e., the number of dynamic scan codes generated in a complete turn of the dial) may be desirable so as to reduce the dial's sensibility for that particular key. An example of this case is the "PAGE UP" - "PAGE DOWN" function, in which a user needs a certain time period between two successive commands so as to recognize the successive displayed images while browsing a certain file or document. This can be done by providing an additional column in Table 2 containing a number representing a different angular unit value for each key.

If internal skirt 57 is dimensioned to allocate for example 20 slots, a wide range of repetition rates may be easily obtained, from nearly nought (by operating the dial from its periphery) to approximately 200 Hz (by sliding the fingers towards the dial's centre to gain rotational speed). This is illustrated in fig. 8 which sketches a clockwise rotation A1 during a repetition operation. An example of a finger point of contact

trajectory has been represented as curve T in figure 8. As may be seen in fig. 8, to generate an approximately complete turn, just a relatively small amount of finger travel is needed by turning the dial, first sliding the finger from starting point S towards the centre of the dial and then sliding the finger back towards the ending point E at the dial periphery. In this elementary operation performed very frequently while using the dial, since the point of contact evolves through a number of radial positions, from radial position r2 to radial position r1 and then back again to radial position r2, different angular speeds are obtained as the dial rotates a greater or lower number of angular units AU in a given time interval, thereby varying the repetition speed and the perceived effective resolution for a given point of contact travel. The result is that the operator can tightly control a certain repetition operation with both speed and precision at the same time, which in the long run results in a comfortably and efficient operation of the computer.

Moreover, if a wider repetition rate range is wished, the effective resolution may be varied dynamically to produce an acceleration effect. In other words, the function relating the number of rotation transducer transitions detected in a certain time period to the effective repetition timing signal cycles generated in the same time period need not be linear, so that a higher number of transitions detected produces an even higher effective repetition timing signal cycles, widening the effective repetition timing signal range. This can be done for example by dynamically altering the instantaneous angular unit as a function of the rotating speed of dial 30. The processing needed to perform the acceleration effect may be done by circuit means 42, using routines widely known in the art. An additional advantage of implementing the acceleration effect is that it lowers the number of slots of skirt 57 and tolerances requirements in mounting of opto-couplers 68 and dial 30, while still allowing a relatively wide repetition rate range.

In a second embodiment of the invention, the processing means that process the signals generated by the dial rotation transducer and perform the disclosed functions may be inside the computer system, as shown in figure 7. The advantage of this alternative embodiment is that the scan-code table may reside in the computer's memory and hence may be easily configurable for user customization. On the other hand, the disadvantage is that it is not independent of the computer operating system running in the computer and may not guarantee immediate 100% compatibility since modifications need to be introduced at operating system level so as to simulate repeated keystrokes upon dial rotation, in a way that it is transparent to any application programme running in the computer. On the other hand, in the first embodiment, the signals generated by the keyboard 10 when the dial is rotated are always identical to those generated by the effective activation of the physical keys, so that the keyboard of the first embodiment of the invention is fully transparent to any programme running in the computer, even to the operating system itself.

In the preferred embodiment, the horizontal arrow key scan codes are assigned as respective default dynamic scan codes, and the vertical arrow key scan codes are assigned as respective dynamic scan codes of auxiliary key 32. With these assignments and since dial 30 and auxiliary key 32 are simultaneously operable, the combination of both elements behaves in some applications as a two-dimensional, one-dimension-at-a-time cursor control device of an extremely wide speed range and of unlimited trajectory extent due to the operational characteristics of the dial mentioned hereinbefore. For example, when editing a text file in a contemporary word processing application, activation of the right or left arrow keys causes a text cursor to shift from one character position to the next, respectively in a forward or backward direction. At that point, the dial 30 can be used as a right-left cursor control device, capable of traveling without limit and continuously over the text file with significantly little effort and hand movement. Furthermore, if the auxiliary key 32 is pressed, the dial 30 can be used as an up-down cursor control device, shifting the cursor across successive lines of text allowing to reach any part of the text file in the same way.

Moreover, if both dial 30 and auxiliary key 32 are placed on the keyboard panel to the right of the ENTER key 21, as shown in figures 1 and 8, the resulting arrangement inside the dotted line in figure 8 allows a fast, relaxed and efficient programme control in many of contemporary computer applications, since most of them are based on the arrow keys and the ENTER key to control a significant part of the programme flow. For example, in an application based in a pull-down menu structure, the dial may be first used to select a sub-menu by generating the horizontal arrow keys (default dynamic scan codes), and further used to select a certain command within the selected sub-menu by simultaneously pressing auxiliary key 32 to generate the vertical arrow key dynamic scan codes. When the desired command is reached, the ENTER key may be pressed to complete the selection. In this way, the dial 30 combined with auxiliary key 32 and the ENTER key work together as a programme control device, eliminating the need for repeatedly pressing the arrow keys to navigate through the menu tree nodes and branches.

Furthermore, auxiliary keys 34 may be advantageously used to issue pairs of commands frequently used in a repetitive fashion and that produce opposite effects to each other. For example, if the "Page Up" and "Page Down" key scan codes are assigned to one of auxiliary keys 34 as its respective dynamic scan

codes, when said key is pressed while the dial is rotated the dial behaves in many applications as a rotary scrolling device, very useful for browsing for example a long text file or data base file at the computer screen, allowing inspection of the file in a forward or backward direction efficiently and comfortably.

Table 3 is an example of how scan codes may be assigned, thus summarising this disclosure.

TABLE 3

Pressed Key	Dynamic Scan Codes	
	Counterclockwise	Clockwise
None (Default)	Left Arrow	Right Arrow
Auxiliary Key 32	Up Arrow	Down Arrow
Aux. Key 34 (1)	Page Up	Page Down
Aux. Key 34 (2)	Space Bar	Delete Character
Aux. Key 34 (3)	Shift + Tab	Tab
Aux. Key 34 (4)	Gen. Inv. Fn.	Gen. Direct Fn.
Alphanumeric Keys	Back Space	Key Static Code

As another example, the scan codes of "DELETE" and "SPACE" keys may be assigned to another key in the set 34 as its respective dynamic scan codes, to let entire strings of characters to be rubbed out as the dial is turned in a clockwise direction and otherwise inserting space characters when the dial is rotated in a counter-clockwise direction.

While the invention has been illustrated and embodied in a keyboard comprising a dial for entering repetitive data and commands to a computer, it is not intended that it should be restricted to the details given, since various modifications and structural changes may be made without departing in any way from the nature of the present invention. Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it to various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention.

Claims

1. A computer keyboard (10) for connection to a computer system for entering commands and data units into said computer system; said keyboard including a plurality of keys (20, 22, 24, 26, 27) mounted in a supporting frame (12), scanning means (42) to sense activation of said keys, processing means (42) to generate said commands and said data units on detecting of a status change of said keys and communication means for transmitting said commands and said data units to said computer system; and characterised by comprising a rotatable dial (30) for manually entering sequences of repeated commands and data units to said computer system, said dial being rotatably mounted in said supporting frame and having a centre (70), a rotation axis (29) passing through said centre and an exposed operating surface (74) engagable by at least one finger of an operator at a plurality of radial positions from said centre so that said dial can be rotated without limit by said at least on finger; rotational transducer means (56, 68) for detecting rotation of said dial and generating an output signal indicative of incremental rotation said dial in pre-defined angular units; means (42) for using said output signal to generate said repeated commands and data units for entry into said computer system upon detection of said incremental rotation angular units, means (42) for modifying said repeated commands and data units by activation of said keys while said dial is rotated by said operator.
2. The keyboard of claim 1, characterised in that said supporting frame is substantially planar; said keyboard including an alphanumeric key panel (20), an arrow key panel (26) and a numeric key panel (22); said dial is mounted with said rotation axis substantially perpendicular to said frame and said dial is located adjacent to at least one of said key panels.
3. The keyboard of claim 2, characterised in that said dial is substantially circular and has a substantially flat circular elevated central portion (70) for ease of operation so as to reach any of said plurality of radial positions on said dial and obtain different rotation speeds of said dial for equal finger travel rates by contacting said dial at different radial positions.

4. The keyboard of claim 3, characterised in that said dial has a sloped substantially conical peripheral portion (74) ergonomically adapted to a human hand to ease operation of said dial.
5. The keyboard of claim 4, characterised by further comprising a plurality of auxiliary keys (32, 34) for switching frequently used commands or data units, at least one of said auxiliary keys (32) being positioned alongside said dial so as to enable simultaneous operation of said dial and said at least one auxiliary keys with a single hand by said operator.
6. The keyboard of claim 5, characterised in that at least one of said auxiliary keys (32) is located adjacent to a left lower quadrant of said circular dial so as to allow operation of said auxiliary key by a thumb of said hand, said auxiliary key having an approximately circular arc shape, said arc being coaxial to said dial.
7. The keyboard of claim 6, characterised by further comprising a printed circuit board (66) including at least a portion of said rotational transducer means including a pair of opto-couplers (68); and characterised in that said dial is shaped like a knob having: a top portion (70) formed by said flat circular elevated central portion and said substantially conical peripheral portion (74) around said central portion, a lower cylindrical skirt (57) extending downwards from said substantially conical peripheral portion and having a bottom edge spaced from said printed circuit board means and a plurality of slots in said bottom edge, said opto-couplers being positioned on said printed circuit board so that said bottom edge of said lower cylindrical skirt passes through said opto-couplers when said dial is rotated, and a central shaft (52) extending downwards from said central portion, said shaft being engagable rotatably, but axially securable, in a bushing (59) fixed to said supporting frame.
8. The keyboard of claim 7, characterised in that said central shaft has a circumferential recess (58) and said bushing has a resilient latch (59) positioned to engage in said recess when said shaft is inserted in said bushing so as to retain said knob in place and enable said knob to be swiftly fitted into and removed from said supporting frame.
9. A computer system including a computer keyboard (10) for entering commands for controlling a computer programme running in said computer system and entering data units into said computer programme; said keyboard including a plurality of keys (20, 22, 24, 27) mounted on a supporting frame (12), scanning and processing means (42) to sense activation of said keys to generate said commands and said data units in response thereto and communication means (42) for transmitting said commands and said data units to said computer system; and characterised by including an arrangement for improving and speeding up operation of said programme comprising a rotatable dial (30) for manually entering sequences of repeated commands and data units to said computer system, said dial being rotatably mounted on said supporting frame and having a centre, a rotation axis (59) passing through said centre and an exposed operating surface (74) engagable by at least one finger of a hand of an operator at a plurality of radial positions from said centre so that said dial can be rotated without limit by said at least one finger of said hand; transducer means (57, 68) for detecting rotation of said dial and generating an output signal indicative of incremental rotation of said dial in pre-defined angular units; means (42) for using said output signal to generate said repeated commands and said data units for entry into said computer system upon detection of said incremental angular units; a plurality of keys (26) positioned in proximity to said dial so as to allow easy access of said keys by said fingers of said hand; a plurality of auxiliary keys (32, 34) for switching frequently used commands and data units, at least one (32) of said auxiliary keys being positioned alongside said dial so as to allow simultaneous operation of said dial and said at least one auxiliary key by said operator with a same hand; and means (42) for modifying said repeated commands and data units by activation of said keys while said dial is rotated by said operator.

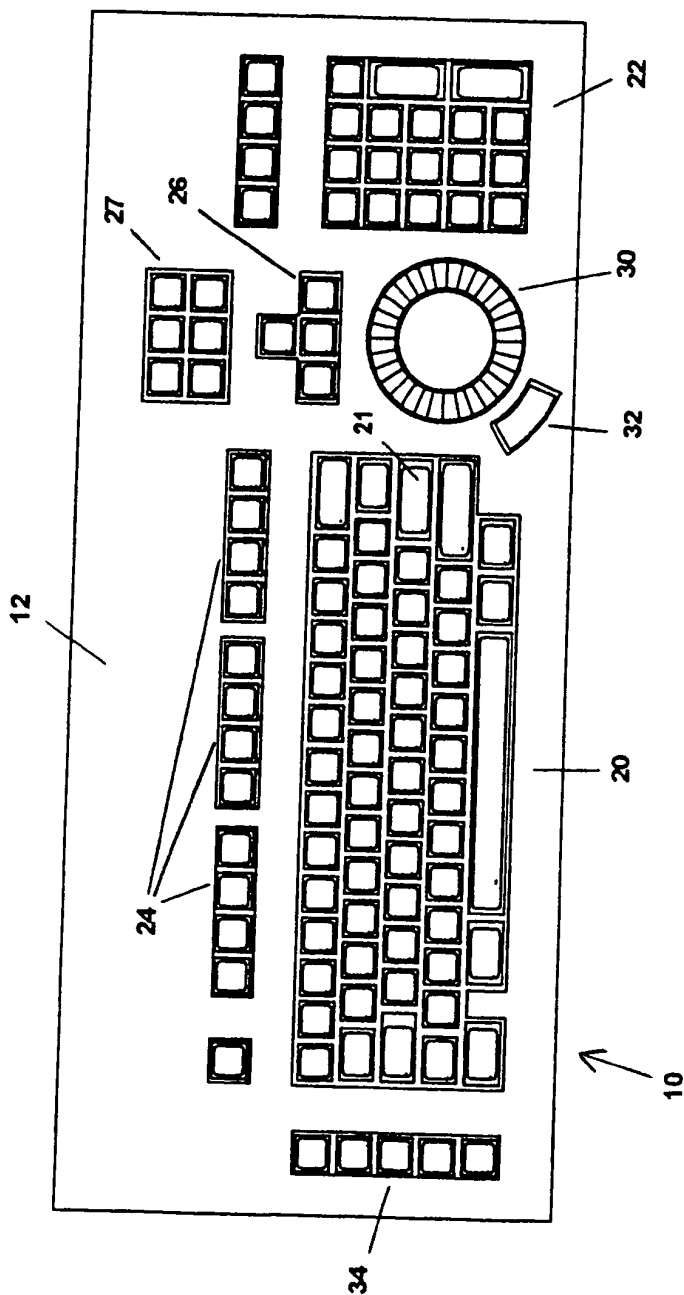


Fig. 1

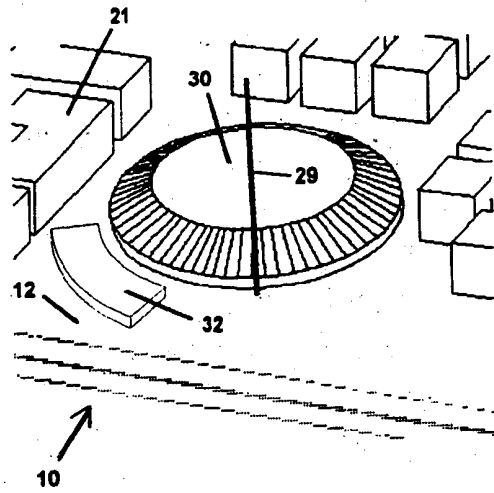


Fig. 2

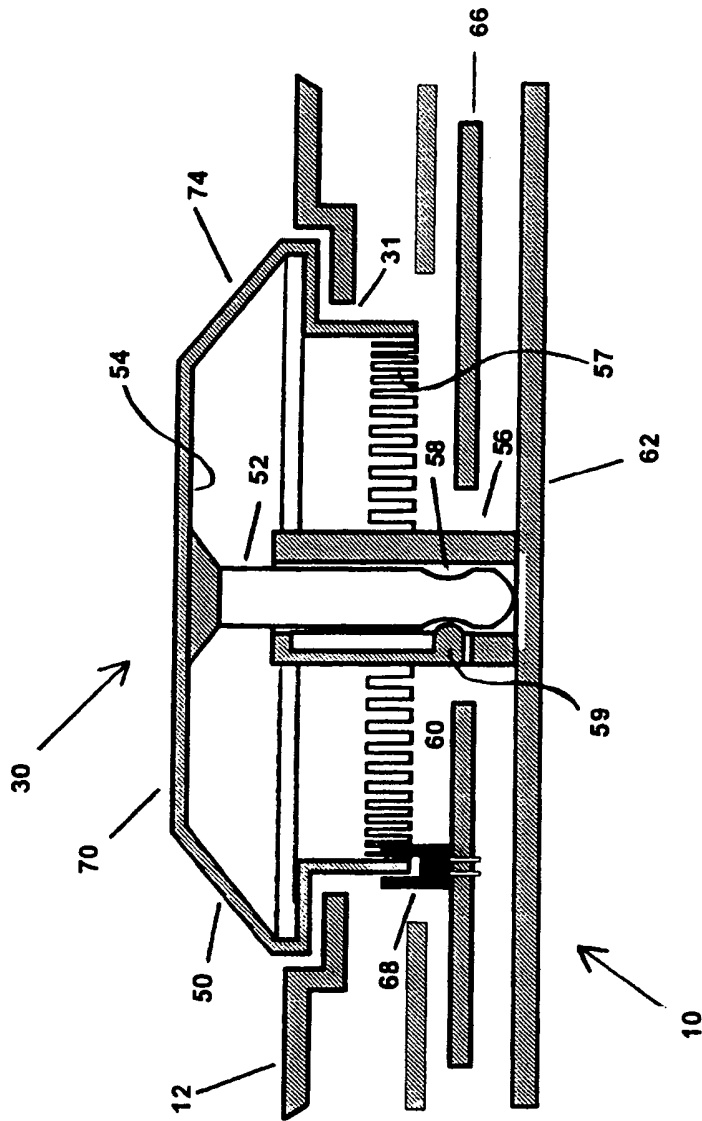


Fig. 3

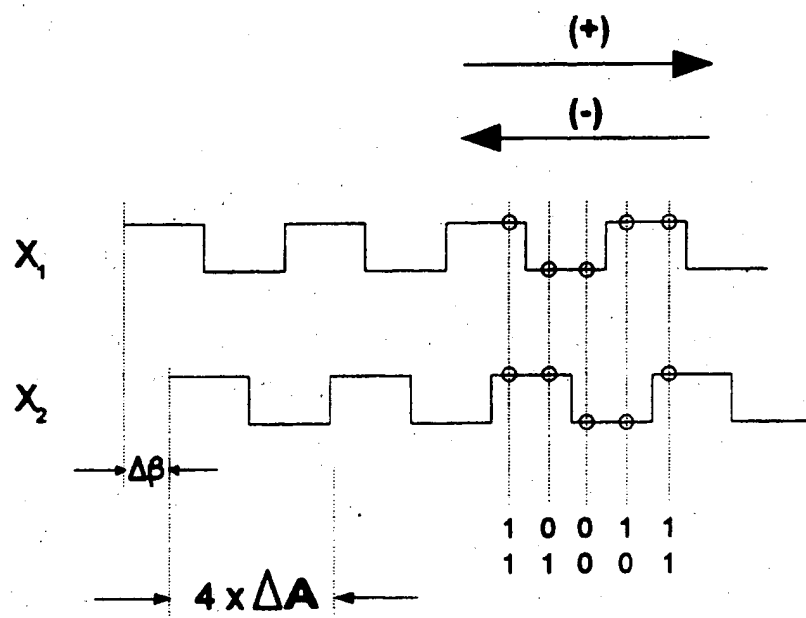


Fig. 4

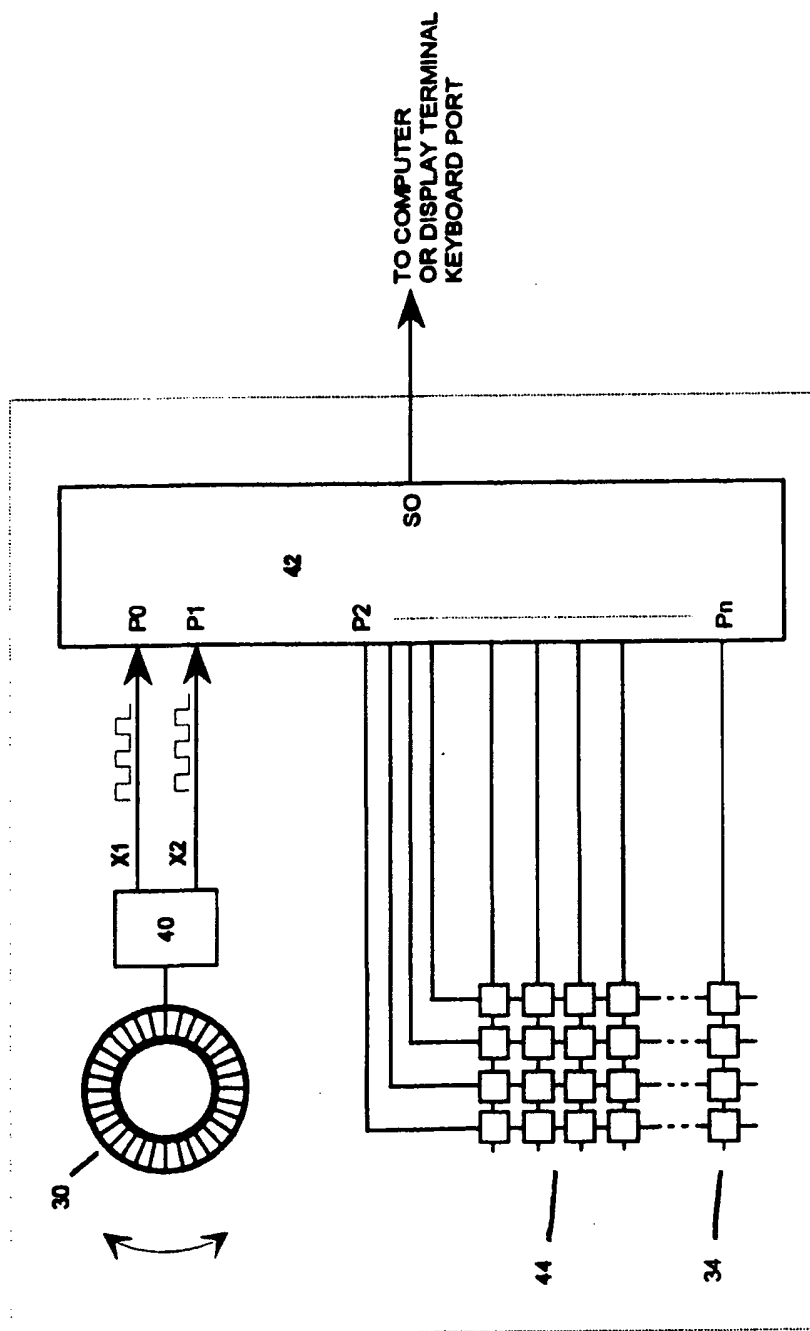


Fig. 5

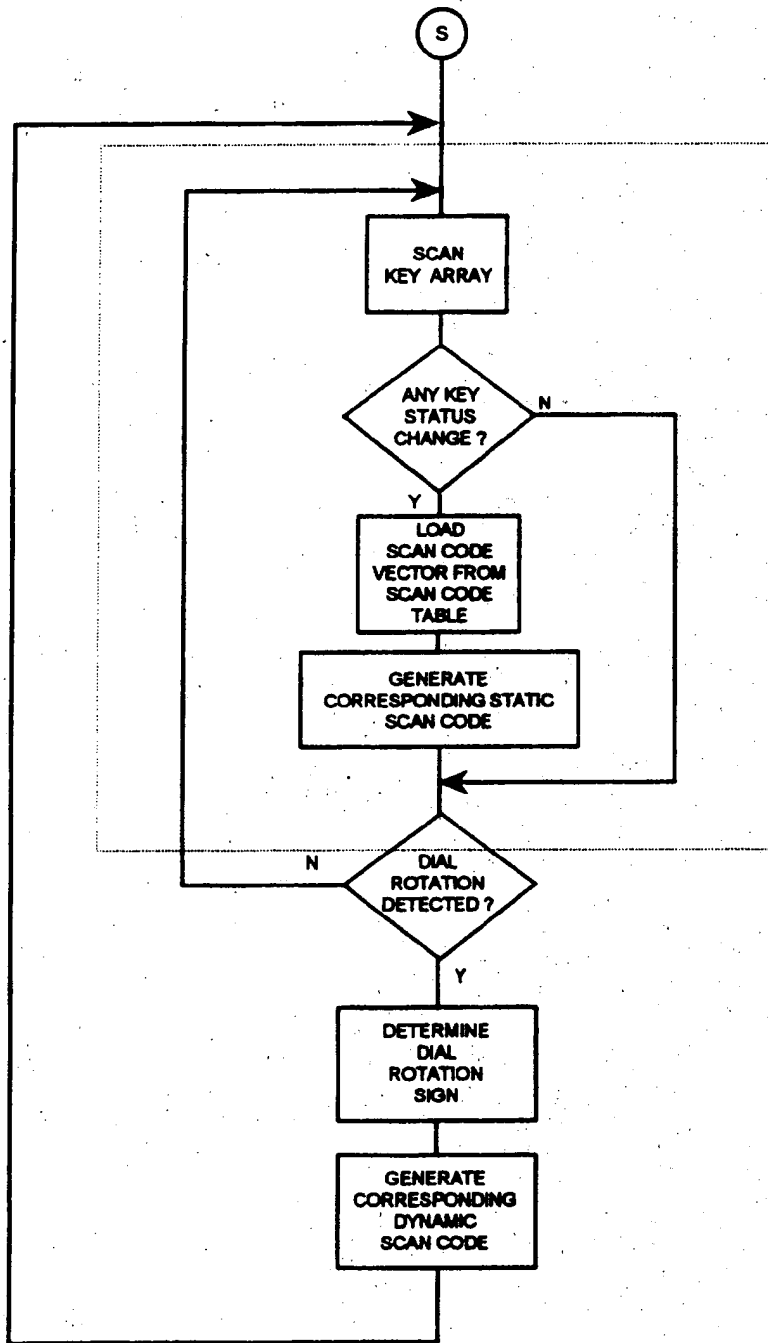
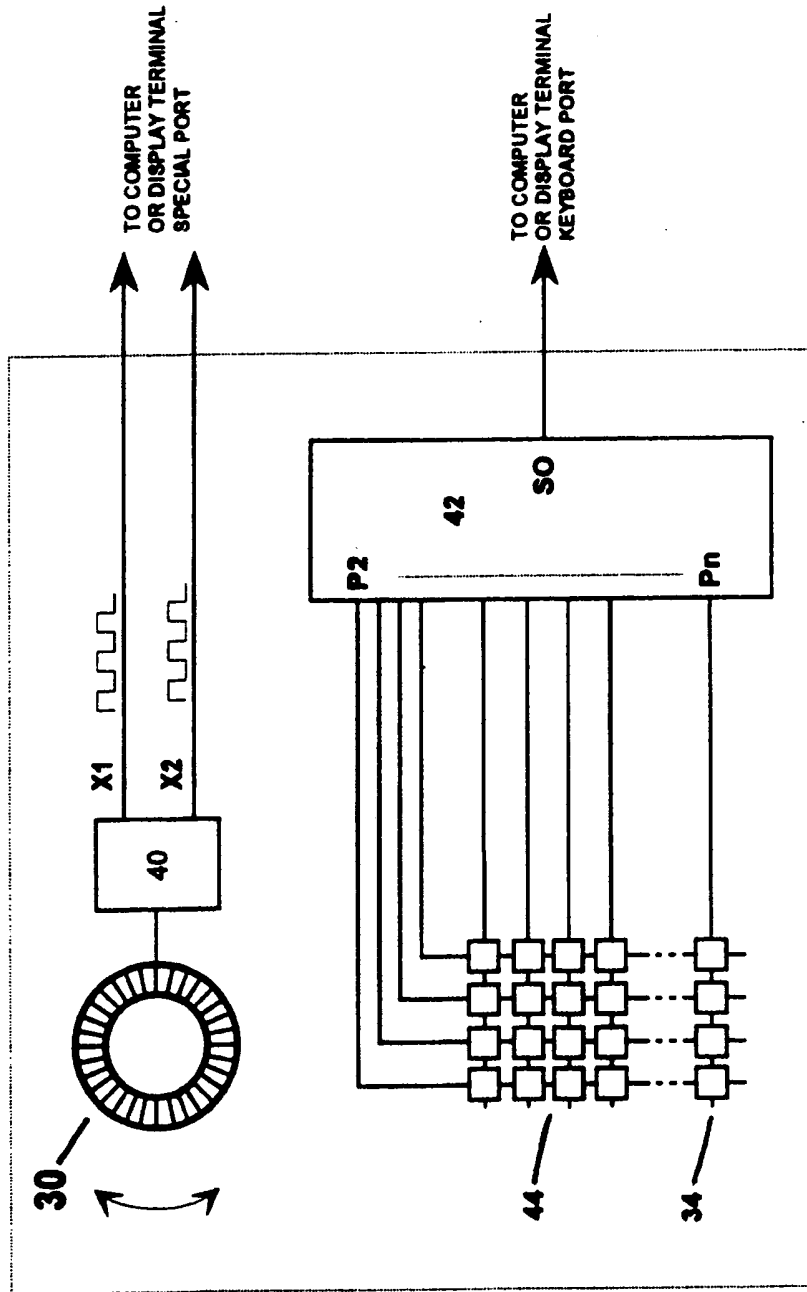


Fig. 6



KEYBOARD

Fig. 7

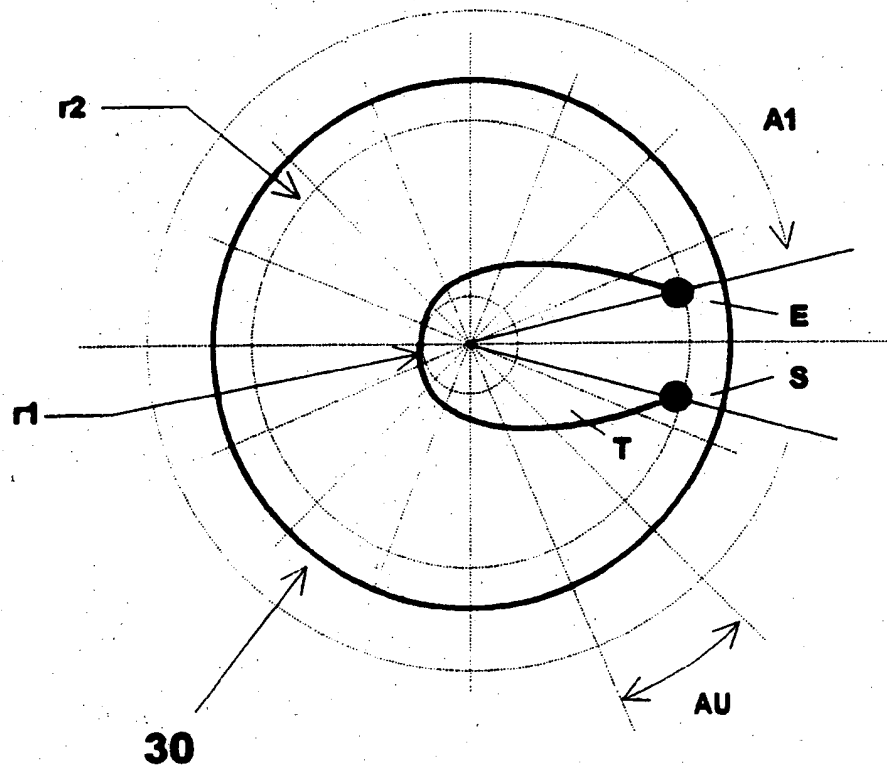


Fig. 8

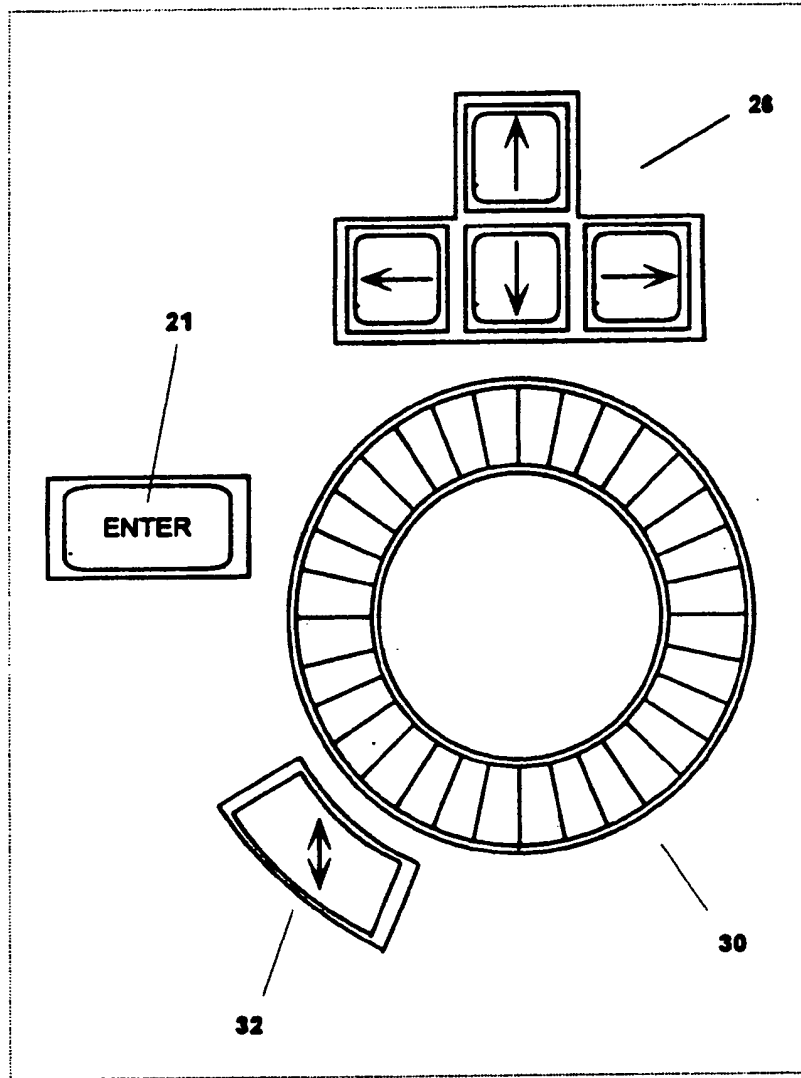


Fig. 9



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 93 11 3186

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)
A	EP-A-0 227 387 (THE OHIO ART COMPANY) * abstract * * page 3, line 34 - line 44; figure 5 * * page 6, line 27 - line 39 * -----	1,9	G06F3/023 G06K11/18
A	EP-A-0 120 683 (TEKTRONIX) * abstract * * page 2, line 13 - page 3, line 11 * * page 9, line 6 - line 16 * -----	1,9	
			TECHNICAL FIELDS SEARCHED (Int.Cl.5)
			G06F G06K
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 30 December 1993	Examiner Bravo, P
CATEGORY OF CITED DOCUMENTS		I : 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	
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			

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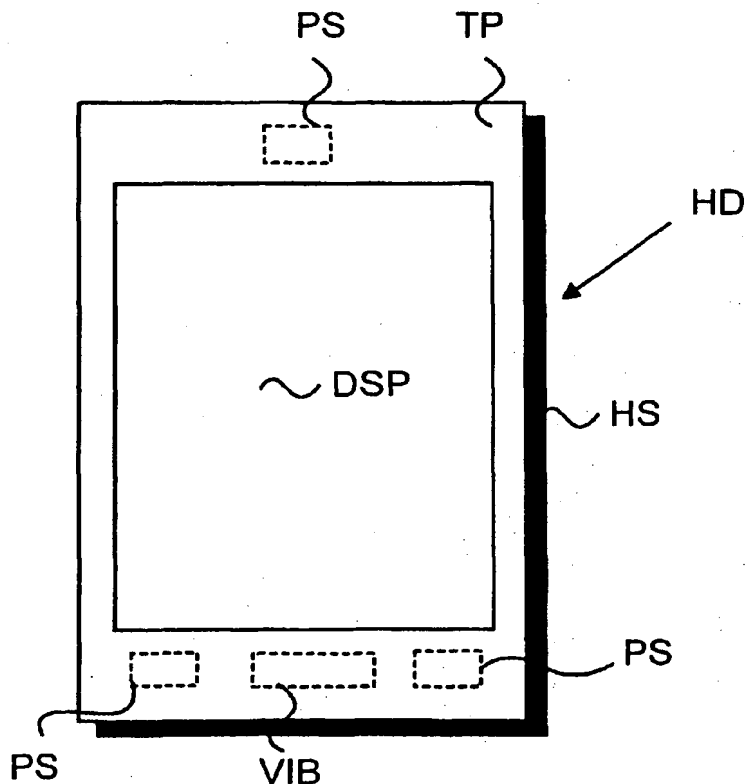
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- (71) Applicant (for all designated States except US): MY-ORIGO OY [FI/FI]; Kasarmintie 28 H 25, FIN-90230 OULU (FI).

[Continued on next page]

(54) Title: METHOD AND DEVICE FOR GENERATING FEEDBACK



(57) Abstract: The present invention describes a method, a dynamic user interface and an electronic device for generating user detectable multi-functional feedback with a single component in response to a stimulus signal. In the invention, one or more resonating vibrating element(s), e.g. piezo-bender, are attached to a certain component of the device. A conventional electronic device comprises different components for generating a haptic feedback signal, a buzzer signal, a vibratory alert signal or an audio signal. All the above-mentioned feedback signals can be generated with the piezo-element attached to, e.g. a lens or a housing. This means significant decrement in the space needed and in the power consumption compared to the situation, where the feedback signals are generated with separate components.

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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.

METHOD AND DEVICE FOR GENERATING FEEDBACK

FIELD OF THE INVENTION

5 The present invention relates to electronic devices. In particular, the present invention relates to a novel and improved method, a dynamic user interface and an electronic device for generating user detectable multi-functional feedback.

BACKGROUND OF THE INVENTION

10 In information technology, the user interface (UI) is everything designed into an information device with which a human being may interact, including display screen, keyboard, mouse, light pen, the appearance of a desktop, illuminated characters, help messages, and how an application program or a Web site invites interaction and responds to it. In early computers there was very little user interface except for a few buttons at an operator's console. The user interface was largely in the form of punched card input and report output.

15 Personal Digital Assistants (PDA) typically comprise a large display area in proportion to the size of the device. Most PDAs include only a few mechanical buttons in order to provide as large display area as possible. Therefore, the display area is also used as an input device. The display area is usually touch-sensitive so that information can be transferred into the device just by touching the display or using a special tool, e.g. a special pen.

20 U.S. Patent 5,241,308 (Paragon Systems) describes a touch sensitive panel for generating selected ones of any of a plurality of different signals, each of which is generated by touching a different location on the panel. The apparatus includes also force sensing means for sensing the magnitudes of the forces that are applied to each panel member support by the panel member when the member is touched at a selected location.

25 Touch-sensitive displays have many advantages over conventional information input methods. The display size can be made bigger when only few mechanical buttons are present. Above all, all the needed buttons can be generated by program basis in an applicable place. There are, however, several problems when a touch-sensitive display is used as a primary information input device. When a user uses his/her finger to touch the display, the problem is that the user does not necessarily receive any haptic

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feedback as to whether his/her selection is acceptable or whether the selection is made at all. A traditional keyboard always gives some kind of mechanical response to a press of a button.

5 The main problem is that there is no solution for electronic devices for generating feedback for various stimulus signals with a single integrated component, the following conditions being fulfilled:

- Cost-effective solution, and
- Minimal power consumption.

10 U.S. Patent No. 5,245,245 (Motorola) describes an electronic device comprising a piezo-bender. The device is preferably a pager. When a signal is received, an electrical drive circuit electrically coupled to the piezo-bender drives the piezo-bender with a drive signal to generate vibratory motion in the piezo-bender, and a vibratory alert is thus provided. The device comprises also tuning means slidably coupled to the piezo-bender for mechanically tuning the resonance frequency of vibration of the piezo-bender by
15 varying the length of the piezo-bender that can vibrate. It must be noted that the piezo-bender is mechanically tuned so the tuning must be made by a competent technician. It is also difficult to manufacture devices with exactly same (resonance) characteristics because of the mechanical tuning feature.
20 The solution in U.S. Patent No. 5,245,245 is also bound to a certain fixed resonance frequency. U.S. Patent No. 5,245,245 represents a low-profile and reliable vibrator for a selective call receiver. However, the reference publication does not present any connection between user actions and vibratory alert. The solution is not applicable for generating feedback for various
25 stimulus signals with a single integrated component.

Reference publication WO01/54109 (Immersion) represents a solution of haptic feedback for touchpads and other touch controls. In the publication, a user uses a touch-input device for entering control instructions. Moreover, at least one actuator is coupled to the touch input device and outputs a force to provide a haptic sensation to the user contacting the touch
30 surface. In other words, the user receives feedback from the input device itself. The actuator is situated under the touch-sensitive display. The problem is that the solution presented in the reference publication is not applicable for generating feedback for various stimulus signals with a single integrated
35 component.

The expression "touch-sensitive display" refers preferably to such displays that are being used in current PDAs. These displays, however, have weaknesses. The display is vulnerable to external impacts. The display may also be temperature sensitive, i.e. the use of a device with a touch-sensitive display may be restricted to a certain temperature range.

SUMMARY OF THE INVENTION

The present invention describes a method and an electronic device for generating user detectable multi-functional feedback with a single component in response to a stimulus signal. In the preferred embodiment, the electronic device is a hand-held device comprising at least a housing, electronic circuitry located in said housing, a display, said housing comprising at least a partially transparent lens, the transparent lens area covering at least the display.

The electronic device in the present invention comprises one or more resonating vibrating elements attached to the housing or on the electronic circuitry. In a preferred embodiment, one or more resonating vibrating elements are attached to an area of the lens not covering the display. The lens is not necessarily a touch-sensitive display as represented in the background of the invention section. Instead, the lens may be more like a panel where the lens itself is not touch-sensitive. When the resonating element(s) are attached to the lens, the feedback is transmitted to the user of the electronic hand-held device effectively through the lens. With the resonating vibrating elements, the feedback is produced to the user in response to the stimulus signal. The resonating vibrating element is preferably a piezoelectric bender.

The touch-sensitive feature is achieved with special detecting means. In a preferred embodiment, the detecting means refer to one or more force sensors attached to the lens. In one embodiment, the electronic device comprises at least force sensors with which the location of a touch on the display can be determined.

In the present invention, an electrical drive circuit is electrically coupled to the resonating vibrating element(s) for electrically driving the resonating vibrating element(s) with a drive signal. The drive signal is constituted based on the stimulus signal. The stimulus signal is preferably a user-actuated signal, a radio signal received with a radio receiver of said elec-

tronic device or an electronic device induced signal. It is also possible that one or more different stimulus signals are detected at the same time. When the drive signal is supplied in the resonating vibrating elements, preferable one or more of the following feedback signals are generated: a haptic feedback signal, a vibratory alert signal, an audio signal or a buzzer signal.

5 The present invention describes also a dynamic user interface for generating user detectable multi-functional feedback with a single component in response to a stimulus signal in a device, the user interface comprising at least a housing and electronic circuitry located in the housing. The dynamic user interface further comprises means for detecting the stimulus signal, one or more resonating vibrating elements attached to the housing or on the electronic circuitry, and an electrical drive circuit electrically coupled to the resonating vibrating element(s) for electrically driving the resonating vibrating element(s) with a drive signal, the drive signal being constituted based on the stimulus signal.

10 The present invention has several advantages over the prior-art solutions. In the present invention, the resonating vibrating element(s) may be used in several different functions. In the prior-art solutions, each function requires a dedicated component in the implementation. This is a clear advantage.

15 The present invention represents a solution where the power consumption is low. This is a very important feature in electronic hand-held devices. In the prior-art solutions, each feedback signal (a haptic feedback signal, a vibratory alert signal, an audio signal or a buzzer signal) is generated with a dedicated component. In the present invention, all the aforementioned feedback signals are generated with a single component, and therefore, there is only one power-consuming component. This enables easier minimisation of the power consumption.

20 The present invention describes also a solution where it is not necessary to use conventional touch-sensitive displays. Electronic hand-held devices can be made much more durable because it is not necessary to use any elastic membranes or touch-sensitive displays. Instead, a rigid transparent lens covers the actual display device.

25 The solution represented in the present invention is simple. Further, the present invention is not prone to manufacturing differences because the feedback can be adjusted easily.

The present invention has still further advantages. Because the solution uses only single component to generate feedback, this means significant space saving in the Printed Circuit Board (PCB). The number of components needed on the PCB is thus reduced. The solution represented in the present invention is also a low-cost solution because of the savings in the components.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are included to provide a further understanding of the invention and constitute a part of this specification, illustrate embodiments of the invention and together with the description help to explain the principles of the invention. In the drawings:

- Fig 1** is a simplified block diagram of an electronic hand-held device, according to the present invention,
- Fig 2** is a top plan view of an electronic hand-held device, according to the present invention,
- Fig 3** is a graph illustrating the resonance frequency, according to the present invention, and
- Fig 4** is a side view of a parallel type mass-loaded piezo-bender, according to the preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Reference will now be made in detail to the embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

Figure 1 is an electrical block diagram of an electronic hand-held device, e.g. a Personal Digital Assistant (PDA) or a mobile phone. Figure 1 does not comprise all the elements required in the electronic hand-held device but only the relevant elements required in the present invention. The electronic hand-held device comprises a central processing unit CPU for controlling the electronic hand-held device. A memory MEM is associated with the CPU to store relevant software applications and other relevant information. The electronic hand-held device comprises at least a partially transparent lens TP, the transparent lens area covering at least the display.

Also the term touch panel can be used when referring to the lens. The actual display DSP is located under the transparent lens TP area.

The lens TP is also used as a primary input device. User actions are detected with means IM for detecting stimulus signals. Means IM for detecting in one embodiment refers preferably to force sensors PS attached directly or indirectly to the lens TP. With three force sensors any location (a touch) on the lens TP area can be recognised and a relevant procedure started. Means IM for detecting stimulus signals together with the lens TP and the display DSP may refer to a conventional touch-sensitive display. In general, means IM for detecting stimulus signals may refer to several different physical or software components with which the stimulus signal(s) can be detected.

Figure 1 also comprises a drive circuit DC and vibrating element(s) VIB. The drive circuit (DC) is electrically coupled to said resonating vibrating element(s) (VIB) and electrically drives the resonating vibrating element(s) (VIB) with a drive signal, the drive signal being constituted based on the stimulus signal. A vibrating element is preferably a piezo-electric element attached directly to the lens TP. The CPU controls the drive circuit DC which itself supplies a drive signal to the vibrating element(s) VIB. The piezo-electric element is attached to the lens TP, e.g. by gluing, welding, screwing etc.

The CPU comprises means DM for determining the source of the stimulus signal, means TM for determining the resonance frequency by producing a bursted frequency sweep, means LM for detecting the vibration level with said force sensors PS, and means OM for feeding the obtained frequency to the resonating vibrating element(s) VIB. The above mentioned means are preferably implemented with the CPU and/or relevant software application(s).

The drive circuit DC in one embodiment comprises several components. It can comprise, e.g. an analog to digital converter (A/D), a digital signal processor, a digital to analog converter (D/A) and an amplifier. When, e.g. a radio signal is received with the radio receiver RF, the radio signal is input to a digital signal processor. The digital signal processor processes the radio signal and inputs the signal to the D/A-converter. The analog signal is then amplified with the amplifier and finally the amplified signal is input to the piezo-bender. Because the piezo-bender is attached to the lens TP, the

whole system acts like an audio speaker and is able to produce an audio signal.

In one embodiment of Figure 1, the vibrating element, e.g. a piezo-bender, is used as means IM for detecting the user stimulus signal. Therefore, both detecting the user stimulus signal and generating a feedback signal is produced by an integrated component.

In one embodiment, the piezo-bender is also used in measuring acceleration. Preferably there is an external mass attached to the piezo-bender. When a hand-held device comprising a mass attached piezo-bender is moved along the z-axis, the z-axis being essentially perpendicular to the x/y-plane of the display of the hand-held device, the piezo-bender measures force changes (acceleration) resulting from the inertia. Several functions can be linked to the measurement. One example is that the zooming factor of the material on the display of the hand-held device depends on the measured acceleration information. The zooming example is described in more detail in the patent application WO0127735 (Myorigo).

If the electronic hand-held device is a mobile phone and/or a radio, the device comprises also a radio receiver RF part for sending and receiving radio frequency signals.

Figure 2 is a top plan view of an electronic hand-held device HD. The device is preferable a Personal Digital Assistant (PDA) or a mobile phone. Figure 2 is a simplified example of an electronic hand-held device so the device may comprise also other features or functional buttons. The electronic hand-held HD device comprises a housing HS. The housing HS comprises at least a partially transparent lens TP covering the actual display DSP.

In a preferred embodiment, the lens/touch panel TP itself is not touch-sensitive. The force sensors PS are directly or indirectly attached to the lens TP. In Figure 2 there are three force sensors PS attached to the lens TP. The force sensors PS are in a preferred embodiment attached to the housing HS as in a triangular form. The force sensors PS can be attached in any other appropriate way.

With three or more force sensors PS it is possible to accurately calculate and determine a place where the lens TP is touched. With the above-mentioned arrangement, the lens TP itself does not have to contain any touch-sensitive membrane or any other touch-sensitive features. In-

stead, a touch is detected with the force sensors PS. The force sensors can sense a user input also outside the transparent lens area. Therefore, certain areas of the housing HS or non-transparent areas of the lens TP can also be used as a part of the user interface.

5 Figure 2 comprises also a resonating vibrating element VIB. The resonating vibrating element VIB is attached to an area of the lens TP not covering the display DSP. The lens TP is preferably impervious outside the display DSP area. The vibrating element VIB is preferably a piezo-electric element and is of unimorph, bimorph or multilayer structure. The multilayer
10 structure is the preferred solution because of the low input voltage required. The piezo-bender is preferably formed of three parts: an upper part, a lower part and a metal element between those parts. The metal element significantly strengthens the overall structure. The drive circuit DC of Figure 1 applies the desired drive signal to the resonating vibrating element VIB, thus
15 causing the vibrating element VIB to vibrate/resonate at a certain frequency.

In one embodiment of Figure 2, the resonating vibrating elements are used to provide multiple feedback signals. The resonating vibrating element is preferably a piezo-bender of unimorph, bimorph or multilayer structure. The stimulus signal can originate from different sources. The stimulus
20 signal can be a user-actuated signal, e.g. a touch on the lens. It can also be a radio frequency signal received with the radio receiver of the electronic device. This is the case when the electronic device is, e.g. a mobile phone. Alternatively, the stimulus signal can be an electronic device induced signal, e.g. operating system originated signal. Therefore, each stimulus signal may
25 cause a different feedback signal.

When the piezo-bender is used to response to, e.g. a touch on the lens, a pulsed or continuous haptic feedback signal occurs. The haptic feedback signal is typically a short signal, e.g. 200-300 Hz of frequency and, e.g. 5-100 ms of duration, or a continuous signal. This signal is typically a plain or
30 modulated resonance frequency of the piezo-bender. However, the feedback signal does not have to be restricted only to the haptic feedback. With a piezo-bender, practically any required frequency bandwidth can be produced. The feedback signal can additionally be a buzzer signal, a vibratory alert signal or an audio signal. This means that a piezo-bender attached to
35 the lens of the electronic hand-held device can act as a speaker. Producing of an audio signal may require that the audio bandwidth is flattened by digital

signal processing in order to reduce the effect of the cantilever resonance frequencies. Certain criteria must be satisfied when generating audio signals. Especially in the buzzer feature, the sound pressure level (in Pascals) has to be adequate. The frequency band has to be broad enough. Also the harmonic multifold frequencies of the resonance frequency can be made use of
5 when generating the feedback signal.

A conventional electronic device comprises different components for generating a haptic feedback signal, a buzzer signal, a vibratory alert signal or an audio signal. A buzzer signal is generated with a buzzer, an audio
10 signal is generated, e.g. with a speaker, a vibratory alert signal is generated, e.g. with an electromagnetic motor and a haptic feedback signal, e.g. with a DC motor, a solenoid, moving magnet actuator etc. All the above-mentioned feedback signals can be generated with the piezo-element in the present invention. This means significant decrement in the power consumption compared to the situation, where the feedback signals are generated with separate components.
15

Figure 1 and 2 represents only one embodiment of the dynamic user interface described in the present invention. The dynamic user interface is not restricted to any special devices. The dynamic user interface is able to
20 generate user detectable multi-functional feedback with a single component in response to a stimulus signal. The stimulus signal can be a user actuated signal, a radio signal received with a radio receiver or a device induced signal. The user interface comprises at least a housing and electronic circuitry located in the housing. The shape of the housing is not restricted. With
25 means for detecting the stimulus signal a stimulus signal source is defined. One or more resonating vibrating elements is attached to the housing or on the electronic circuitry, e.g. a PCB board located in the housing. An electrical drive circuit electrically coupled to the resonating vibrating element(s) electrically drives the resonating vibrating element(s) with a drive signal, the drive signal being constituted based on the stimulus signal.
30

The resonating vibrating element is preferably a piezo-bender of unimorph, bimorph or multilayer structure. It is very crucial to define the type of the stimulus signal, because the feedback signal generated by the piezo-bender solely depends on the stimulus signal. The feedback signal is a haptic feedback signal, a vibratory alert signal, an audio signal or a buzzer signal.
35 It is very important to carefully define the attachment point of the piezo-

bender to the housing or to the electronic circuitry. The piezo-bender component itself does not produce all the needed feedback signals but attached to the housing or to the electronic circuitry it is able to produce multi-functional feedback.

5 There are numerous devices where the dynamic user interface described can be used. The devices include, e.g. joysticks, keyboards, e-books, or practically any device, where multi-functional feedback can be used.

10 Figure 3 shows the acceleration and the current-frequency response of an exemplary electronic hand-held device. The upper graph represents the acceleration factor of the lens as a function of frequency. The bigger the acceleration value, the stronger the feedback to the user. The lower graph represents the current as a function of frequency. In a preferred embodiment of Figure 3, an external mass is attached to the vibrating element. The use of an external mass increases the force obtained at the clamp
15 point of the piezo-bender and also improves the low-frequency audio bandwidth. The reason why the frequency area for a haptic feedback is quite low, e.g. 200-300 Hz, is that normally a human being is not so sensitive to higher frequencies, e.g. with a hand. The peak current value is slightly higher in the
20 resonance than in the immediate surroundings of the resonance frequency. The acceleration and the current values in Figure 3 are not necessarily real values but merely exemplary values.

25 The resonance frequency can be made use of yet another way. In the manufacturing phase, the lens or the overall housing may be manufactured in such a way that one of the resonance frequencies of the lens or of the housing is in the same frequency range as that of the vibrating element. Therefore, the overall effect of the haptic feedback is more efficient.

30 It may occur that the resonance frequency must be individually sought. The electronic hand-held device comprises a feature where the optimal frequency may be determined. This is done by determining the resonance frequency by producing a bursted frequency sweep. The force sensors can be made use of in another situation. The responses of the vibrating element(s) (haptic feedback) can be detected with the force sensors. With the force sensors it is possible to determine the individual resonance frequency. When the measurement is made, the drive circuit is set to feed the
35 obtained frequency to the vibrating element(s).

The feedback parameters can also be individually tuned for each person using it. The main parameters that the user can control are, for example:

- amplitude
- the time period of the vibration
- the vibration frequency.

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20
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Figure 4 is a side view of a parallel type mass-loaded piezo-bender, according to the preferred embodiment of the present invention. Here, the metal beam 42 is placed between the piezo-ceramic layers 41 and 43. The metal beam 42 extends beyond the piezo-ceramic layers 41 and 43 and has a mass 44 mechanically coupled to the other end of the metal beam 42. The mass 44 may be spot welded to the metal beam 42, and provides a vibratable body at one end of the cantilever structure. The other end of the piezo-bender is clamped to the lens or housing 45. When an electrical driving signal is applied, for example, across the opposing surfaces of the piezo layers, the tip of the piezo-bender begins to deflect. The deflections at the resonance of the piezo-bender are significantly greater than without the mass because of the extension of the metal beam 42 beyond the piezo-ceramic layers 41 and 43 and because of the mass 44 at the end of the beam 42. The vibrating mass 44' and vibrating bender tend to impart greater impulses to the lens or housing 45 through each vibration cycle. In the present invention, the resonating vibrating elements are made use of in several different functions. In the prior-art solutions, each function requires a dedicated component in the implementation. Therefore, valuable space saving in electronic hand-held devices is accomplished, and above all, the power consumption is minimized. This is a very important feature in electronic hand-held devices.

30

The present invention describes also a solution using only single component to generate feedback. This means significant space saving in the Printed Circuit Board (PCB). The number of components needed on the PCB is reduced. The solution represented in the present invention is also a low-cost solution because of the savings in the components.

35

The present invention describes a solution where feedback can be adjusted electrically. Adjusting the drive signal a desired feedback can be achieved. The adjustment can be set manually by the user or automatically by the device itself. The present invention describes also a dynamic user

interface and an integrated low-cost and low power solution for producing multi-functional feedback.

5 It must be noted that the piezo-bender component itself is not necessarily able to generate all the feedback signals (a haptic feedback signal, a buzzer signal, a vibratory alert signal or an audio signal) described in the present invention. However, the situation is different when the piezo-bender is attached, e.g. to a lens, a certain part of a housing, or a PCB board. Together with the component on which the piezo-bender is attached, it is possible to generate multi-functional feedback as described in the present invention.

10 It is obvious to a person skilled in the art that with the advancement of technology, the basic idea of the invention may be implemented in various ways. The invention and its embodiments are thus not limited to the examples described above, instead they may vary within the scope of the claims.

CLAIMS

1. An electronic device for generating user detectable multi-functional feedback with a single component in response to a stimulus signal, said electronic device (HD) comprising at least a housing (HS) and electronic circuitry located in said housing (HS),

5 c h a r a c t e r i s e d in that said electronic device further comprises:

 means (IM) for detecting said stimulus signal;

 at least one resonating vibrating element (VIB) attached to said
10 housing (HS) or on said electronic circuitry, the resonating vibrating element having the ability to produce at least two feedback signals selected from a group consisting of a haptical feedback signal, a vibratory alert signal, an audio signal, and a buzzer signal; and

 an electrical drive circuit (DC) electrically coupled to said resonating vibrating element(s) (VIB) for electrically driving said resonating vibrating element(s) (VIB) with a drive signal, said drive signal being constituted based
15 on said stimulus signal.

2. The electronic device according to claim 1, c h a r a c t e r -
i s e d in that the electronic device comprises a display (DSP) and a partially transparent lens (TP), the transparent lens area covering at least said
20 display (DSP), said resonating vibrating element(s) (VIB) being attached to an area of said lens (TP) not covering said display (DSP).

3. The electronic device according to claim 1 or 2, c h a r a c -
t e r i s e d in that said stimulus signal is one or more of the following signals:
25

 a user actuated signal;

 a radio signal received with a radio receiver (RF) of said electronic device; and

 an electronic device induced signal.

4. The electronic device according to any of the claims 1, 2 or 3,
30 c h a r a c t e r i s e d in that said feedback comprises one or more of the following signals:

 a haptic feedback signal;

 a vibratory alert signal;

35 an audio signal; and

 a buzzer signal.

5. The electronic device according to any of the claims 1, 2, 3 or 4, c h a r a c t e r i s e d in that the means (IM) for detecting said stimulus signal comprises one or more sensors (PS) for detecting user input.

6. The electronic device according to any of the claims 1, 2, 3, 4
5 or 5, c h a r a c t e r i s e d in that the electronic device comprises means (DM) for determining the source of said stimulus signal.

7. The electronic device according to any of the claims 1, 2, 3, 4, 5
or 6, c h a r a c t e r i s e d in that the electronic device comprises:
means (TM) for determining the resonance frequency by produc-
10 ing a bursted frequency sweep;
means (LM) for detecting the vibration level with said sensor(s)
(PS); and
means (OM) for feeding the obtained frequency to said resonating
vibrating element(s) (VIB).

8. The electronic device according to any of the claims 1, 2, 3, 4,
15 5, 6 or 7, c h a r a c t e r i s e d in that said resonating vibrating element
(VIB) is used as an acceleration sensor.

9. The electronic device according to any of the claims 1, 2, 3, 4,
5, 6, 7 or 8, c h a r a c t e r i s e d in that said resonating vibrating ele-
20 ment (VIB) is a piezo-bender of a unimorph, bimorph or multilayer structure.

10. The electronic device according to claim 9, c h a r a c -
t e r i s e d in that the electronic device comprises an external mass at-
tached to said piezo-bender.

11. The electronic device according to claim 1 or 2, c h a r a c -
25 t e r i s e d in that said housing (HS) and/or said lens (TP) is manufac-
tured so that at least one of its resonating frequencies is within the same fre-
quency range as the frequency range of said resonating vibrating element(s)
(VIB).

12. The electronic device according to any of the claims 1, 2, 3, 4,
30 5, 6, 7, 8, 9, 10 or 11, c h a r a c t e r i s e d in that the electronic device
is a hand-held electronic device.

13. A method for generating user detectable multi-functional feed-
back with a single component in response to an stimulus signal with an elec-
tronic device, said electronic device comprising at least a housing and elec-
35 tronic circuitry located in said housing,

characterised in that said electronic device comprises at least one resonating vibrating element (VIB) attached to said housing or on said electronic circuitry, the resonating vibrating element producing at least two feedback signals selected from a group consisting of a haptical
5 feedback signal, a vibratory alert signal, an audio signal, and a buzzer signal;
the method further comprising the steps of:
detecting said stimulus signal; and
electrically driving said resonating vibrating element(s) with a drive
signal with an electrical drive circuit electrically coupled to said resonating
10 vibrating element(s), said drive signal being constituted based on said stimulus signal.

14. The method according to claim 13, characterised in that the electronic device comprises a display and a partially transparent lens, the transparent lens area covering at least said display, said resonating
15 vibrating element(s) being attached to an area of said lens not covering said display.

15. The method according to claim 13 or 14, characterised in that said stimulus signal comprises one or more of the following signals:
20 a user actuated signal;
a radio signal received with a radio receiver of said electronic device; and
an electronic device induced signal.

16. The method according to any of the claims 13, 14 or 15, characterised in that said feedback comprises one or more of
25 the following signals:

30 a haptic feedback signal;
a vibratory alert signal;
an audio signal; and
a buzzer signal.

17. The method according to any of the claims 13, 14, 15 or 16, characterised in that detecting user input with one or more sensors.

18. The method according to any of the claims 13, 14, 15, 16 or
35 17, characterised in that the method comprises the step of:
determining the source of said stimulus signal.

19. The method according to any of the claims 13, 14, 15, 16, 17 or 18, c h a r a c t e r i s e d in that the method comprises the steps of:
determining the resonance frequency by producing a bursted frequency sweep;

5 detecting the vibration level with said sensor(s); and
feeding the obtained frequency to said resonating vibrating element(s).

20. The method according to any of the claims 13, 14, 15, 16, 17, 18 or 19, c h a r a c t e r i s e d in that using said resonating vibrating
10 element as an acceleration sensor.

21. The method according to any of the claims 13, 14, 15, 16, 17, 18, 19 or 20, c h a r a c t e r i s e d in that said resonating vibrating element is a piezo-bender of a unimorph, bimorph or multilayer structure.

22. The method according to claim 21, c h a r a c t e r i s e d
15 in that the method comprises the step of:
attaching an external mass to said piezo-bender.

23. The method according to any of the claims 13, 17, 21 or 22, c h a r a c t e r i s e d in that detecting said stimulus signal with said piezo-bender.

24. The method according to claim 12 or 13, c h a r a c t e r -
20 i s e d in that the method comprises the step of:
manufacturing said housing and/or said lens so that at least one of its resonance frequencies is within the same frequency range as the frequency range of said resonating vibrating element(s).

25. The method according to any of the claims 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23 or 24, c h a r a c t e r i s e d in that the electronic device is a hand-held electronic device.

26. A dynamic user interface for generating user detectable multi-functional feedback with a single component in response to a stimulus signal
30 in a device, said user interface comprising at least a housing (HS) and electronic circuitry located in said housing (HS),

c h a r a c t e r i s e d in that said dynamic user interface further comprises:

35 means (IM) for detecting said stimulus signal;
at least one resonating vibrating element (VIB) attached to said housing (HS) or on said electronic circuitry; the resonating vibrating element

having the ability to produce at least two feedback signals selected from a group consisting of a haptical feedback signal, a vibratory alert signal, an audio signal, and a buzzer signal; and

5 an electrical drive circuit (DC) electrically coupled to said resonating vibrating element(s) (VIB) for electrically driving said resonating vibrating element(s) (VIB) with a drive signal, said drive signal being constituted based on said stimulus signal.

27. The dynamic user interface according to claim 26, c h a r -
a c t e r i s e d in that the device comprises a display (DSP) and a partially transparent lens (TP), the transparent lens area covering at least said
10 display (DSP), said resonating vibrating element(s) (VIB) being attached to an area of said lens (TP) not covering said display (DSP).

28. The dynamic user interface according to claim 26 or 27,
c h a r a c t e r i s e d in that said stimulus signal is one or more of the
15 following signals:

a user actuated signal;
a radio signal received with a radio receiver (RF); and
a device induced signal.

29. The dynamic user interface according to any of the claims 26,
20 27 or 28, c h a r a c t e r i s e d in that said feedback comprises one or more of the following signals:

a haptic feedback signal;
a vibratory alert signal;
an audio signal; and
25 a buzzer signal.

30. The dynamic user interface according to any of the claims 26,
27, 28 or 29, c h a r a c t e r i s e d in that the means (IM) for detecting said stimulus signal comprises one or more sensors (PS) for detecting user
input.

31. The dynamic user interface according to any of the claims 26,
30 27, 28, 29 or 30, c h a r a c t e r i s e d in that the dynamic user interface comprises means (DM) for determining the source of said stimulus signal.

32. The dynamic user interface according to any of the claims 26,
35 27, 28, 29, 30 or 31, c h a r a c t e r i s e d in that the dynamic user interface comprises:

means (TM) for determining the resonance frequency by producing a bursted frequency sweep;

means (LM) for detecting the vibration level with said sensor(s) (PS); and

5 means (OM) for feeding the obtained frequency to said resonating vibrating element(s) (VIB).

33. The dynamic user interface according to any of the claims 26, 27, 28, 29, 30, 31 or 32, c h a r a c t e r i s e d in that said resonating vibrating element (VIB) is used as an acceleration sensor.

10 34. The dynamic user interface according to any of the claims 26, 27, 28, 29, 30, 31, 32 or 33, c h a r a c t e r i s e d in that said resonating vibrating element (VIB) is a piezo-bender of a unimorph, bimorph or multilayer structure.

15 35. The dynamic user interface according to claim 34, c h a r a c t e r i s e d in that the dynamic user interface comprises an external mass attached to said piezo-bender.

20 36. The dynamic user interface according to claim 26 or 27, c h a r a c t e r i s e d in that said housing (HS) and/or lens (TP) is manufactured so that at least one of its resonating frequencies is within the same frequency range as the frequency range of said resonating vibrating element(s) (VIB).

37. The dynamic user interface according to any of the claims 26, 27, 28, 29, 30, 31, 32, 33, 34, 35 or 36, c h a r a c t e r i s e d in that the device is a hand-held electronic device.

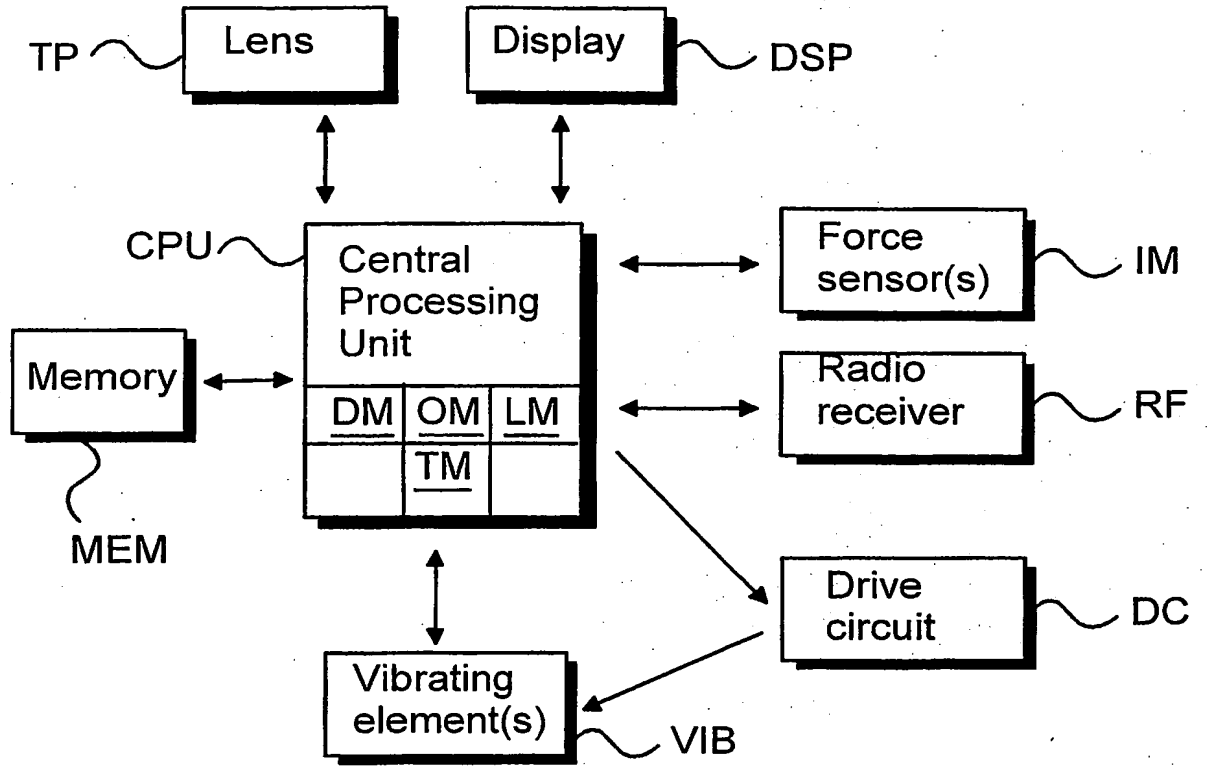


Fig. 1

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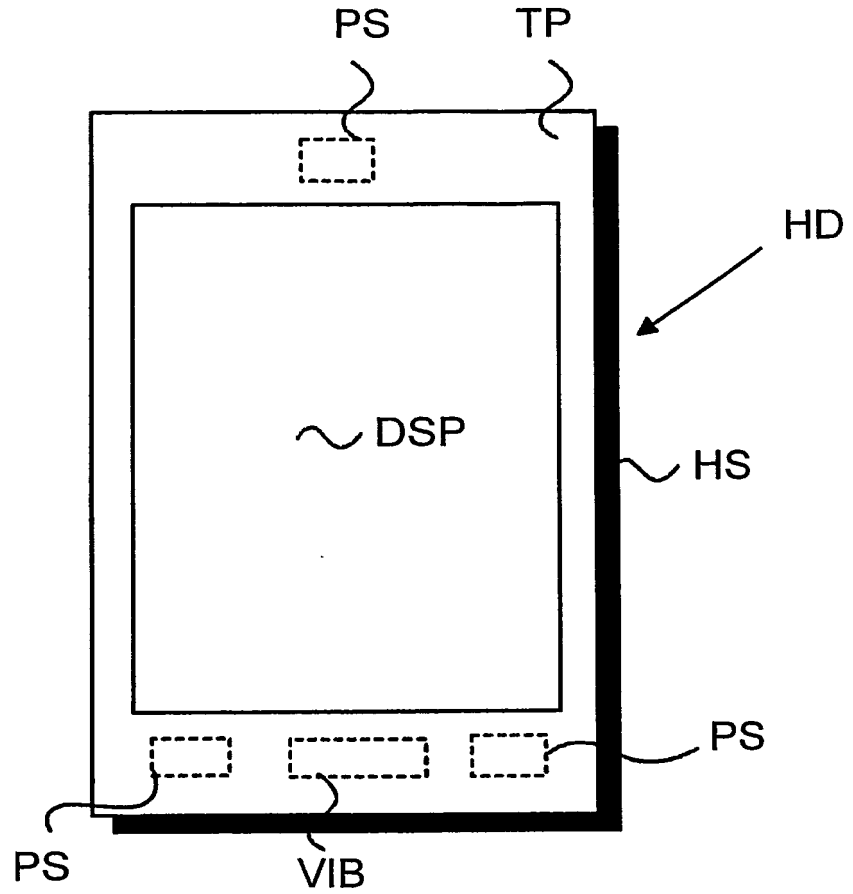


Fig. 2

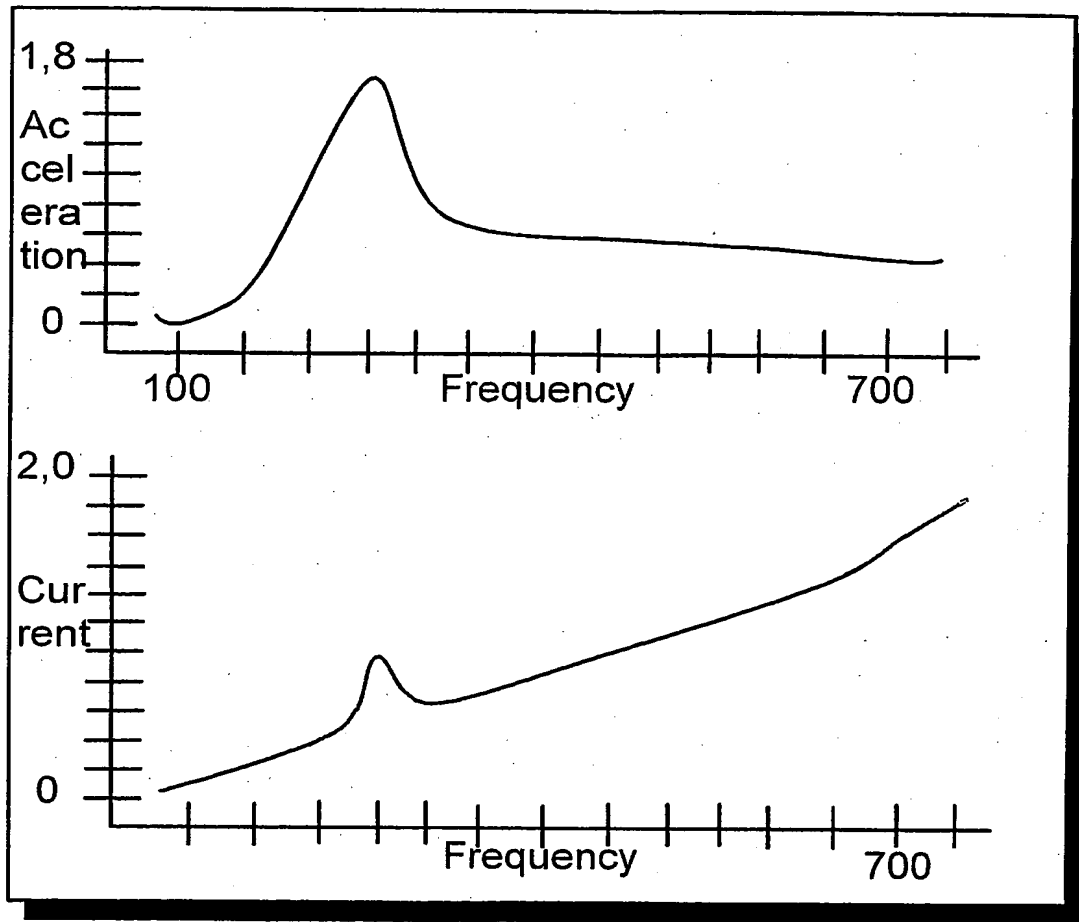


Fig. 3

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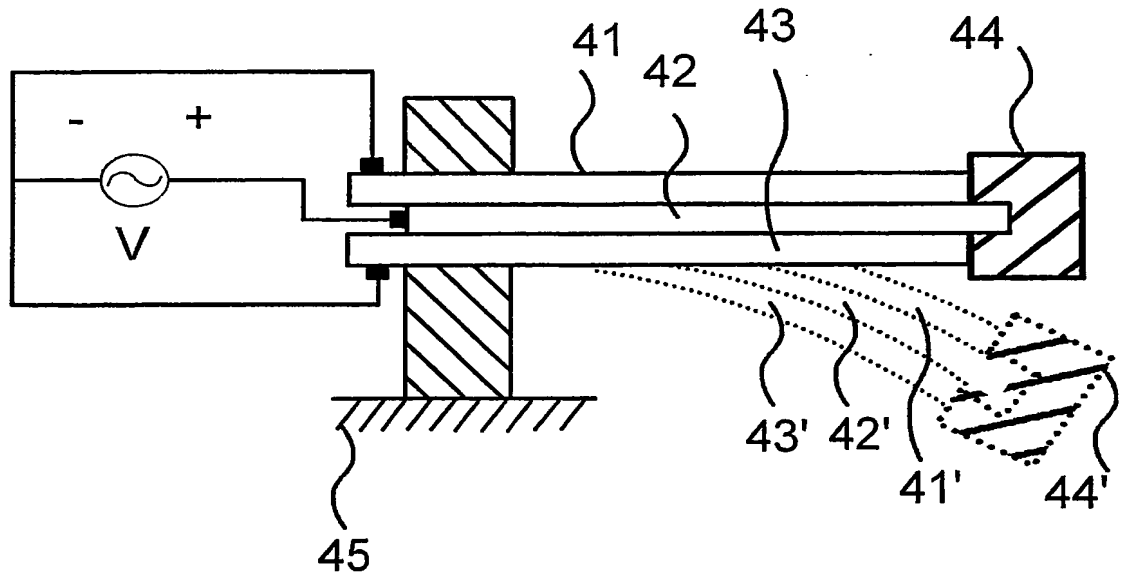


Fig. 4

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 02/00889

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: G06F 3/033, G06K 11/18

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)

IPC7: G06F, G06K

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

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, 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.
X	WO 9200559 A1 (HEWLETT-PACKARD CO), 9 January 1992 (09.01.92), page 6, line 1 - line 26, claims 1,4, 13, abstract --	1-6,11-18, 24-31,36-37
X	US 4885565 A (EMBACH, J.T.), 5 December 1989 (05.12.89), column 1, line 20 - line 45, claim 1, abstract --	1-6,11-18, 24-31,36-37
X	WO 0152029 A2 (SONY COMPUTER ENTERTAINMENT INC), 19 July 2001 (19.07.01), page 2, line 1 - page 3, line 25, abstract --	1-6,11-18, 24-31,36-37

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

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 4323863 A1 (ANDROMEDA GESELLSCHAFT FÜR COMPUTER- UND ROBOTER PRODUKTE MBH), 19 January 1995 (19.01.95), column 1, line 1 - line 56, claims 1-2, abstract --	1-6, 11-18, 24-31, 36-37
P,X	US 2002033795 A1 (SHAHOIAN, E.J. ET AL), 21 March 2002 (21.03.02), [0007] - [0014] -- -----	1-6, 11-18, 24-31, 36-37

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INTERNATIONAL SEARCH REPORT
 Information on patent family members

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International application No.
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9200559 A1	09/01/92	GB 9014130 D	00/00/00
US 4885565 A	05/12/89	NONE	
WO 0152029 A2	19/07/01	EP 1247152 A	09/10/02
DE 4323863 A1	19/01/95	NONE	
US 2002033795 A1	21/03/02	WO 02073587 A	19/09/02
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October 31, 2003

Attorney Docket No.: 16300-002001

Mail Stop Patent Application

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

Presented for filing is a new original patent application of:

Applicant: BETH MARCUS AND W. DAVID LEE

Title: HUMAN INTERFACE AND INPUT SYSTEM

Enclosed are the following papers, including those required to receive a filing date under 37 CFR §1.53(b):

	<u>Pages</u>
Specification	21
Claims	7
Abstract	1
Declaration	2
Drawing(s)	9

Enclosures:

- Assignment cover sheet and an assignment, 2 pages, and a separate \$40 fee.
- New disclosure information, including:
 - Information disclosure statement, 1 page.
 - PTO-1449, 2 pages.
 - References, 28 items cited (6 references enclosed).
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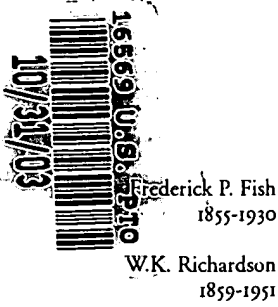
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Page 2

This application is entitled to small entity status. See 37 CFR 1.27.

Basic filing fee	\$385
Total claims in excess of 20 times \$9	\$81
Independent claims in excess of 3 times \$43	\$129
Fee for multiple dependent claims	\$0
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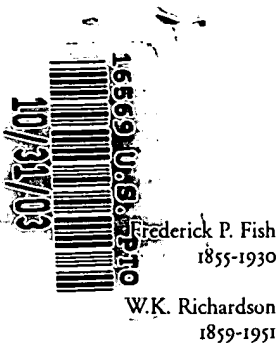
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- New disclosure information, including:
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APPLICATION
FOR
UNITED STATES LETTERS PATENT

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Human Interface System

BACKGROUND

The following description relates to human interface and input systems for electronic devices, particularly hand-held electronic devices, such as cell phones, personal digital assistants (“PDAs”), pocket personal computers, smart phones, hand-held game devices, bar-code readers, remote controls, and other similar input devices having a keypad or one or more input elements.

Electronic devices have become increasingly sophisticated and physically smaller due in part to a decrease in the price of processing power and a concurrent increase in demand by consumers for smaller devices. Such devices, however, tend to be limited in function and utility by the user’s ability to interface with the device for data input (e.g., text, numeric, and functional input) and/or device control, which becomes increasingly more difficult to do as the available space on the device’s surface for positioning the input elements, which are used for data input and/or device control, continues to decrease.

Various human interface and input systems and techniques for hand-held electronic devices have been developed for data input and device control. These include miniature keyboards and keypads used in combination with chordal input techniques, modal input techniques and/or smart keys; and touch screens used in combination with on-screen keyboard or keypad software or hand-writing recognition software.

Keyboard or Key pad Used With Chordal, Modal and Smart Key Techniques

Miniature keyboards and keypads are similar to their standard full-size versions—i.e., a keyboard generally has a full set or substantially full set of numeric, character, and functional input elements, while key pads typically have a reduced set of numeric, character and/or functional input elements compared to keyboards. These miniature input devices typically are designed to fit the available space on one surface of a hand-held electronic device or are designed as small, easily transportable, external plug-in devices. Thus, as hand-held electronic devices become smaller, the size of the input elements typically has been reduced in order for the desired number of input elements to fit on one surface of the electronic device.

For data input and device control, miniature keyboards and keypads typically either require one of two input techniques-- use of one or more thumbs or fingers to press the desired input elements or use of a stylus to “peck” the desired input elements (which is usually done

where the input element is of smaller size). Various techniques, such as chordal input techniques, modal input techniques and smart keys, have been developed and implemented to improve the efficiency and effectiveness of using miniature keyboards and keypads.

- **Chordal Input Techniques**

5 Chordal input techniques generally are based upon the principle that characters, symbols, words, phrases or concepts can be represented by a reduced set of input elements. Thus, by only having to press a reduced combination of input elements, functionality can be increased and quicker and more accurate data input can be realized. Chordal input techniques can be used on any keyboard or keypad configuration or any device having more than one input element, and typically results in fewer input elements or more functions compared to conventional keyboards or keypads. An example of an electronic device using two-handed chordal input techniques is a court reporter or stenographer's typewriter. One chordal input technique using a keypad to decrease the number of actuations to achieve a large number of functions is described in U.S. Patent No. 5,973,621 to Levy, entitled "Compact Keyed Input Device," which is incorporated herein by reference.

- **Modal Input Techniques**

Modal input techniques are based on the concept that functions of the electronic device, e.g., text messaging in a cell-phone or PDA, can be accessed by pressing a particular input element (or combination of elements) on a keyboard or keypad. Once that particular input element is pressed, the functionality of all or a portion of the input elements on the keyboard or keypad may change. Modal techniques typically are used in calculators, cell-phones, and PDAs. For example, in cell phones, a modal technique called multi-tap is common, in which individual input elements on the keypad are associated with multiple symbols, such as characters, letters, numbers, icons or other types of symbols, which tends to reduce the number of input elements required to achieve the desired functions, e.g., a twelve-input-element keypad can be used to represent all letters of the English alphabet and the decimal digits. A user can input a desired symbol within a set of symbols associated with a certain input element by tapping on that particular input element with a thumb, finger, or stylus, one or more times to input the desired character. Thus, if a user desires to send a text message, the user may press a functional input element, e.g., a mode key, to access the text messaging functionality of the cell phone and then tap an individual input element one or more times to select the associated symbol for input. The

number of taps needed to input a particular symbol may differ depending on the language character set chosen. For example, Japanese keypad or keyboards typically require a minimum set of 46 characters for text input, while English or American keyboards and keypads usually require a minimum set of 26 characters for text input. These modal input techniques have gained some popularity as users perform more text functions.

- **Smart Keys**

Smart keys are typically used on keypads and refer to a single key or combination of keys that, when pressed, predict the users next logical action. Some implementations work better than others and some applications reduce the number of keystrokes required to complete a function better than others. Word-predictor software, for example, attempts to predict the word or character the user intends to input based upon one or more letters inputted by the user and the likely probabilities within a given language. The probability of the software guessing correctly increases with the length of the word or number of letters or characters inputted. In a device using smart keys on the keypad, a user may tap the keys 2, 2 and 8 in sequence to generate the word “cat” and the device would display that word first because it is usually the most common combination, whereas the word “bat,” which can be generated by pressing the same keys, would not be displayed first because it is not as common. Also, the word “cat” may be displayed after pressing the 2 key the second time based on a guess by the word-predictor software.

Smart keys also are typically used for Japanese data input where a user phonetically inputs letters representing the sound of the Japanese character (e.g., a Kanji character). Based on the inputted letters, the predictor software guesses the Japanese character. To select the character, a user would press the accept button or use the scrolling function to go to the next character with a similar set of phonetic inputs.

Touch Screen Using On-Screen Keyboard or Handwriting Recognition Software

Using on-screen keyboard or keypad software with a touch screen offers users the ability to enter data with fingers or thumbs on a screen-sized keyboard or buttons, allowing faster data input without a stylus or physical keyboard or keypad accessory; while using handwriting recognition software with a touch screen, such as Graffiti[®] on the Palm operating system, offers users the ability to enter text with a stylus by writing the text directly on the touch screen. Touch screens usually consume more power and are more expensive than non touch-sensitive screens. This higher power consumption can be a problem for hand-held electronic devices, which

typically have limited power resources. Moreover, touch screens usually require the user to use both hands (e.g., one hand is used to hold and steady the device while the other hand is used to grasp the stylus), which is generally undesirable for interfacing with and controlling one handed hand-held electronic device, such as cell phones. Handwriting recognition software has improved the slowness and awkwardness inherent in stylus, finger or thumb input but other drawbacks still remain, such as high power consumption, the necessity to use both hands, and lack of tactile feedback to inform a user when an input element has been. Moreover, recognition software requires training to use properly, and, even then, still results in a high error rate.

Game Control

For game control, many of the above approaches have been used, but in most hand-held electronic devices, a user typically controls game play through the use of some form of input element, such as on a miniature keypad and/or directional pad (“D-pad”), which typically is located on the front surface of the device. Game control on some hand-held electronic devices, such as cell phones, is inherently one handed or at most two thumbed because of the size of the device, while game control on other hand-held electronic devices, such as PDAs and conventional game console controllers, is typically two-handed. The input elements associated with game control on these devices are typically digital even though analog input elements have been used on game controllers for PC and console game systems, such as Microsoft’s Xbox or Sony’s Play Station 2.

SUMMARY

The present inventors recognized that conventional human interface and input systems for hand-held electronic devices tended to be relatively inflexible, cumbersome, and inefficient to use, among other reasons, because they were not designed to take advantage of the biomechanics of the human hand, particularly the advantages associated with the opposition of the thumb to the fingers and the beneficial attributes of the thumb, e.g., its large range of motion and ability to impart large sustained forces, and the beneficial attributes of the fingers, e.g., their fine motor control, spatial memory and rapidity of motion.

The present inventors also recognized that the input techniques developed to improve the efficiency of data input and device control, such as chordal and modal techniques, were limited by the inefficiencies inherent in conventional input systems. For example, miniature keyboards

and keypads used in combination with chordal input techniques not only required the user to memorize numerous input combinations and develop the necessary motor skills to control a reduced number of input elements to provide even more complex functionality compared to typical QWERTY keyboards, but also did not use or allocate input tasks to the fingers and thumb
5 of the human hand effectively. Moreover, miniature keyboards and keypads used in combination with modal input techniques tended to limit the user's ability to efficiently input data depending on the number of taps required to input a particular symbol and how fast the user could tap the input element with his thumb or a stylus to select the particular symbol.

The present inventors also recognized that a user's ability to control game play in such
10 devices was greatly limited. For example, while analog game control has been available to users of PC and console game systems, analog game control generally has not been widely available on hand-held electronic devices, such as cell phones and PDAs. Moreover, because the game controls for conventional hand-held electronic devices were typically positioned on the front surface of the device, the user's hand typically obscured the user's view of the video screen.
15 Also, the "fast twitch" control (e.g., a trigger) for shooting or activating special purpose game controls, which users have come to expect in console and PC game systems, generally has not been available to users of such hand-held electronic devices due in part to the nature of conventional interface and input systems, which were optimized for data input rather than for game control.

Consequently, the present inventors developed a flexible and efficient human interface
20 and input system and techniques for hand-held electronic devices (whether one handed or two handed) that utilize the opposed thumb and finger ergonomics inherent in the hand and the skills already developed for using conventional input techniques to accomplish data input, device control and game control in a timely, efficient, comfortable and intuitive manner. Thus, no
25 specialized training beyond that normally expected with any newly purchased hand-held device is expected.

Implementations of the human interface and input system for hand-held electronic devices described here may include various combinations of the following features.

The human interface and input system for a hand-held electronic device may be
30 configured to include on a first surface a plurality of input elements that can be manipulated by one or both of a human user's thumbs or a stylus. At least one of the input elements may be

configured in software to provide access to a plurality of input functions. For example, one of the input elements may provide access to the text symbols 5, j, k and l, while another input element may provide access to the text symbols 3, d, e and f, such as is found on a typical cell phone keypad. The human interface and input system also includes on a second surface one or more selection elements that may be manipulated by any of the human user's fingers. The selection elements may be associated with one or more input functions, which may be configured in software. For example, the selection elements may be configured to correspond to a particular shift position. Therefore, when a user manipulates a selection element, which is configured to correspond to a third shift position, for example, then the input function that may be accessed by a particular input element will be the third input function associated with the input element. In the example provided above, the third input function may be the text symbol "k" for the input element that provides access to the text symbols 5, j, k and l.

One of the selection elements may be a pressure sensor pad that can be configured to represent a plurality of delineated active areas, as well as inactive areas. These delineated active areas likewise can be configured in software to represent one or more input functions. A shape changing media also may be provided with the pressure sensor pad so as to permit a human user to tactilely discriminate between the plurality of delineated active areas and/or inactive areas.

The input elements and/or selection elements also may be associated with a palpable detent, vibratory unit and/or force producing unit, which may provide tactile feedback to the user when the user manipulates the elements or in response to events occurring in a software application running on a processor.

The human interface and input system also may be configured to include a first input assembly and a second input assembly. The first input assembly may include a plurality of input or selection elements situated on one or more surfaces of the electronic device and configured to be easily and comfortably actuated by one or both of a human user's thumbs or a stylus. The second input assembly may include one or more input or selection elements situated on one or more surfaces of the electronic device and configured to be easily and comfortably actuated by one or more of the human user's fingers. The first input and second input assemblies may be disposed on one or more surfaces of the hand-held electronic device to take advantage of the full range of opposition configurations of the thumb and the fingers. Sensing circuitry, such as an input controller, may be provided to receive signals generated by the elements of the first and/or

second input assemblies when the elements are manipulated by the human user and convert those signals in a form suitable to be received by a processor running application software, which based on the received signals, can determine the type of input provided by the human user.

5 The first input assembly may be situated on a front surface of the electronic device, while the second input assembly may be situated on the back surface of the electronic device to take advantage of the thumb/finger opposition. As configured, a user may manipulate input elements in the first input assembly with one or both thumbs or a stylus, while, manipulating elements in the second input assembly with one or more fingers.

10 The input function of the input elements of the first and/or the second input assembly may change depending on the application running on the electronic device. When a text application (e.g., e-mail, word processing, or text messaging) is running on the electronic device, the elements of the first and/or second input assembly may be associated with data input keys, such as symbols. When a game application is running on the electronic device, the input elements of the first and/or second input assembly may be associated with game controls, such as
15 a directional control, action buttons, and trigger buttons. The mapping of one or more of the input elements of the first and/or second input assembly to a software application, i.e., whether one or more of the input elements will operate as data input keys, game controls or device controls can be customized by the software application developer or the user through downloads or other programming modalities. Moreover, to reduce the cost of manufacturing hand-held
20 electronic devices that will be used in multiple countries, input element sets particular to the language of a desired country can be implemented in software.

The systems and techniques described here may provide one or more of the following advantages. The human interface and input system and associated techniques offer the functionality of a high performance game controller, which can support the most demanding
25 game input requirements, and the speed and accuracy of data input that can be obtained with the use of a conventional standard QWERTY keyboard, but without the large footprint. Also, the human interface and input system and associated techniques can increase the number of functions that may be associated with a given number of input elements without increasing the number of keystrokes or taps that is required. Moreover, it allows the input element size to
30 remain consistent with the ergonomics of the human hand without increasing the time it takes to learn how to use the input system compared to conventional input systems.

Details of one or more implementations are set forth in the accompanying drawings and the description below. Other features and advantages will be apparent from the description and drawings, and from the claims.

DESCRIPTION OF DRAWINGS

5 Fig. 1 is a block diagram of a typical hand-held electronic device upon which the human interface and input system may be implemented.

Fig. 2 is a block diagram of an implementation of the human interface and input system.

10 Figs. 3a and 3b show front and back isometric views, respectively, of a hand-held electronic device wherein the second input assembly includes a pressure sensor pad having a plurality of configurable active areas.

Fig. 3c illustrates an exploded view of an example of an input element of the first input assembly.

Fig. 3d depicts one implementation of how the plurality of configurable active areas of the pressure sensor pad of the second input assembly may be configured.

15 Figs. 4a and 4b depict front and back isometric views, respectively, of a hand-held electronic device wherein the second input assembly includes three touch pads.

Figs. 5a and 5b depict front and back isometric views, respectively, of a hand-held electronic device wherein the second input assembly includes three two-position rockers.

20 Figs. 6a and 6b illustrate front and back isometric views, respectively, of a hand-held electronic device wherein the second input assembly includes a D-pad and two contact sensors.

Figs. 7a and 7b show a two-handed hand-held electronic device wherein the second input assembly includes two rotary dials.

25 Fig. 8 is a block diagram of a hand-held electronic device in the context of a communication system that may be used to implement the human interface and input systems and techniques described here.

Like reference symbols in the various drawings indicate like elements.

DETAILED DESCRIPTION

Biomechanics of the Human Hand

30 The human hand comprises an opposable thumb and four fingers, i.e., the thumb may be used in opposition, in concert, in combination or functional relation with any of the four fingers.

Compared to the human fingers, the human thumb may be characterized as having larger range of motion, stronger sustaining force actuation and poorer dexterity. The human base joint of the thumb has three degrees of freedom, such as side-to-side movement, up and down movement, and rotation about the thumb's long axis; while the base joint of the fingers has two degrees of freedom, such as side-to-side and up and down movement. Thus, the thumb typically is considered to have better range of motion than any of the fingers. Also, because the human thumb has a bigger actuation muscle than any of the fingers, it can provide larger sustaining forces than the fingers. But also because of the larger muscle, the human thumb may suffer from diminished fine motor control and rapidity of motion that can be exerted compared to the fingers. Thus, the human fingers are more suitable for performing tasks that require fine motor coordination or the ability to pinpoint or rapidly repeat actuation.

Hand-Held Electronic Device Hardware Overview

FIG 1 is a block diagram that illustrates a hand-held electronic device 100, such as a cell-phone, PDA, pocket PC, or smart phone, or other similar input devices upon which the human interface and input system and associated input techniques described herein may be implemented. Electronic device 100 may include a bus 102 or other communication mechanism for communicating information, and a processor 104, such as an ARM, OMAP or other similar processor, coupled with bus 102 for processing information, such as one or more sequences of one or more instructions, which may be embedded software, firmware, or software applications, such as a text messaging application or video game. Electronic device 100 also may include a main memory 106, such as a random access memory (RAM) or other dynamic storage device, coupled to bus 102 for storing information and instructions to be executed by processor 104. Main memory 106 also may be used for storing temporary variables or other intermediate information during execution of instructions to be executed by processor 104. Electronic device 100 further may include a read only memory (ROM) 108 or other static storage device coupled to bus 102 for storing static information and instructions for processor 104. A storage device 110 may be provided and coupled to bus 102 for storing information and instructions. Electronic device 100 may also include a display 112, such as a liquid crystal display (LCD), for displaying information to a user, and a human interface and input system 114 for communicating information and command selections to processor 104. Electronic device 100 also may include a communication interface 118 coupled to bus 102. Communication interface 118 provides a two-

way data communication coupling to a base station. For example, communication interface 118 may be a wireless link, a modem to provide a data communication connection to a corresponding type of telephone line or any other communication interface known to one of ordinary skill. As another example, communication interface 118 may be a local area network (LAN) card to provide a data communication connection to a compatible LAN. In the wireless link implementation, communication interface 118 may send and receive electrical, electromagnetic or optical signals that carry digital data streams representing various types of information.

Human Interface and Input System Overview

FIG. 2 is a block diagram illustrating the major subsystems of the human interface and input system 114. The input system 114 may include a first input assembly 206, a second input assembly 208, and an input controller 216. The first input assembly 206 and the second input assembly 208 may include one or more input or elements. The input or selection elements, which may be keys, buttons, pressure sensor pads, touch pads or other actuators, associated with one or more sensors, which produce one or more electrical signals 214 when the input or selection elements are actuated. The input controller 216, which may include one or more processors, receives the one or more electrical signals 214 and converts them into a form suitable to be received and interpreted by processor 104 after passing through bus 102.

One or more context signals 222 are provided to input controller 216 through bus 102 in response to processor 104 executing embedded software, firmware, or software applications, such as a text messaging application. The context signals 222 are received and used by input controller 216 to map input or selection elements in the first input assembly 206 and/or the second input assembly 208 to one or more application input functions and responses. For example, if a text application is being executed by processor 104, then the input controller 216 may map one or more input elements of the first input assembly 206 to one or more symbols, such as characters, letters, numbers, icons, other types of symbols, or combinations of different types of symbols, and map one or more input or selection elements of the second input assembly 208 to a shifting or indexing functionality. If processor 104 is executing a game application, then the input controller 216 may map the input or selection elements of the input assemblies 206, 208 to game functions. The mapping of the input or selection elements to particular input functions for a given software application, whether done by the input controller 216 or processor 104, may be customized by the application developer or the user through downloads or other

programming modalities. Moreover, the mapping of the input or selection elements may be done for language key set changes, which may reduce the cost of manufacturing hand-held electronic devices for manufacturers servicing multiple countries.

Alternative implementations of the input system 114 need not have the input controller 216, particularly where cost is of a concern. In those instances, processor 104 may assume the functions of the input controller 216. Thus, processor 104 can perform the mapping function described above.

Human Interface and Input System and Techniques Implementations

Figs. 3a and 3b illustrates front and back isometric views, respectively, of a hand-held electronic device 302 upon which an implementation of the human interface and input system may be implemented. Electronic device 302 may include six planar or contoured surfaces: a front-side surface 312, a back-side surface 314, a left-side surface 316, a right-side surface 318, a top-side surface 320, and a bottom-side surface 322. Although, in other implementations, electronic device 302 may have more or fewer planar and/or contoured surfaces. On the front-side surface 312, a display 330, such as an LCD, and a first input assembly 340 is disposed adjacent to each other. Alternatively, display 330 may be on a separate assembly such as those displays for PDA's and cell phones with a swivel-mounted screen or flip-phone configurations. Also, the first input assembly 340 may be disposed on more than one surface. The first input assembly may be a typical cell-phone keypad, which may include twelve input elements 342, although any number of input elements may be provided. A user's thumb or thumbs or a stylus may actuate the input elements 342.

A second input assembly 350 is disposed on the back-side surface 314, left-side surface 316 and right side surface 318. Alternatively, the second input assembly may be disposed on one of those surfaces or a combination of those surfaces. In this implementation, the first input assembly 340 is disposed relative to the second input assembly 350 to take advantage of the opposition of the human thumb and finger. The second input assembly 350 includes a pressure sensor pad 354 having a plurality of software configurable active areas, which may be actuated by one or more of the user's fingers. The pressure sensor pad 354 in this implementation may include an actuator, such as an elastomeric material, attached to a force sensitive resistor array, a capacitive mat or array, or other similar pressure sensitive device or grid that can provide multiple outputs corresponding to the pressure readings of the plurality of active areas on the

pad's 354 surface. Here, the pressure sensor pad 354 wraps around from the left-side surface 316 across the back-side surface 314 to the right-side surface 318.

It is to be understood that the input elements 342, 354 in this implementation and any other implementation could be analog and/or digital buttons, keys, rockers (which may be a one or more position buttons or an analog joystick-type button), sliders, dials or touch pads used in combination with pressure sensors (such as force sensitive resistors, piezo resistive sensors, and capacitive sensors), positional sensors (such as rotary encoders, linear potentiometers and the like) or other sensors or a combination of them.

Fig. 3c depicts an exploded view of an input element 342 of the first input assembly 340, which is mapped to represent one or more text functions. Here, the input element is mapped to represent the number 7 and letters p, q, r and s, as is found on a typical keypad of a cell phone. Other input elements 342 may be associated with other letters, numbers and/or icons. For example, one input element may be associated with the number 4 and letters g, h and i, while another input element may be associated with the number 2 and the letters a, b and c.

As shown in FIG. 3d, the pressure sensor pad 354 may be configured in software to represent one or more delineated active areas corresponding to different programmable functions depending on the application. In this case, inverted U-shaped active area 360 forms an active area-- the vertical sides 362 of the inverted U-shaped active area 360 are on the left-side surface 316 and the right-side surface 318 and the horizontal side 364 of the inverted U-shaped active area 360 is along the top edge of the pressure sensor pad 354 on the back-side surface 314. Below the inverted U-shaped active area 360 on the back-side surface 314 are five oblong-shaped active areas 372 labeled from 1 to 5. On the bottom of both the left-side surface 316 and the right-side surface 318 and stretching to the back-side surface 314 of the pressure sensor pad 354 are rectangular-shaped active areas 374, 376, 378, 380. The remaining area of the pressure sensor pad 354 may be configured to be inactive.

In this implementation, inverted U-shaped active area 360 may be used for navigation-- the vertical sides 362 for y-directional movement and the horizontal side 364 for x-directional movement. The oblong-shaped active areas 372 may be used for shifting or indexing between symbols, such as characters, letters and/or numbers, or text input. The rectangular-shaped active areas 374, 376, 378, 380 may be used for shifting between modes—two of the active areas 374, 376 for left-handed users and the other two active areas 378, 380 for right-handed users. In

another configuration of the pressure sensor pad 354, the entire surface of the pressure sensor pad 354 may be covered by horizontal rectangular active areas interspersed between small rectangular horizontal inactive areas to achieve any desired number of active areas. Other configurations of the pressure sensor pad 354 may be realized depending on the requirements of the desired application.

The delineated active areas of the pressure sensor pad 354 may be actuated by one or more of the user's fingers, such as by applying pressure against the delineated active areas of the pad 354 beyond a pre-defined or user-adjustable threshold pressure. Likewise, the absence of pressure may be used as an actuation event. The pressure sensor pad 354 also may contain or be mounted above or below a shape-changing media such as an electrorheostatic fluid, shape memory metal array or similar material, which can permit the user to tactilely discriminate between the one or more delineated active areas. Thus, the user will be able to perceive the one or more delineated active areas as if they were physical buttons. Also, a computer graphical representation (not shown) of the configuration of the delineated active areas of the pad 354 may be displayed temporarily (or some predetermined time) on a portion of the display 330 to visually assist the user in locating where the delineated active areas of the pad 354 are positioned. Moreover, an input element 342 of the first input assembly 340 may be mapped to activate and/or deactivate the displaying of the computer graphical representation.

The input architecture described above, with the first input assembly 340 on the front-side surface 312 and the second input assembly 350 on the back-side surface 314, left-side surface 316 and right-side surface 318, is configured to take advantage of the biomechanics of the hand, whether the user is left-handed or right-handed. This configuration, for example, can reduce the number of thumb taps required to input a particular symbol compared to the number of thumb taps or stylus presses required using only a typical key pad with modal input techniques, such as is found in conventional text input systems. Moreover, this configuration can permit full keyboard capability with fewer input elements on the first input assembly 340 and with greater spacing between input elements to enhance the ease of input compared to typical keypads for existing cell phones. Also, this configuration can permit full functionality of a high performance game controller, which can support the most demanding game input requirements.

A method to implement full keyboard capability and reduce the number of thumb taps is to map in software the delineated active areas of the pressure sensor pad 354, such as the oblong-

shaped active areas 372, to an indexing or shifting functionality to take advantage of the capability of the human finger, i.e., rapidity of motion, spatial memory and fine motor control, and to map in software the input elements 342 of the first input assembly 340 to text functionality to take advantage of the capability of the human thumb, i.e., range of motion and sustained force actuation.

When a text messaging application is running on the electronic device 302 and displayed on the screen 330, the first input assembly 340 and the second input assembly 350 are used together to perform the text messaging functions. Each input element 342 of the first input assembly 340 may represent one or more text functions, e.g., one input element may be associated with the decimal digit 2 and letters a, b and c, while another input element may be associated with the decimal digit 7 and letters p, q, r and s (as shown in Fig. 3c), such as is found on typical keypads.

In this implementation, the input elements 342 are configured the same as a typical keypad on a cell phone. The specific text function inputted by a user for a particular input element 342 is determined by which delineated active area of the pressure sensor pad 354 is pressed. For example, going from left to right, each oblong-shaped active area 372 may be mapped to represent a separate index or shift position such that index position 1 may be assigned to the left-most oblong-shaped active area (labeled 1), index position 2 may be assigned to the adjacent oblong-shaped active area 372 (labeled 2) and so on, where index position 5 may be assigned to the right-most oblong-shaped active area 372 (labeled 5). Thus, to input the word “yes”, the user may press the oblong-shaped active area 372 representing index position 4 with any of his fingers and press the particular input element 342 representing the letter “y” with his thumb; then the user may press the oblong-shaped active area 372 representing index position 3 with any of his fingers and press the input element 342 representing the letter “e” with his thumb; and then the user may press the oblong-shaped active area 372 representing index position 5 with any of his fingers and press the input element 342 representing the letter “s” with his thumb.

The coordination of finger motions and thumb motions in other than a grasping motion may be difficult for most people. Generally, doing two separate types of motions simultaneously can be difficult. However, the human interface and input system described herein does not require those types of motions due to the flexibility of the system. Generally, it is easier to tap

both the fingers and thumbs or leave either the thumb or fingers in contact with an input element or delineated active area while moving the other. For example, a user's finger may press an oblong-shaped active area 372 at the same time or nearly the same time the user's thumb taps an input element 342 in the first input assembly 340.

5 Also, a user may tap an input element 342 with his thumb while pressing an oblong-shaped active area 372. Pressing or touching an oblong-shaped active area 372 while tapping on an input element 342 in the first input assembly 340 typically is natural, comfortable and easy to do. Likewise, the same holds true where the index finger moves substantially linearly from one oblong-shaped active area 372 to the next, generally a left to right motion or vice versa, while the
10 thumb taps an input element 342 in the first input assembly 340.

 Another way to implement finger/thumb coordination would be to permit asynchronous or sequential tapping between the finger tap and the thumb tap. For example, pressing an input element 342 within a pre-determined time (e.g., one second) after pressing and depressing a oblong-shaped active area 372 would constitute the same action as if both were pressed
15 simultaneously. This time window could be configured by the user to facilitate different proficiencies in typing or different types of applications—for game applications, the time window could be quite short, whereas for text input applications, the time window could be much longer. The time window also could be different for different delineated active areas based on their intended function in a given application.

20 Another method to implement full keyboard capability and reduce the number of thumb taps is map in software the delineated active areas of the second input assembly 350 as follows: left vertical side 362 of the inverted U-shaped active area 360 to be shift position 1; anywhere along the horizontal side 364 to be shift position 2; the top-left rectangular-shaped active area 378 to be shift position 3; the top-right rectangular-shaped active area 374 to be shift position 4;
25 the bottom-left rectangular-shaped active area 380 to be shift position 5; and, if needed, the bottom-right rectangular-shaped active area 376. The input elements 342 of the first input assembly 340 may again be mapped to text functionality.

 Thus, to input the word "yes", the user may press the top-right rectangular-shaped active area 374 representing shift position 4 with any of his fingers and press the particular input
30 element 342 representing the letter "y" with his thumb; then the user may press the top-left rectangular-shaped active area 378 representing index position 3 with any of his fingers and

press the input element 342 representing the letter “e” with his thumb; and then the user may press the bottom-left rectangular-shaped active area 380 representing index position 5 with any of his fingers and press the input element 342 representing the letter “s” with his thumb.

5 A method of implementing the functionality of a game controller is to assign in software the input elements 342 of the first input assembly 340 specific game functions to take advantage of the capability of the human thumb, i.e., range of motion and sustained force actuation, and to map in software the delineated active areas of the pressure sensor pad 354 of the second input assembly 350 analog control to take advantage of the capability of the human finger, i.e., rapidity of motion, spatial memory and fine motor control. Thus, as a user’s index finger or middle
10 finger slides from left to right across the oblong-shaped active areas 372, the horizontal side 364 of the inverted U-shaped active area 360, and/or the rectangular active area 370, the input controller (not shown) may interpret the motion as “increasing” a parameter such as speed, size, position, etc. Alternatively, the input controller may be programmed to interpret different levels of applied pressure to these delineated active areas as the “increasing” parameter, i.e., increased
15 pressured may represent increased speed, size, position, etc.

In this implementation, the vertical side 362 of the inverted U-shaped active area 360 may be programmed to represent the y-directional (vertical) movement of control of a character in a game, while the horizontal side 364 of the U-shaped active area 360 may be programmed to represent the x-directional (horizontal) movement. Movement into or out of the field of view
20 may be controlled by the left and right rectangular buttons 374, 376, 378, 380, thereby allowing 3-D control. Rapid firing of weapons may be accomplished by using the input elements 342 of the first input assembly 340 or one of the five oblong-shaped active areas 372, with each one representing a different weapon or action. Complex moves or mode shifts could be accomplished by combining input elements 342 of the first input assembly 340 with any
25 delineated active area of the second input assembly 350. In this way, a game developer may optimize the mapping of delineated active areas based on the best configuration for a particular game. For example, a game developer could set up control configurations for novice users differently than for advanced users, such as mapping different numbers or sizes of delineated active areas, in order to reduce the learning time to be proficient and make game control easier
30 for first time players.

Figs. 4a and 4b illustrate front and back isometric views, respectively, of a hand-held electronic device 402 similar to the device shown in Figs. 3a and 3b, except the second input assembly 450 includes three input or selection elements 454, 456, 458, which may be rectangular-shaped touch pads. Each touch pad 454, 456, 458 may transduce the location of the contact of an object or a user's finger anywhere on its surface. Also each touch pad 454, 456, 458 may correspond to different programmable functions. Here, touch pad 454 may be disposed on the back-side surface 414; touch pad 456 may be disposed on the left-side surface 416; and touch pad 458 may be disposed on the right-side surface 418.

In a hand-held device such as a cell-phone or PDA, the second input assembly 450 may include a touch-pad located diagonally on the back-side surface 414 with another touch-pad on the left-side surface 416 because a right-handed user's index finger typically is placed along a diagonal path on the back-side surface 414 wrapping around to the left-side surface 416. In that case, second input assembly 450 may include touch pad 454 and touch pad 456. A user's finger may move along the length of the touch-pad strip 454 in order to select the desired function. For example, a far left portion of touch-pad 454 may be mapped to be index position 1, a far right portion of touch-ad 454 may be mapped to be index position 5, and portions between the far-left portion and the far right portion of the touch-pad 454 may be mapped to intervening index positions. Alternatively, index position 1 may be mapped to touch pad 456 for right-handed users and mapped to touch pad 458 for left-handed users. Thus, in this implementation, text input is similar to that as described with respect to Figs. 3a and 3b. Other configurations of the active areas of the touch pads 454, 456, 458 are possible and can be tailored to specific applications.

Figs. 5a and 5b illustrate front and back isometric views, respectively, of a hand-held electronic device 502 similar to the device shown in Figs. 3a and 3b, except the second input assembly 550 includes three input or selection elements 554, which may be actuated by any of the user's fingers, typically the user's index finger or middle finger or a combination of both. The input elements 554 in this implementation are conventional two-position rockers. Thus, the second input assembly 550 can provide six index positions at a relatively low cost with passive tactile feedback built in.

Figs. 6a and 6b illustrate front and back isometric views, respectively, of a hand-held electronic device 602 similar to the device shown in Figs 3a and 3b, except the second input

assembly 650 includes three input or selection elements 654, 656, 658. Input element 654 may be a D-pad input device and input elements 656, 658 may be either digital or analog contact sensors. The D-pad 654 may be mounted on the center of the back-side surface 614 and mapped in software to represent one or more index or shift positions. For example, the D-pad 654 may be mapped to represent four index positions with each compass heading of the D-pad (e.g., North, South, East and West) representing a different index position. A fifth index position could be mapped to orthogonal movement of the center of the D-pad 654 into the device 602. Alternatively, the D-pad 654 may be mapped to represent eight index positions, e.g., the compass directions North, South, East, West, Northeast, Northwest, Southeast and Southwest may be mapped. The contact sensors 656, 658 may be used as mode functions, for firing weapons, or any other functionality specified by an application developer.

Figs. 7a and 7b illustrate front and back isometric views, respectively, of a two-handed hand-held electronic device 702. A first input assembly 740 including a plurality of input elements 742 is disposed on the front-side surface 712. A second input assembly 750, including two input or selection elements 754, 756, is disposed on the back-side surface 714. In this implementation, the two input elements 754, 756 are rotary dials. Alternatively, rotary dial 754 may be disposed on the left-side surface 716 and rotary dial 756 may be disposed on the right-side surface 718. In a one-handed hand-held electronic device, such as a cell-phone, typically one rotary dial is needed if placed on the back-side surface 714 or two rotary dials are needed if placed on the left and right side surfaces 716, 718. Rotation of the rotary dials 754, 756 may be mapped in software to represent one or more index positions. The rotary dials 754, 756 may be implemented with detents so that the user can distinguish between separate index positions, i.e., tactile feedback may be provided to the user's finger(s).

FIG. 8 is a block diagram that illustrates a hand-held electronic device 800, such as a cell-phone or PDA, upon which the human interface and input system and associated techniques described herein may be implemented in a communication system. Network link 820 typically provides data communication through one or more networks to other devices. For example, network link 820 may provide a connection through local network 822 to a host computer 824 or to data equipment operated by an Internet Service Provider (ISP) 826. ISP 826 in turn provides data communication services through the world wide packet data communication network now commonly referred to as the "Internet" 828. Network link 820 also could provide data

communication directly to the ISP 826 and Internet 828. Local network 822 and Internet 828 both use electrical, electromagnetic or optical signals that carry digital data streams. The signals through the various networks and the signals on network link 820, which carry the digital data to and from electronic device 800, are exemplary forms of carrier waves transporting the information.

Electronic device 800 can send messages and receive data, including program code, which includes one or more sequences of one or more instructions, through the network(s) and network link 820. In the Internet example, a server 830 might transmit a requested code for an application program through Internet 828, ISP 826, local network 822 and network link 820. In one aspect, one such downloaded application may be for software games to be played on electronic device 800, which may obtain application code in the form of a carrier wave.

In any of the above implementations, active and/or passive tactile feedback may be implemented. To provide passive tactile feedback, the input elements of the first and/or second input assemblies may be combined with a palpable detent, such as a dome cap or dome spring so that a user can tactilely perceive, through his fingers or thumbs, activation and/or deactivation of an input element. In one implementation, among others, the palpable detent may be positioned between the actuator and sensor components of the input elements. To provide active tactile feedback, one or more vibratory units or force producing units may be mounted in the handheld electronic device and activated to provide tap or index level or other information to a user. The vibratory unit may be an electric motor with an eccentric mass attached to the motor's shaft, a solenoid, a variable reluctance device, a loud speaker or any other vibrator that can provide tactile feedback. A force producing unit may be a solenoid in non-vibratory mode, a motor, non-vibratory actuators or any other actuator that can produce forces. A vibratory unit and/or force producing unit may be provided for each input element. In that case, the vibratory unit and/or force producing unit may be mounted below the input element so that when the vibratory unit and/or force producing unit is activated, the vibratory unit and/or force producing unit can push out the surface of the electronic device to a different level or position depending on the information to be communicated. Thus, in implementations using a pressure sensor pad or touch-pad as the input element, a stepped array may be configured to indicate higher and higher levels of index positions across the touch pad or pressure sensor pad. The vibratory units and/or force producing units may also be used to provide tactile feedback to indicate the momentary

achievement of an objective, such as target lock in game applications. Tactile feedback may also be accomplished by actuators, such as a solenoid, which changes the stiffness of the input element electronically or pushes against the user's hand or fingers to indicate an event of interest in the software application.

5 The computational aspects described here can be implemented in analog or digital electronic circuitry, or in computer hardware, firmware, software, or in combinations of them. Where appropriate, aspects of these systems and techniques can be implemented in a computer program product tangibly embodied in a machine-readable storage device for execution by a programmable processor; and method steps can be performed by a programmable processor
10 executing a program of instructions to perform functions by operating on input data and generating output.

 The systems and techniques described above utilize the biomechanics of the thumb and fingers, i.e., it uses the function of opposition, the fine motor control of the fingers, and the larger range of motion and stronger actuation provided by the thumb. By using the fingers and thumb
15 in concert, the number of taps and time needed to accomplish a given function is reduced, the accuracy is improved, and the natural programming inherent in the human hand replaces the training required for other systems.

 A number of implementations have been described. Other implementations may include different or additional features. For example, other configurations of the one or more input
20 elements of the first and second input assemblies may be realized. Also, the hand-held electronic devices described herein may have more or less than six planar or contoured surfaces. Moreover, the number of input elements in the first and second input assemblies are not limited to the number of input elements described in the implementations above.

 Also, the one or more input elements of the first and second input assemblies may be any
25 input or selection type known to one of skill in the art, such as keys, buttons, touch pads, other types of pads, rockers, sliders, dials, contact sensors or other actuators associated with any sensor. Each sensor associated with an actuator may include digital momentary on/off switches or analog sensors, such as pressure sensors (e.g., force sensitive resistors, piezo film sensors, or capacitive sensors), or positional sensors (e.g., rotary or linear potentiometers or encoders), or
30 other analog sensors known to those of ordinary skill, or accelerometers or gyroscopes. The first and second input assemblies may include a combination of these different types of input or

selection elements, which may be mounted in the configurations shown in the figures or imbedded within the device to permit control through motion of the overall device.

Moreover, the methods to provide data input, device control or game control may be performed in a different order and still achieve desirable results. Accordingly, other

5 implementations are within the scope of the following claims.

WHAT IS CLAIMED IS:

1. A hand-held electronic device comprising:

a first surface having a plurality of input elements configured to receive input from a human user through manipulation of the plurality of input elements by one or both of the human user's thumbs or a stylus, wherein at least one of the input elements is further
5 configured to provide selective access to more than one input function; and

a second surface having one or more selection elements configured to be manipulated by one or more of the human user's fingers, wherein manipulation of a selection element causes the input function of one or more input elements to change.

10 2. The device of claim 1, wherein the first and second surfaces are arranged so as to optimize a biomechanical effect of the human user's opposing thumb and fingers.

3. The device of claim 1, wherein at least one of the selection elements is a pressure sensor pad configurable to represent a plurality of delineated active areas, wherein
15 manipulation of a delineated active area causes the input function of one or more input elements to change.

4. The device of claim 3, further comprising a shape changing media configured relative to the pressure sensor pad so as to permit the human user to tactilely discriminate
20 between the plurality of delineated active areas.

5. The device of claim 1 further comprising a processor, wherein the processor receives signals generated by the input elements and selection elements when manipulated by the human user.

5 6. The device of claim 1 further comprising an input controller, wherein the input controller receives signals generated by the input elements and selection elements when manipulated by the human user and converts the signals into a form suitable to be interpreted by a processor.

10 7. The device of claim 1, wherein at least one of the selection elements is a rotary dial.

8. The device of claim 1, wherein at least one of the selection elements is a D-pad.

15

9. The electronic device of claim 1, further comprising at least one palpable detent, wherein the detent is associated with at least one of the input elements or selection elements so as to provide tactile feedback to the human user when the human user manipulates the element associated with the palpable detent.

20

10. The electronic device of claim 1 further comprising one or more vibratory or force producing units, at least one of the vibratory or force producing units capable of providing tactile feedback upon the human user's manipulation of at least one of the input elements or selection elements.

11. The electronic device of claim 10, wherein at least one of the vibratory units provide tactile feedback in response to events occurring in a software application running on a processor.

5

12. A hand-held electronic device comprising:

a first surface having a plurality of input elements configured to receive input from a human user through manipulation of the plurality of input elements by one or both of the human user's thumbs or a stylus, wherein at least one of the input elements is further configured to provide selective access to more than one text symbol; and

10

a second surface with one or more input element having one or more selectable active areas configured to be manipulated by one or more of the human user's fingers, wherein manipulation of an active area causes the text symbol of one or more input elements to change.

15

13. The device of claim 12 further comprising a controller, wherein the controller receives signals generated by the human user's manipulation of the input elements or active areas.

20

14. The device of claim 13 further comprising a dome cap positioned above at least one input element and capable of providing tactile feedback to the human user when the input element associated with the dome cap is manipulated.

15. The electronic device of claim 13 further comprising one or more vibratory units capable of providing tactile feedback.

5 16. The electronic device of claim 13 further comprising one or more force producing units capable of providing tactile feedback.

17. A method for configuring a human interface and input system for use with a hand-held electronic device, the method comprising:

10 disposing on a first surface a plurality of input elements configured to receive input from a human user through manipulation of the plurality of input elements by one or both of the human user's thumbs or a stylus, wherein at least one of the input elements is further configured to provide selective access to more than one input function; and

15 disposing on a second surface one or more selection elements configured to be manipulated by one or more of the human user's fingers, wherein manipulation of a selection element causes the input function of one or more input elements to change

18. The method of claim 17, wherein each input element is labeled indicating each input function that can be selectively accessed by the input element.

20 19. The method of claim 17 further comprising connecting a controller to the input elements and selection elements, wherein the controller is capable of receiving signals generated by the human user's manipulation of one or more of the input elements or selection elements.

20. The method of claim 19, wherein at least one selection element having a plurality of active areas configurable by the controller to form a plurality of delineated active areas.

5 21. The method of claim 20 further comprising positioning a shape changing media relative to the one selection element having a plurality of active areas so as to permit the human user to tactilely discriminate between the plurality of delineated active areas.

10 22. The method of claim 17, wherein the first and second surfaces are disposed so as to optimize a biomechanical effect of the human user's opposing thumb and fingers.

23. The method of claim 17 further comprising positioning a palpable detent with at least one input element or selection element so as to provide tactile feedback when manipulated by the human user.

15

24. A method for inputting data on a hand-held electronic device having a first surface with a plurality of input elements configured to receive input from a human user through manipulation of the plurality of input elements by one or both of the human user's thumbs or a stylus, wherein at least one of the input elements is further configured to provide selective access to a plurality of symbols in a data input mode, wherein each of the plurality of symbols is associated with a unique index position identifier, and a second surface having one or more selection elements configured to be manipulated by one or more of the human user's fingers, wherein each selection element corresponds to one of the unique index position identifiers, the method comprising:

20

determining the index position identifier of a desired symbol to be inputted;
pressing the selection element corresponding to the index position identifier of
the desired symbol with any finger; and
pressing the input element configured to provide selective access to the
5 desired symbol with any thumb or the stylus.

25. The method of claim 24, wherein each input element is labeled indicating
each symbol that can be selectively accessed by the input element and a positional order in
which each symbol can be selectively accessed.

10

26. The method of claim 24, wherein determining the index position identifier of
the desired character to be inputted comprises:

locating the input element configured to provide selective access to the
desired symbol; and

15

counting from left to right the number of symbols preceding the desired
symbol labeled on the located input element, wherein the index position identifier of the
desired symbol is the number of symbols preceding the desired symbol plus one.

27. The method of claim 24, wherein at least one of the input elements or
20 selection elements is further configured to provide selective access to a plurality of modes, at
least one of the modes is the data input mode, the method further comprising enabling the
data input mode.

28. A method for a human user to input data on a hand-held electronic device using an interface and input system comprising a plurality of input elements in a thumb-manipulated assembly, wherein at least one input element is mapped to more than one text function, and one or more selection elements in a finger-manipulated input assembly, 5 wherein each selection element is mapped to a unique shift position, the method comprising:

pressing a desired selection element with a human a finger to select a desired shift position; and

pressing a desired input element of the thumb-actuated input assembly with a human thumb to input a desired text character.

10

29. A hand-held electronic device comprising:

a first input assembly disposed on a surface of the electronic device, wherein the first input assembly comprises a plurality of input elements configured to be actuated by a human user's thumb;

15 a second input assembly disposed on a different surface from the first input assembly so as to optimize a biomechanical effect of the human user's opposing thumb and fingers, wherein the second input assembly comprises one or more input elements configured to be manipulated by one or more of the human user's fingers, wherein at least one input element being a configurable sensing surface so as to provide a plurality of delineated active

20 areas; and

a memory comprising a mapping of the configurable sensing surface to the plurality of delineated active areas.

ABSTRACT

A human interface configured to optimize a biomechanical effect of a human user's opposing thumb and fingers by including, on one surface, one or more software configurable input elements manipulatable by a user's thumb(s) or a stylus, and, on another surface, one or
5 more software configurable selection elements manipulatable by a user's finger(s). A selection element may be a pressure sensor pad configurable to represent delineated active areas that are mapped to one or more input functions. Shape changing media may be provided to permit a user to tactilely discriminate between delineated active areas. Tactile
10 feedback may be provided to a user through palpable detents, vibratory or force producing units. Inputting data may include mapping each selection element to a shift function, mapping each input element to text functions, and using the selection elements to shift between text functions associated with an input element to input a desired text function.

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Fig. 1

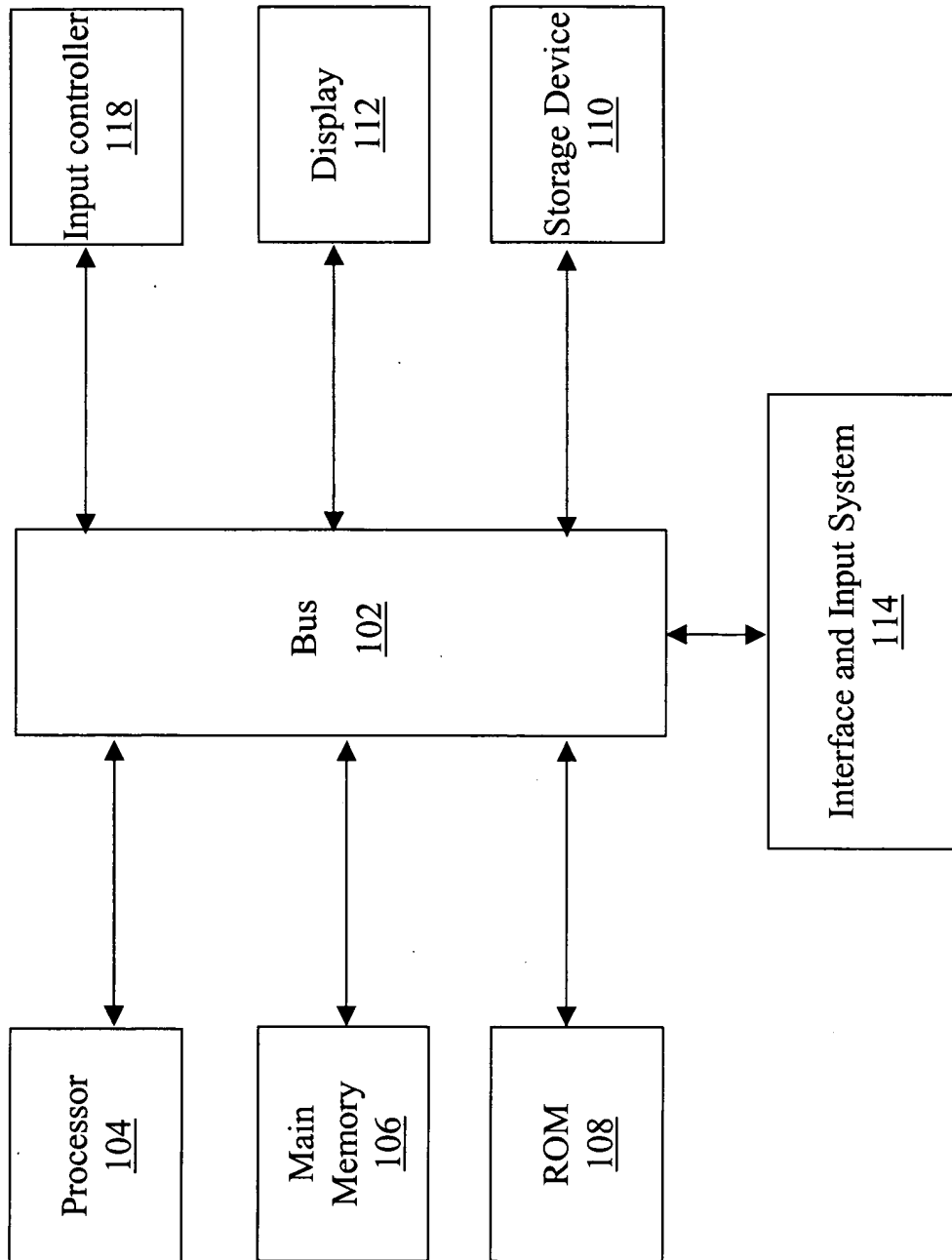
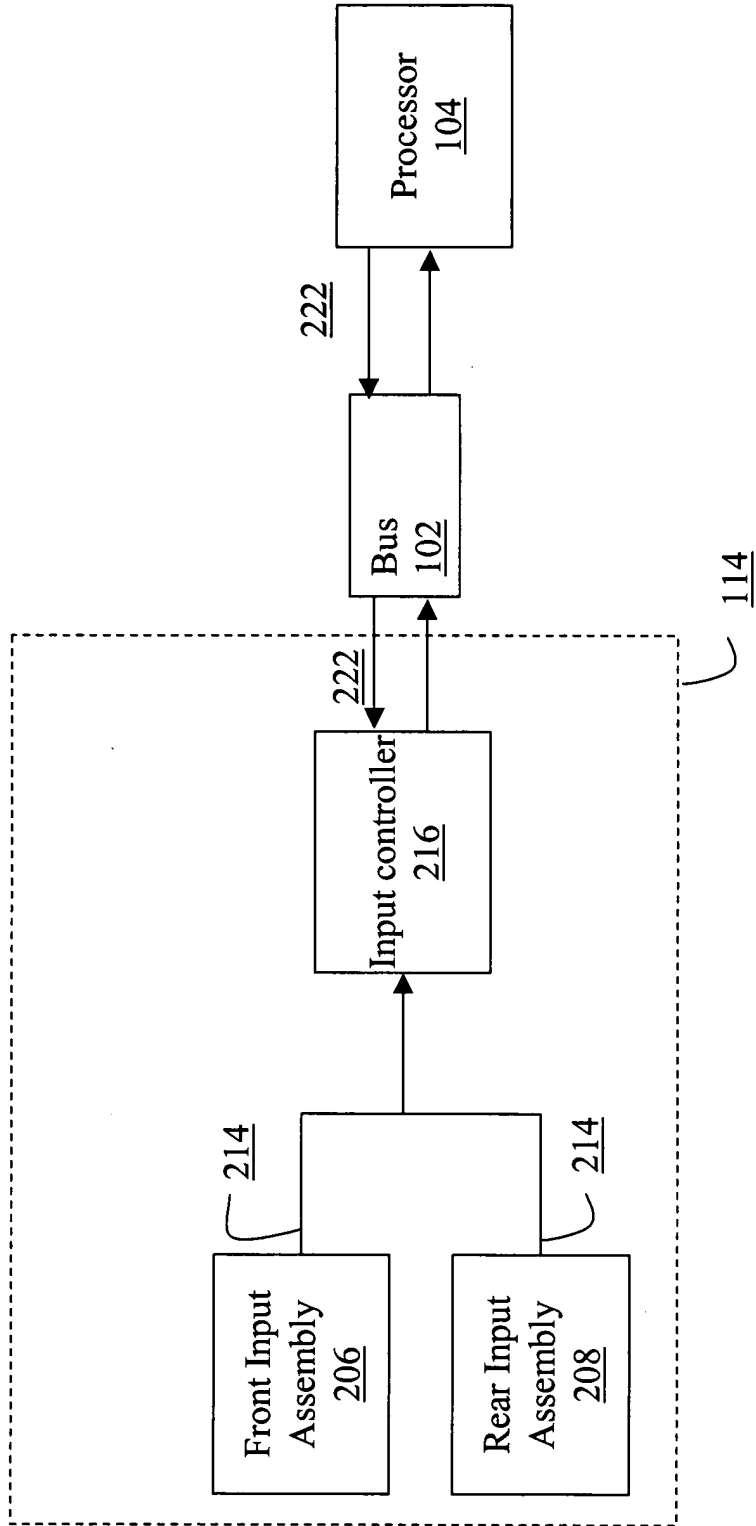


Figure 2



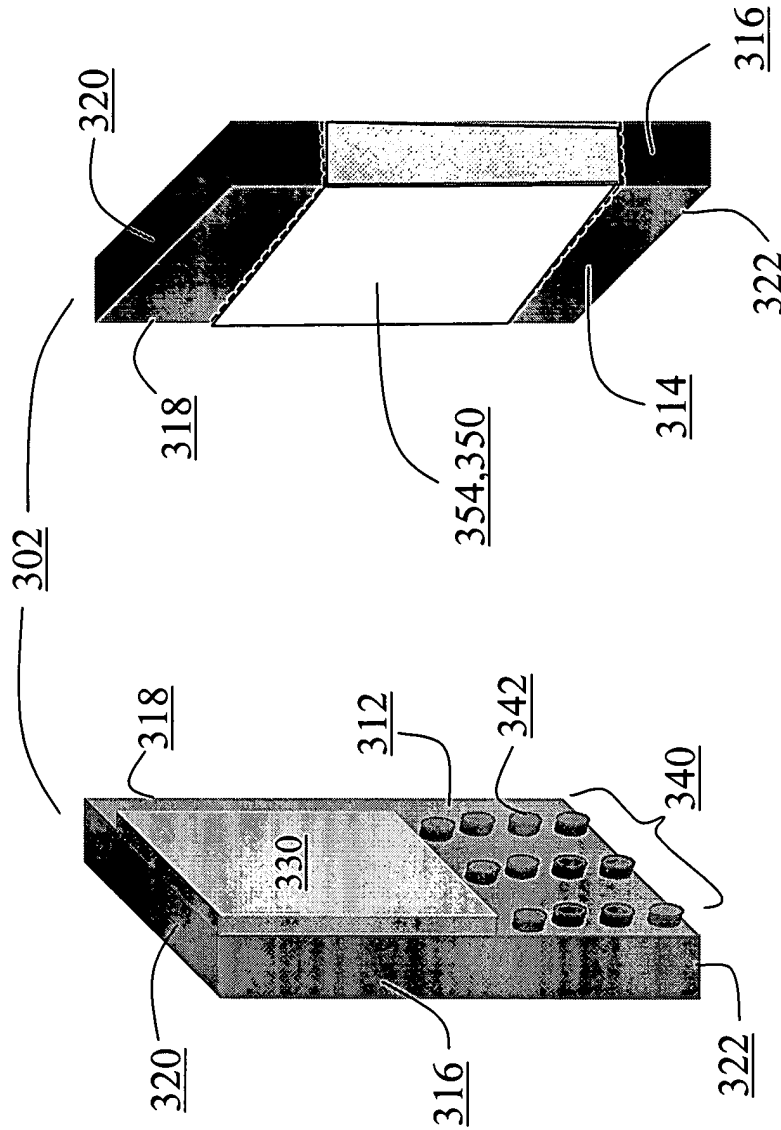


Fig 3b

Fig 3a

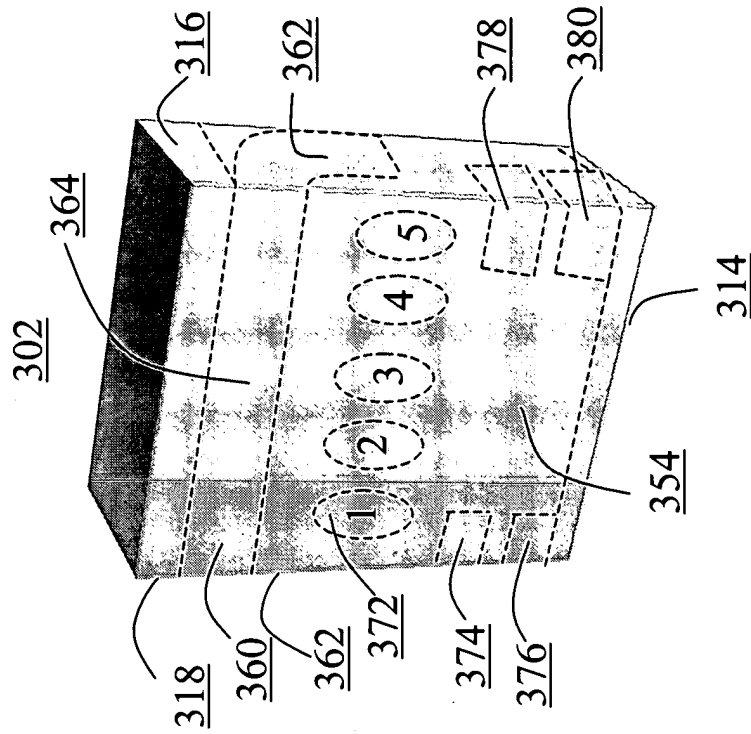


Fig 3d

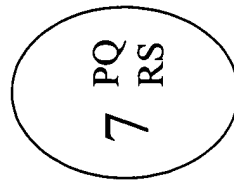


Fig 3c

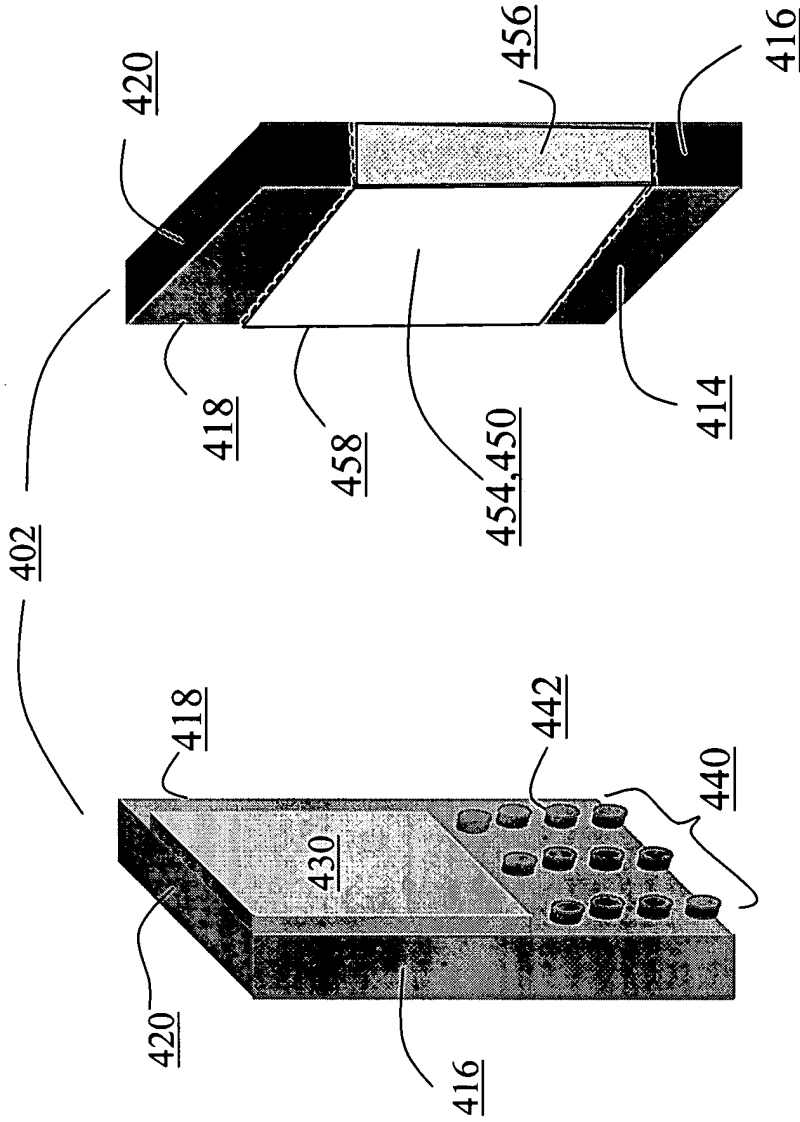


Fig 4b

Fig 4a

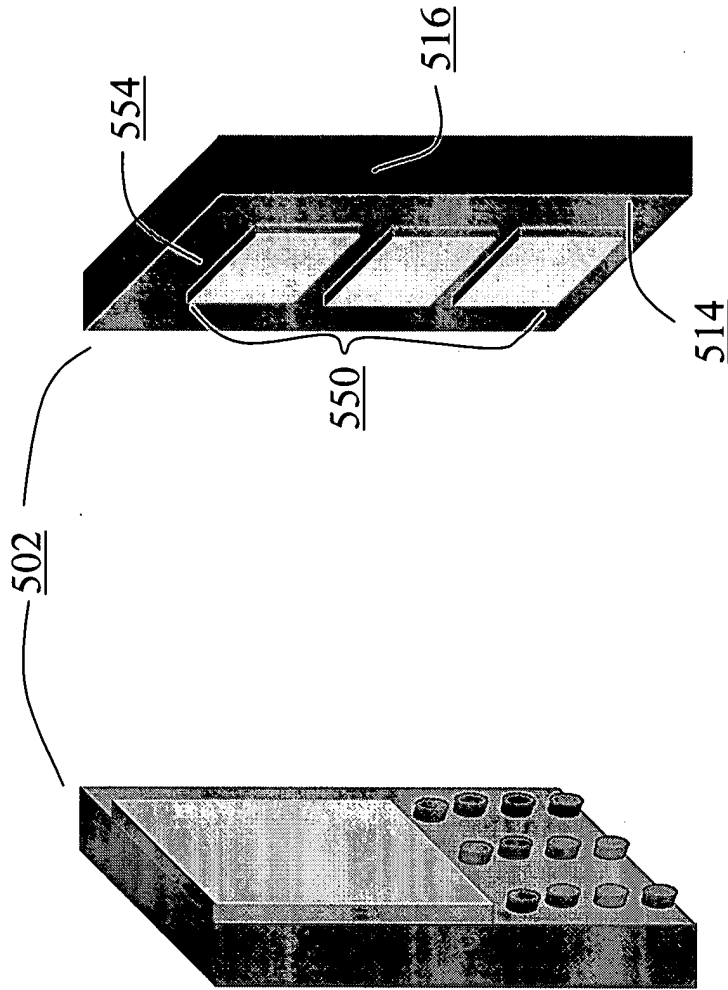


Fig. 5b

Fig 5a

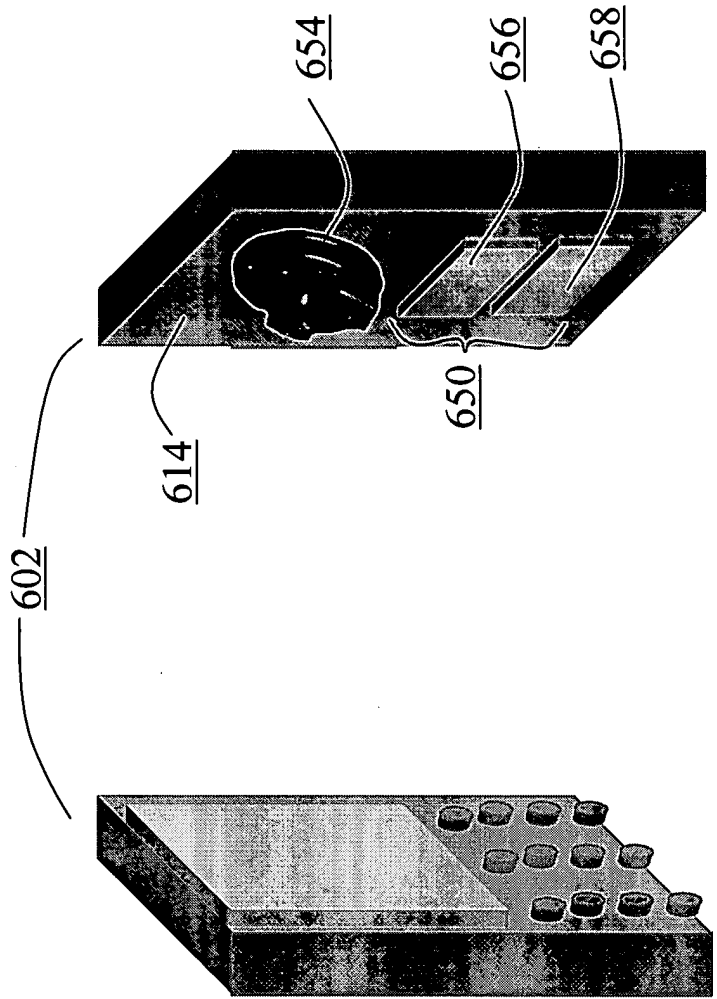


Fig. 6b

Fig 6a

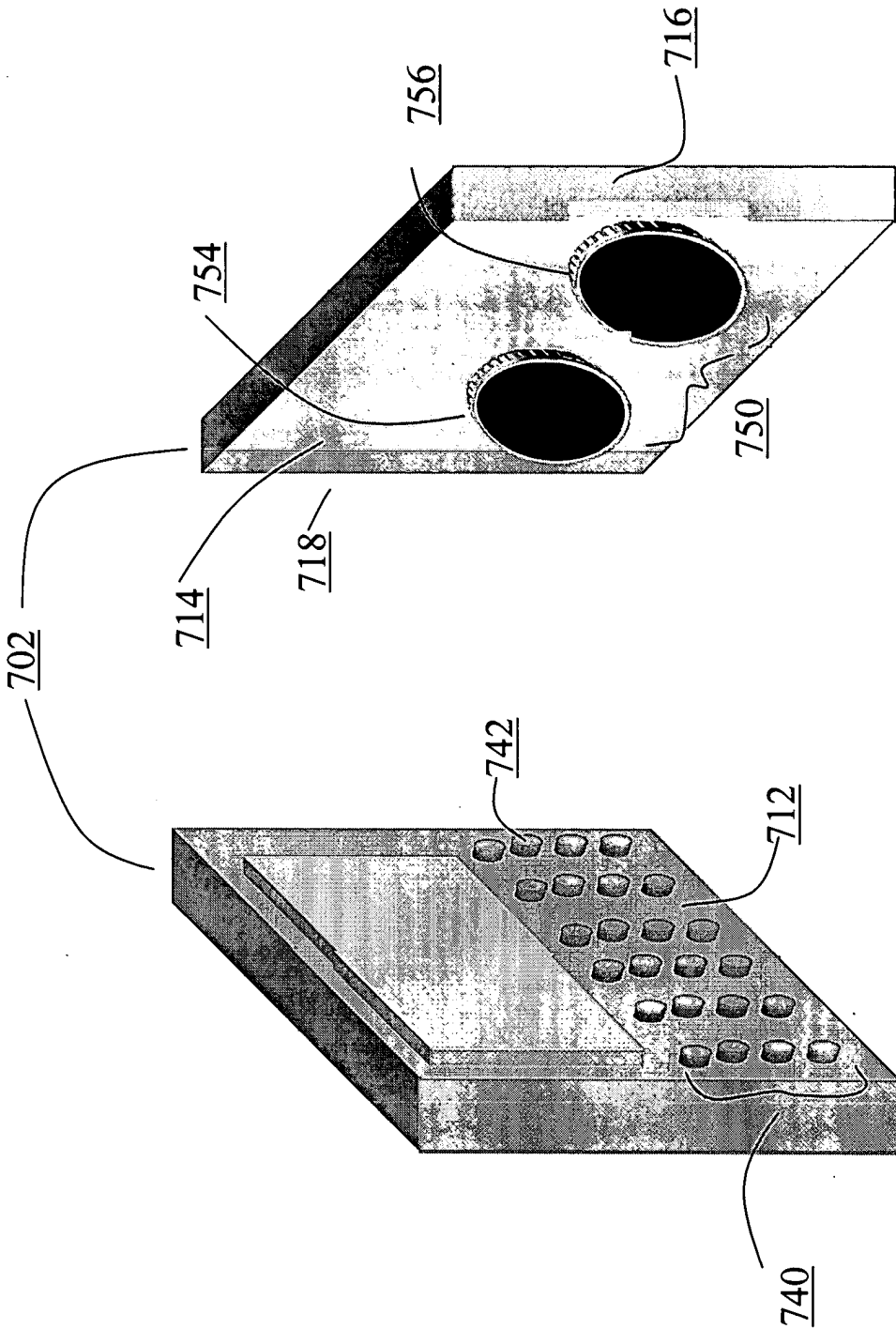
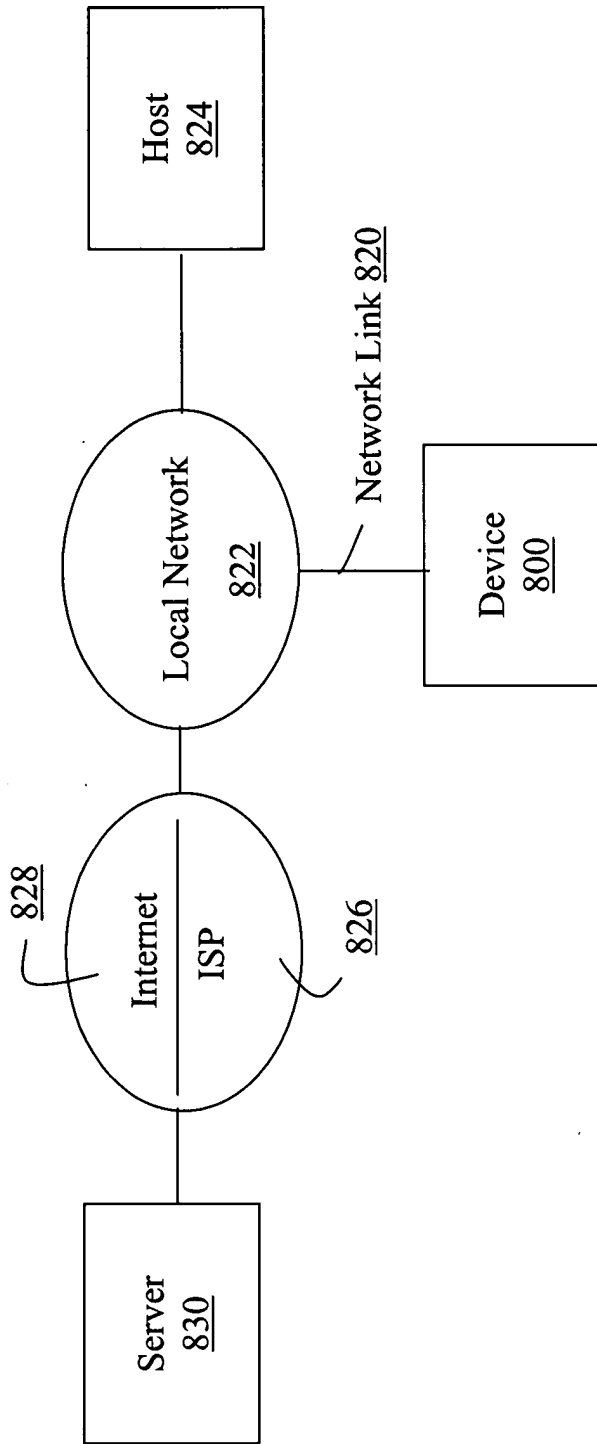


Fig. 7b

Fig 7a

Figure 8



COMBINED DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am an original, first and joint inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled HUMAN INTERFACE SYSTEM, the specification of which:

- is attached hereto.
- was filed on _____ as Application Serial No. _____ and was amended on _____.
- was described and claimed in PCT International Application No. _____ filed on _____ and as amended under PCT Article 19 on _____.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose all information I know to be material to patentability in accordance with Title 37, Code of Federal Regulations, §1.56.

I hereby claim the benefit under Title 35, United States Code, §119(e)(1) of any United States provisional application(s) listed below:

U.S. Serial No.	Filing Date	Status
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I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose all information I know to be material to patentability as defined in Title 37, Code of Federal Regulations, §1.56(a) which became available between the filing date of the prior application and the national or PCT international filing date of this application:

U.S. Serial No.	Filing Date	Status
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I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed:

Country	Application No.	Filing Date	Priority Claimed
---------	-----------------	-------------	------------------

I hereby appoint the following attorneys and/or agents to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

Scott C. Harris, Reg. No. 32,030
 David L. Feigenbaum, Reg. No. 30,378
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 Bing Ai, Reg. No. 43,312
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Combined Declaration and Power of Attorney

Page 2 of 2 Pages

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Direct all correspondence to the following:

20985
PTO Customer Number

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 Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patents issued thereon.

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Applicant : Beth Marcus, et al
Serial No. :
Filed : October 31, 2003
Page : 2 of 2

Attorney's Docket No.: 16300-002001

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Beth Marcus

Signature: _____

Typed name: Beth Marcus

Title: President

Assignee: Marcus Enterprises, Ltd.

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Substitute Form PTO-1449 (Modified) Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 16300-002001	Application No. to be assigned
	Applicant Beth Marcus, et al		
	Filing Date October 31, 2003		Group Art Unit to be assigned

U.S. Patent Documents							
Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	AA	4,793,312	12/27/1988	Doinaga et al.			
	AB	4,867,028	09/19/1989	Peter S. Jones			
	AC	4,891,777	01/02/1990	James M. Lapeyre			
	AD	4,896,554	01/30/1990	Craig F. Culver			
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	AF	5,189,416	02/23/1993	Mark D. Estes			
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	AH	5,512,919	04/30/1996	Yoshitsugu Araki			
	AI	5,612,690	03/18/1997	David Levy			
	AJ	5,824,931	10/20/1998	M. G. Papadopoulos			
	AK	5,859,629	01/12/1999	Bruce Tognazzini			
	AL	5,900,864	05/04/1999	Bruce W. Macdonald			
	AM	5,973,621	10/26/1999	David Levy			
	AN	6,005,496	12/21/1999	Hargreaves et al.			
	AO	6,084,576	07/04/2000	Leu et al.			
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	AR	6,377,685	04/23/2002	Ravi C. Krishnan			
	AS	6,520,699	02/18/2003	Toshiyasu Abe			
	AT	6,541,715	04/01/2003	Philip Swanson			
	AU	6,542,091	04/01/2003	Wayne Allen Rasanen			
	AV	6,546,239	04/08/2003	Pazdersky et al.			

Foreign Patent Documents or Published Foreign Patent Applications								
Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation	
							Yes	No
	AW							

Examiner Signature	Date Considered
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EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Substitute Form PTO-1449 (Modified) Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 16300-002001	Application No. to be assigned
	Applicant Beth Marcus, et al		
	Filing Date October 31, 2003	Group Art Unit to be assigned	

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
	AX	Buxton, "A Directory of Sources for Input Technologies", 10/1/2003, http://www.billbuxton.com/InputSources.html
	AY	"Introducing the Dvorak Keyboard", http://www.mwbrooks.com/dvorak/
	AZ	Innovative Ergonomic Solutions, Cirque Pocket Keyboard, http://www.iesproducts.com/key-misc-pocket.html
	AAA	Buxton, "Human Input to Computer Systems: Theories, Techniques and Technology", http://billbuxton.com/inputManuscript.html
	ABB	Buxton, "An Introduction to Human Input to Computers", 6 April 1999, http://www.billbuxton.com/input01.Introduction.pdf
	ACC	Unidentified and Undated Document discussing alternative designs to QWERTY Keyboard, pages 2-10
	ADD	
	AEE	

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

PATENT APPLICATION SERIAL NO. _____

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
FEE RECORD SHEET

11/06/2003 WABDELRI 00000068 10699555

01 FC:2001	385.00	OP
02 FC:2201	129.00	OP
03 FC:2202	81.00	OP

PTO-1556
(5/87)

PATENT APPLICATION FEE DETERMINATION RECORD

Effective October 1, 2003

Application or Docket Number

16300-02001

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	6 minus 3 =	* 3
MULTIPLE DEPENDENT CLAIM PRESENT <input type="checkbox"/>		

SMALL ENTITY TYPE

OR OTHER THAN SMALL ENTITY

RATE	FEE
BASIC FEE	385.00
X\$ 9=	81
X43=	129
+145=	
TOTAL	595

RATE	FEE
BASIC FEE	770.00
X\$18=	
X86=	
+290=	
TOTAL	

* If the difference in column 1 is less than zero, enter "0" in column 2

CLAIMS AS AMENDED - PART II

(Column 1) (Column 2) (Column 3)

AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total	*	Minus	**	=
	Independent	*	Minus	***	=
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>				

SMALL ENTITY

OR OTHER THAN SMALL ENTITY

RATE	ADDITIONAL FEE
X\$ 9=	
X43=	
+145=	
TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE
X\$18=	
X86=	
+290=	
TOTAL ADDIT. FEE	

AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total	*	Minus	**	=
	Independent	*	Minus	***	=
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RATE	ADDITIONAL FEE
X\$ 9=	
X43=	
+145=	
TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE
X\$18=	
X86=	
+290=	
TOTAL ADDIT. FEE	

AMENDMENT C		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total	*	Minus	**	=
	Independent	*	Minus	***	=
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>				

RATE	ADDITIONAL FEE
X\$ 9=	
X43=	
+145=	
TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE
X\$18=	
X86=	
+290=	
TOTAL ADDIT. 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."

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