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UTILITY PATENT APPLICATION TRANSMITTAL

(ONLY FOR NEW NONPROVISIONAL APPLICATIONS UNDER 37 CFR 1.53(B))

Attorney Docket No.	710078061US
First Inventor	Jakob Sternby
Title	TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES
Express Mail Label No.	

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: **Commissioner for Patents**
P.O. Box 1450
Alexandria, VA 22313-1450

1. [X] **Fee Transmittal Form.** (PTO/SB/17 or equivalent)
2. [ ] **Applicant claims small entity status.** See 37 CFR 1.27
3. [X] **Specification.** [*Total Pages* 39]
   Both the claims and abstract must start on a new page
   (For information on the preferred arrangement, see MPEP § 608.01(a))
4. [X] **Drawing(s).** *(35 U.S.C. 113)* [*Total Sheets* 12]
5. **Inventor's Oath or Declaration.** [*Total Sheets*]
   (including substitute statements under 37 CFR 1.64 and assignments serving as an oath or declaration under 37 CFR 1.63(e))
   a. [ ] Newly executed (original or copy)
   b. [ ] A copy from a prior application (37 CFR 1.63(d))
6. [X] **Application Data Sheet.** **See note below*
   See 37 CFR 1.76 (PTO/AIA/14 or equivalent)
7. [ ] **CD-ROM or CD-R.**
   In duplicate, large table or Computer Program *(Appendix)*
   [ ] Landscape Table on CD
8. **Nucleotide and/or Amino Acid Sequence Submission**
   (if applicable, items a. -- c. are required)
   a. [ ] Computer Readable Form (CRF)
   b. Specification Sequence Listing on:
      i. [ ] CD-ROM or CD-R (2 copies); or ii. [ ] Paper
   c. [ ] Statements verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

9. [ ] **Assignment Papers** (cover sheet & document(s))
   Name of Assignee
10. [ ] **37 CFR 3.73(c) Statement.** *(when there is an assignee)* [ ] **Power of Attorney.**
11. [ ] **English Translation Document.** *(if applicable)*
12. [ ] **Information Disclosure Statement.** (PTO/SB/08 or PTO-1449)
    [ ] Copies of citations attached
13. [ ] **Preliminary Amendment.**
14. [ ] **Return Receipt Postcard.** *(MPEP § 503) (Should be specifically itemized)*
15. [ ] **Certified Copy of Priority Document(s.)** *(if foreign priority is claimed)*
16. [ ] **Nonpublication Request.** Under 35 U.S.C.122 (b)(2)(B)(i). Applicant must attach form PTO/SB/35 or equivalent.
17. [X] Other: Authorization for Extensions of Time and Fees

*Note: (1) Benefit claims under 37 CFR 1.78 and foreign priority claims under 1.55 **must** be included in an Application Data Sheet (ADS).
(2) For applications filed under 35 U.S.C. 111, the application must contain an ADS specifying the applicant if the applicant is an assignee, person to whom the inventor is under an obligation to assign, or person who otherwise shows sufficient proprietary interest in the matter. See 37 CFR 1.46(b).

19. CORRESPONDENCE ADDRESS

[X] The address associated with Customer Number: 105412 *OR* [ ] Correspondence address below

Name					
Address					
City		State		Zip Code	
Country		Telephone		Email	

Signature		Date	October 15, 2012
Name (Print/Type)	Ryan M. Bello	Registration No (Attorney/Agent)	67,556

Samsung v. Cerence
IPR2024-01267
Exhibit 1004

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FEE TRANSMITTAL

Complete if Known	
Application Number	Not Yet Assigned
Filing Date	Concurrently Herewith
First Named Inventor	Jakob Sternby
Examiner Name	Not Yet Assigned
Art Unit	Not Yet Assigned
Practitioner Docket No.	710078061US

[ ] Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT ($) 1,260.00

METHOD OF PAYMENT (check all that apply)

[ ] Check [X] Credit Card [ ] Money Order [ ] None [ ] Other (please identify): _____

[X] Deposit Account Deposit Account Number: 50-0665 Deposit Account Name: Perkins Coie LLP

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

[ ] Charge fee(s) indicated below
[ ] Charge fee(s) indicated below, **except for the filing fee**
[X] Charge any additional fee(s) or underpayments of fee(s) under 37 CFR 1.16 and 1.17
[X] Credit any overpayment of fee(s)

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FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES

	FILING FEES		SEARCH FEES		EXAMINATION FEES		
Application Type	Fee ($)	Small Entity Fee ($)	Fee ($)	Small Entity Fee ($)	Fee ($)	Small Entity Fee ($)	Fees Paid ($)
Utility	380	190	620	310	250	125	1,260.00
Design	250	125	120	60	160	80	
Plant	250	125	380	190	200	100	
Reissue	380	190	620	310	750	375	
Provisional	250	125	0	0	0	0	

2. EXCESS CLAIM FEES

Fee Description	Fee ($)	Small Entity Fee ($)
Each claim over 20 (including Reissues)	60	30
Each independent claim over 3 (including Reissues)	250	125
Multiple dependent claims	450	225

Total Claims		Extra Claims	Fee ($)		Fee Paid ($)
20	- 20 or HP =	0	x	=	

HP = highest number of total claims paid for, if greater than 20.

Indep. Claims		Extra Claims	Fee ($)		Fee Paid ($)
3	- 3 or HP =	0	x	=	

HP = highest number of independent claims paid for, if greater than 3.

Multiple Dependent Claims	
Fee ($)	Fee Paid ($)

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets		Extra Sheets		Number of each additional 50 or fraction thereof		Fee ($)		Fee Paid ($)
39	- 100 =	0	/50 =		(round up to a whole number) x		=	

4. OTHER FEE(S)

	Fees Paid ($)
Non-English Specification, $130 fee (no small entity discount)	
Non-electronic filing fee under 37 CFR 1.16(t) for a utility application, $400 fee ($200 small entity)	
Other (e.g., late filing surcharge):	

SUBMITTED BY

Signature	/Ryan M. Bello/	Registration No. (Attorney/Agent)	67,556	Telephone	(206) 359-8000
Name (Print/Type)	Ryan M. Bello			Date	October 15, 2012

Docket No.: 710078061US
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Nuance Communications, Inc.

Application No.: Not Yet Assigned	Confirmation No.: Not Yet Assigned
Filed: Concurrently Herewith	Art Unit: Not Yet Assigned
For: TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES	Examiner: Not Yet Assigned

AUTHORIZATION FOR: EXTENSIONS OF TIME UNDER 37 C.F.R. § 1.136(A)(3) AND FEES UNDER 37 C.F.R. § 1.17

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

Madam:

With respect to the above-identified application, the Commissioner is authorized to treat any concurrent or future reply requiring a petition for an extension of time under 37 C.F.R. § 1.136(a)(3) for its timely submission as incorporating a petition therefor for the appropriate length of time.

The Commissioner is also authorized to charge any extension of time fees or other fees that may be required under 37 C.F.R. § 1.17 for any paper filed concurrently herewith or in the future, or credit any overpayment, to Deposit Account No. 50-0665.

Dated: October 15, 2012

Respectfully submitted,

By _____
Ryan M. Bello
Registration No.: 67,556
PERKINS COIE LLP
P.O. Box 1247
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	710078061US
	Application Number	
Title of Invention	TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
Mr.	Jakob		Sternby	

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

City		State/Province		Country of Residence	

Mailing Address of Inventor:

Address 1			
Address 2			
City		State/Province	
Postal Code		Country	

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
Mr.	Jonas		Morwing	

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

City		State/Province		Country of Residence	

Mailing Address of Inventor:

Address 1			
Address 2			
City		State/Province	
Postal Code		Country	

Inventor 3 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
Mr.	Jonas		Andersson	

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

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	Application Number	
Title of Invention	TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES	

City		State/Province		Country of Residence	

Mailing Address of Inventor:

Address 1	
Address 2	

City		State/Province	
Postal Code		Country	

Inventor 4 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
Mr.	Christer		Friberg	

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

City		State/Province		Country of Residence	

Mailing Address of Inventor:

Address 1	
Address 2	

City		State/Province	
Postal Code		Country	

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

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	105412		
Email Address	patentprocurement@perkinscoie.com	Add Email	Remove Email

Application Information:

Title of the Invention	TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES		
Attorney Docket Number	710078061US	Small Entity Status Claimed	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Suggested Class (if any)		Sub Class (if any)	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)	12	Suggested Figure for Publication (if any)	

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	710078061US
	Application Number	
Title of Invention	TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES	

Publication Information:

☐	Request Early Publication (Fee required at time of Request 37 CFR 1.219)
☐	**Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for thr Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	105412		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

Prior Application Status		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

Foreign Priority Information:

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(a).

		Remove	
Application Number	Country[1]	Filing Date (YYYY-MM-DD)	Priority Claimed
			○ Yes ○ No

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

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	Application Number	
Title of Invention	TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES	

Authorization to Permit Access:

☐ Authorization to Permit Access to the Instant Application by the Participating Offices

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

◉ Assignee	○ Legal Representative under 35 U.S.C. 117
○ Person to whom the inventor is obligated to assign.	○ Person who shows sufficient proprietary interest

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

If the Assignee is an Organization check here. ☒

Organization Name	Nuance Communications, Inc.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	710078061US
	Application Number	
Title of Invention	TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES	

Mailing Address Information:			
Address 1	1 Wayside Road		
Address 2			
City	Burlington	State/Province	MA
Country	US	Postal Code	01803
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button.

Signature:

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

Signature	/Ryan M. Bello/			Date (YYYY-MM-DD)	2012-10-15
First Name	Ryan	Last Name	Bello	Registration Number	67556

Additional Signature may be generated within this form by selecting the Add button.

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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 the Freedom of Information Act requires disclosure of these records.

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

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

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

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

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

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

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

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

TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES

BACKGROUND

[0001] Users enter text into computers and other data processing systems using a variety of input devices, including many types of keyboards. Most standard keyboards are large so as to accommodate both hands of a typist, but this leads to a less portable device. Laptop computers have attempted to shrink the size of a keyboard, sometimes at the expense of typing efficiency for some users.

[0002] Certain mobile devices such as cell phones, smart phones and the like, require an even smaller keyboard to maintain the form factor common with such devices. Some phones include a small key pad with physical buttons to distinguish each key on the keyboard, with which a user may use her thumbs to actuate the buttons. Other devices use a touch screen that displays a similar sized keyboard. Both of these smaller keyboards are cramped and can provide for slower and/or error prone text entry.

[0003] Although touch screen devices have become increasingly popular, consumers continue to demand simpler ways to input text, such as for e-mail, text messaging, instant messaging, and other activities. These touch screen keyboards, however, may suffer from more problems than their small key pad counterparts. The soft keys on the touch screen of such keyboards provide less tactile feedback to a user, which can lead to input errors, as well as other problems. Further, some devices have text input areas for inputting characters or letters drawn by the user, but the system must determine when one character/letter ends and the next one begins. Often, this is done with a button to commit a drawn character/letter, entry of a space character, or by a time-out or pause between inputted characters/letter. This, of course, decreases the speed of character/letter input by users.

[0004] The need exists for a system that overcomes the above problems, as well as one that provides additional benefits. Overall, the examples herein of some prior or

related systems and their associated limitations are intended to be illustrative and not exclusive. Other limitations of existing or prior systems will become apparent to those of skill in the art upon reading the following Detailed Description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] Figure 1 shows multiple data processing devices, and a communication interface between the devices and a centralized server accessible via a network under various implementations of the disclosed technology.

[0006] Figure 2 is a flow diagram illustrating a process of creating a character sequence choice under various implementations of the disclosed technology.

[0007] Figures 3A through 3D are screen shots illustrating a suitable user interface methods for character input under various implementations of the disclosed technology.

[0008] Figures 4A through 4F are screen shots illustrating user interface methods for user input of characters under various implementations of the disclosed technology.

[0009] Figures 5A through 5D are screen shots illustrating user interface methods for user input of characters under further implementations of the disclosed technology.

[0010] Figure 6 is a block diagram illustrating a suitable computing system that may employ aspects of the disclosed technology.

[0011] Figure 7A is a flowchart illustrating a process for creating a word choice list based on user input to a device under various implementations of the disclosed technology.

[0012] Figure 7B is a flow diagram illustrating a process to generate a word choice list under various implementations of the disclosed technology.

DETAILED DESCRIPTION

[0013] Various examples of the disclosed technology will now be described. The following description provides specific details for a thorough understanding and enabling description of these examples. One skilled in the relevant art will understand,

however, that the disclosed technology may be practiced without many of these details. Likewise, one skilled in the relevant art will also understand that the disclosed technology may include many other obvious features not described in detail herein. Additionally, some well-known structures or functions may not be shown or described in detail below, so as to avoid unnecessarily obscuring the relevant description.

[0014] The terminology used below is to be interpreted in its broadest reasonable manner, even though it is being used in conjunction with a detailed description of certain specific examples of the disclosed technology. Indeed, certain terms may even be emphasized below; however, any terminology intended to be interpreted in any restricted manner will be overtly and specifically defined as such in this Detailed Description section.

[0015] As will be explained in further detail below, the technology described herein relates to systems and methods for increasing the speed and accuracy with which a user can enter characters or text into devices, such as into mobile devices having touch screens. In accordance with one embodiment, upon entry of a character, letter, text or similar input by the user ("character" generally), data representative of such character entry is input to a buffer and compared to linguistic knowledge before being committed.

[0016] Described in detail below is a linguistically aided auto-commit system for handwriting recognition user interfaces (UIs). The system maintains an editable or changing buffer, where the buffer stores candidate characters and/or words that may be input or selected by the user and altered by the system as new characters are added, before the candidate characters and/or words are committed to an application and the buffer is cleared of these candidate characters and/or words. The system adds characters from an input writing area and determines a best recognition result for the whole character sequence stored in the buffer. The system determines when a sequence of characters may be output to the application, from the buffer, thereby clearing the buffer and no longer allowing those characters to be selected by the user or altered by the system.

[0017] The recognition engine or process provides an indication or output as to when one or more characters can be committed and sent to the application, as

opposed to requiring a user to input of a space gesture, select a commit button, or other user input. In other words, the system provides an automatic and quicker recognition system. By using more elaborate linguistic knowledge, the system can perform this identification of, e.g., the end of one word and the beginning of the next without the need to detect a space gesture between two words. The system, however, is not limited to analyzing two or more words, but can instead analyze single characters individually, but in context with other characters, such as Asian characters.

[0018] Thus, the use of linguistic tools with an intermediary buffer allows the system to use a "history" of characters input by a user to increase the speed and accuracy of handwritten characters input to the system. The system can automatically decide when to clear this intermediary buffer by analyzing the context of two or more characters or words. Many other improvements to the system are described below, such as ways to assist in identifying boundaries between words by recognizing punctuation, particular phrases, context of data entry (e.g. data being input to an address field of the form) etc.

[0019] Overall, the editable buffer is not a user interface (UI) element, but rather a buffer in the engine where the content is still modifiable (editable) by the engine. The characters in the buffer may be displayed in the UI through a recognition candidate list, (a list that contains information of a hypothesis from the engine based on the content of this buffer). It is not necessary to display the contents of this buffer in a separate UI component; however, the example described below employs a UI to show the buffer contents that the engine can modify inline in the application, typically underlined or in some other fashion highlighted or visually differentiable by a user. This will then be displayed as the current highest ranking candidate in the candidate list. The content of the buffer can then be modified in at least four different ways:

1. The user enters or writes more characters (in which case the candidate list is updated and what is displayed in the UI is likewise updated, including the highlighted part)
2. The user selects a candidate from the candidate list, such as by editing the displayed sequence (or by interacting with the highlighted area in the UI).

In this case the engine will know that the user has interacted with the buffer and can therefore flush the buffer and "commit" it to the application (which will remove the highlight). The selection of the highest ranking candidate in the list could also be done with some other specialized button in the UI or a special gesture.

3. The user modifies committed text in the application which can act as context to the engine. In one example, the candidate in the engine buffer is the word "go" and the context text preceding this in the application is changed from "I can" to "I like" then the engine may find a better string candidate in the word "you" instead of "go" and that buffer may be updated accordingly without direct user interaction to place the word "you" first.

4. Auto-commit: The engine uses linguistics and or other heuristic rules to identify that part of the current content can be flushed from the engine buffer (and no longer be modifiable by the engine). For instance if the user so far has written "lliketowrite" and the best candidate in the candidate list is "I like to write", and then the user continues writing "n" (as in the start of the word "novels"), then the engine may decide that it can "commit" "I like" to the application. The engine then notifies the UI so that before displaying the new candidate list incorporating the added "n" it sends "I like" to the application and deletes the corresponding input from the candidate list and from the highlight. Consequently the new candidate list will then contain "to write n" possibly as the best candidate and the highlighted text reflects this accordingly (whereas now unhighlighted the text "I like" has been entered before the cursor in the application).

Suitable Environment

[0020] Referring first to Figure 1, one suitable example for employing the present system or disclosed technology is shown. In Figure 1, one or more devices are shown, including cellular telephones, smart phones, netbooks or laptop computers or the like. Many other devices may employ the disclosed technology, such as tablet computers,

ultrabooks, set top boxes, gaming consoles, hand-held gaming devices, vehicle-based computers, etc.

[0021] The disclosed technology may operate solely on such devices. However, each of these devices may be provided with a communication system, such as a standard wired or wireless Internet connection or other proprietary wireless or wired communication system, as is well known to one of ordinary skill in the art. Thus, actions taken or data entered on one or more of the devices may be communicated as appropriate to a centralized enterprise server.

[0022] Under such an alternative to the disclosed technology, certain functions that may be implemented on one or more of the user devices are instead transferred to a server, such as an enterprise server, thus providing a more similar user experience for all users of the enterprise system, as well as allowing for larger databases and data sets to be accessed, and to permit greater and quicker process than may be available on certain user devices. In particular, when entering characters into one or more of the devices, typically all functionality regarding correction and auto suggestion is performed in accordance with information retained on the device. Therefore, in accordance with this alternative, the user device may employ certain character entry and error tolerant character entry techniques at the device level, while using some error tolerant character entry results to select suggested character entry information from a centralized database location based on one or more larger databases of linguistic and usage information.

[0023] Figure 2 is a flow diagram illustrating a process 200 of creating a character sequence choice under various implementations of the disclosed technology. The process begins at block 205 where the user interface receives a single character input from a user. As explained in further detail below, the user can create the single character input through one or a series of strokes or input features (e.g., using a finger and/or a stylus on a touch screen interface). At block 210, the process 200 performs character recognition on the input character from block 205. Character recognition can take many forms such as, for example, comparing a best match between one or more strokes/gestures input at a touch-sensitive input device to a database of recognized

characters. At block 215, after finding a best match, the process 200 adds the character to a temporary editable character buffer, which may be presented to the user.

[0024] At block 220, based on a sequence of one or more characters in the current buffer, the process 200 determines whether at least a portion of the sequence in the temporary editable character buffer is a committable sequence. Block 220 may include, for example, a recognition engine (described in further detail below) that analyzes the sequence of characters currently stored in the buffer for a match with certain rules, a database or dictionary. Based on linguistic context, for example, the process 200 may identify a character sequence of one or more characters that are meant to be separate from other characters that have been input by the user (e.g. representing two or more words). If the sequence in the buffer is identified in block 220, the process 200 proceeds to block 225 in which the committable part of the sequence is sent to the current application and removed from the buffer. (While the character sequence is described as being input to an application, it can be sent to any service, such as to a Web server for input into a web form.) As a result, a user can continually enter characters without spaces, and the system can automatically parse words from the string of input characters, as described herein.

[0025] At block 230, the process 200 updates the display of the characters (if any) currently in the buffer. If, for example, the process 200 did not identify a sequence in the buffer at block 220 (e.g. the start of the first sequence did not match any word in the dictionary), then at block 230 the unidentified sequence may be displayed to the user at block 230. If, however, part of the sequence in the buffer was identified as a committable sequence at block 220, only the remaining unidentified part of the sequence may be displayed at block 230. In addition, in some embodiments, the process 200 can present the sequence in a text area for display.

[0026] At block 235, the process 200 monitors a character input area for additional text input. If the user continues the writing process, for example, by entering one or more characters, the process 200 returns to block 205 to process the recognition of the additional text entry. If, however, no further text input is detected, the process 200 at block 240 displays one or more candidate sequences and monitors a candidate display

area to receive user input indicative of a selection of one of the candidate sequences. For example, as explained in further detail herein, the process 200 may, based on the sequence currently in the buffer, display one or more candidate sequences computed by the recognition engine. (Options 1., 2. and 3. above reflect three ways a user can interact with the buffer.) If the user selects one of the candidate sequences at block 240, the process 200 returns to blocks 220 and 225 and updates the buffer accordingly at block 230. If, however, the user does not select one of the candidate sequences from the buffer display, the process 200 proceeds to block 245.

[0027] At block 245, the process 200 detects whether the system is receiving additional input from the user. If additional input is detected, the process 200 returns to block 205 to receive the additional user input. If no additional input is detected, the process 200 ends.

Suitable User Interface

[0028] Figure 3A illustrates a user interface suitable for outputting words in response to receiving multi-modal user inputs (e.g., a mixture of stroke or traces, as well as taps, hovers, other tactile inputs and/or non-tactile inputs). The user interface described herein may form part of any system where it is desirable to convert user input into words, including, but not limited to, user devices noted above, including mobile phones, personal digital assistants, portable audio systems, laptop computers (including ultra-mobile personal computers), desktop computers, other computing systems, video game systems, televisions, and a myriad of other consumer and commercial electronic systems or appliances (including, e.g. refrigerators, kiosks, etc.)

[0029] The user interface comprises a touch screen or similar display 300 that facilitates both tactile input from a user and visual output (though separate input and output components are possible, such as a display area and a separate input area to receive character input). As indicated by the illustrative axes, each point on the display may be described by a unique X-Y coordinate. Additionally, although not shown in Figure 3A, the user interface may receive other inputs, including inputs from a system accelerometer and/or pressure sensors in the touch screen, audio inputs, visual inputs,

etc. Additionally, the user interface may produce other outputs, including other visual outputs, audio outputs, haptic outputs, etc.

[0030] The display 300 shown in Figure 3A (and other depicted displays) is for a wireless mobile device, though of course other implementations of the technology are possible. An application bar 304 includes some information and/or input buttons for an application, which in the depicted displays is a messaging application. A text display portion or output area 306 displays text input exported from an editable buffer, which for example, may be associated with an application program.

[0031] A highest-candidate character sequence text display 307 displays text that the recognition engine has determined to be the best match or most probable candidate sequence, based on the user input, which is currently stored in the buffer. The text output in the text display 307 can be modified by the recognition engine before being committed or exported to the output area 306. As those skilled in the art would appreciate, while the candidate sequence is in the buffer, the sequence is subject to further modification by the recognition process due to, for example, additional user input. Once the candidate sequence is committed and pushed to the application, however, the recognition engine removes the sequence from the buffer, precluding further editing of the sequence.

[0032] An input area 310 of the display 300 is configured to receive tactile input from the user (e.g., by fingertip or by stylus) in the form of, for example, characters. As used herein, the term "characters" may include alphabetic letters (with or without diacritic markers such as accents), digits, characters or symbols that represent a phonetic or sub-word component, including Japanese kana, Korean jamos, and Chinese zhuyin, or another linguistic and non-linguistic characters such as digits, and punctuation that are contained in abbreviations, chat slang, emoticons, user IDs or URLs.

[0033] A key area 312 at the bottom display includes one or more function keys associated with the performance of special functions related to the input of textual information (e.g., capitalization of a letter, deletion of characters). Special function keys may include, but are not limited to, a numerical input key (e.g., to select a keyboard

layout suitable for faster entry of numerical and symbolic characters), a speech recognition activation key to receive voiced input, a space key, delete key, a multi-keyboard selection key (e.g., to select a different keyboard layout and/or virtual keyboard that supports a different character set), icon input key (e.g., to select one or more icon keys), and/or a return key. The special function keys may also include, for example, a commit key which can be configured to send the currently active candidate character and/or word to the application.

[0034] Figures 3B-3D will now be described, which illustrate an example of tactile user input. As shown first in Figure 3B, the input area 310 receives one or more input features that can form a first character 314 (e.g., by fingertip or by stylus). A user selection area 308 can display the contents of the recognized character buffer in a input candidate display 320 and one or more candidate words or character sequences 322. The text display 307 can display the currently selected choice in the input candidate display 320. It can also allow the user to edit the sequence shown in the text display 307 or input candidate display 320 using, for example, a virtual keyboard, additional handwriting input, and/or speech recognition. This type of action would also alter the contents of the buffer.

[0035] Figure 3B shows a series of input features that form the first character 314 (e.g., a letter "R"). As explained in further detail below, a recognition engine can identify the character 314, based on, for example, the input features. The character 314 may then be added to the input candidate display 320, which is displayed in the selection area 308 and the text display 307 as "R." The recognition engine can also present the user with the one or more candidate character sequences 322. The recognition engine may select the candidate sequences 322 from one or more dictionaries contained therein based on, for example, user history and/or character context. For example, as shown in the Figure 3B, based on prior character recognition, the candidate sequences 322 may include the letters "IT," because the user may have in the past selected "IT" when enter input features generally similar to those shown in the input area 310.

[0036] Figure 3C shows a second series of input features that form a second character 315 (e.g., a letter "a"). The addition of the input features corresponding to character 315 in the buffer (as shown in input candidate display 320) allows the recognition engine to present more candidate sequences 322 from which the user may select the sequence 322 he or she is attempting to input. Alternatively, if the desired sequence is not one of the candidate sequences 322, the user may continue to, for example, trace and/or stroke input features into the input area 310.

[0037] Figure 3D shows a third series of input features that form a third character 316 (e.g., a letter "t"). Based on the additional input, the recognition engine further refines the candidate sequences 322. After the user enters the third character 316, if the user's desired sequence is displayed in the selection area 308, the user can, for example, select from either the input candidate display 320 or one of the candidate sequences 322. Otherwise, the user can, for example, continue to enter an additional series of input features until the desired word is displayed in the selection area 308. The user can alternatively select the contents of the input candidate display 320 shown in the text display 307 and edit the text using, for example, one of the suitable text input methods described herein. Furthermore, the system may auto-commit the sequence shown in the text display 307 if the next recognized input does not match a known word or character sequence. For example, if a letter "x" were subsequently received by the system, the system may automatically commit "Rat" to the application because there is no known word or sequence containing the sequence "Ratx." Alternatively or additionally, the system may employ a time-out feature, so the user may wait a selected time (e.g., one second) and the system will automatically select the word in the buffer, then clear the buffer.

User Input

[0038] Figures 4A-4F illustrate examples of user inputs that may be received by the suitable user interface shown in Figures 3A-3D and analyzed by a recognition engine to produce a candidate character list that is displayed within the user interface (as in, for example, Figure 2). For simplicity, tactile user inputs to a touch screen display are described herein in conjunction with a user's depressing the display with a

fingertip. However, one having skill in the art will appreciate that the user may depress a touch screen by any suitable means, e.g., a finger, a stylus, or any other suitable input tool. Furthermore, the character entry shown in Figures 4A-4F contains characters from the Roman alphabet. However, the user interface can receive user character input in any number of languages, including, for example, Japanese, Chinese, and/or Korean.

[0039] Figure 4A illustrates the user interface 300 after the user has input characters 414 (e.g., an "A" and a "B") as a part of a new character sequence. The input characters 414 are received by the recognition engine, which produces a character sequence choice list in the selection area 308. The default choice is displayed as a first sequence choice and is added to the input candidate display 320 and is presented to the user as a character sequence 432 in the text display 307. In the present implementation of the disclosed technology, the sequence 432 is underlined to indicate editability (i.e., the sequence 432 remains in the input candidate display 320 and is editable by the recognition engine and possibly also by the user). However, in other implementations, any suitable text markup (i.e. bold, italics, etc.) may be used to indicated editability of the text in the text display 307. After inputting the input characters 414, the user may proceed in one of several ways, including continuing to input additional characters, selecting a desired sequence choice from one of the options presented in the selection area 308, or directly editing the character sequence 432 in the text display 307.

[0040] Figure 4B illustrates the user interface after the user has input an additional character 415 (e.g., a “c”). The corresponding input data is added to the buffer and the recognition engine produces a new list of character sequence candidates shown in the selection area 308 and the new sequence 434 (being the first sequence from the recognition engine) is displayed in the text display 307 and as a default choice in the input candidate display 320.

[0041] Figure 4C illustrates the user interface after the user has input an additional character 416 (e.g., a “D”). The corresponding input data is added to the buffer and the recognition engine produces a new list of character sequence candidates shown in the

selection area 308 and the new sequence 436 (being the first sequence from the recognition engine) is displayed in the text display 307 and as a default choice in the input candidate display 320.recognition engine Based on the additional input data representing character 416, the recognition engine is able to determine that the previous character 415 should actually be an uppercase “C” rather than a lowercase “c” as previously recognized. recognition engine

[0042] Figure 4D illustrates the user interface after the user has input an additional character 417 (e.g., an “e”). The corresponding input data is added to the buffer and the recognition engine produces a new list of character sequence candidates shown in the selection area 308 and the new sequence 438 (being the first sequence from the recognition engine) is displayed in the text display 307 and as a default choice in the input candidate display 320.recognition engine As explained above, after inputting the input character 417, the user may continue in one of several ways, including continuing to input additional characters, selecting a desired sequence choice from one of the options presented in the selection area 308, or directly editing the character sequence 438 in the text display 307.

[0043] Figure 4E illustrates the user interface after the user has input an additional character 418 (e.g., an “F”). The corresponding input data is added to the buffer and the recognition engine produces a new list of character sequence candidates shown in the selection area 308 and the new sequence 440 (being the first sequence from the recognition engine) is displayed in the text display 307 and as a default choice in the input candidate display 320.recognition engine Based on the additional character 418, the recognition engine is able to determine that the previous character 417 should actually be an uppercase “E” rather than a lowercase “e” as previously recognized. recognition engine

[0044] Figure 4F illustrates the user interface after the user has input an additional character 419 (e.g., a “G”). The corresponding input data is added to the buffer and the recognition engine produces a new list of character sequence candidates shown in the selection area 308 and the new sequence 444 (being the first sequence from the recognition engine) is displayed in the text display 307 and as a default choice in the

input candidate display 320.recognition engine At this point, the recognition engine has realized that the user has had several iterations to edit the first characters 414 and determines that that the characters 414 form a recognized sequence 442 that the user is unlikely to edit. As a result, the recognition engine removes the recognized sequence 442 from the buffer, thereby precluding the recognized sequence 442 from further alteration by the recognition engine. The sequences 442 is removed from the text display and sent to the application and 444 is displayed in the text display 307. In this way, the recognition engine is able to receive single character input and recognize character sequences without the need of a designated segmentation character (e.g., a space). This offers an advantage of, for example, increased speed of input and acceptance of input using character input in alphabets that typically do not use a space between characters (e.g., Japanese, Chinese, and/or Korean alphabets).

[0045] Figures 5A-5D illustrate examples of user inputs that may be received by the suitable user interface shown in Figures 3A-3D, using characters from the Chinese alphabet. As noted above, however, the user interface can receive user character input in any number of other languages, including, for example, Japanese and/or Korean.

[0046] Figure 5A illustrates a user interface 500 after the user has input a first character 514 (e.g., a Chinese 嗨 character) as a part of a new character sequence. The input data corresponding to character 514 is received by the recognition engine, which produces a character sequence candidatelist in the selection area 308. The default choice is displayed as a first sequence choice, is added to the buffer, and is presented to the user as a character sequence 532 in the input candidate display 320 and the text display 307. After inputting the first character 514, the user may proceed in one of several ways, including, for example, continuing to input additional handwritten characters or directly editing the character sequence 532 in the text display 307.

[0047] Figures 5B-5C illustrate the user interface after the user has input second and third characters 515 and 516 (e.g., Chinese 你 and 好 characters, respectively). The corresponding input data is added to the buffer and the recognition engine produces a new list of character sequence candidates shown in the selection area 308 and the updated sequence 532 (being the first sequence from the recognition engine)

is displayed in the text display 307 and as a default choice in the input candidate display 320.recognition engine As was the case in Figure 5A described above, after inputting the characters 515 and 516, the user may proceed in one of several ways, including, for example, continuing to input additional characters, selecting a desired sequence choice from one of the options presented in the selection area 308, or directly editing the character sequence 532 in the text display 307.

[0048] Figure 5D illustrates the user interface 500 after the user has input a fourth character 517 (e.g., a Chinese 嗎 character). As described herein, the recognition engine can be configured to determine whether the user intends to make edits to the currently selected sequence shown in the text display 307 and as the first candidate in the input candidate display 320based on, for example, linguistic and contextual cues and/or the amount of time since the user inputted the character without being edited. For example, the recognition engine can employ a linguistic engine to disambiguate or separate the character sequence into two or more recognized sequences. The recognition engine can also determine that user is unlikely to edit one of the recognized sequences and accordingly push the sequence to the current application, based on, for example, the amount of time since the user has inputted the sequence and/or past user input history.

[0049] As shown in Figure 5D, the linguistic engine of the recognition engine determines that user intended to input a first recognized sequence 534 comprising the first character 514 (e.g., 嗨 or "Hi." in Chinese), and a second recognized sequence 536 comprising the characters 515-517 (e.g., 你好嗎 or "How are you" in Chinese). The recognition engine also determines that the user is unlikely to edit the sequence 534 since he or she has subsequently entered the characters 515-517 without editing the first character 514. Accordingly, the sequence 534 is removed from the buffer and pushed to the application displayed in the user interface 500, precluding the recognition engine from further alteration of the sequence 534. As noted above, automatically removing, for example, the sequence 534 from the buffer offers the advantage of increased speed of input and acceptance of input using character input in alphabets that typically do not use a space between characters (e.g., Chinese, Japanese, and/or

Korean alphabets). The sequence 536 remains in the buffer and is presented as the default option in the selection area 308, while an additional sequence (e.g., 你好嗎? or "How are you?" in Chinese) is presented as another option based on context and linguistic cues. Moreover, the present system provides improved speed since a user need not purposefully pause between each inputted character, or select a commit button; instead, the user can continue to enter characters, one on top of the other, in the text entry location.

[0050] The system may employ other disambiguation and automatic correction techniques to further aid in user input, such as is described in detail in commonly assigned U.S. Patent No. 6,307,549, entitled "REDUCED KEYBOARD DISAMBIGUATION SYSTEM;" U.S. Patent Application No. 11/379,006/ U.S. Patent Publication No. 2006/0274051 entitled "VIRTUAL KEYBOARD SYSTEMS WITH AUTOMATIC CORRECTION," filed April 17, 2006; U.S. Patent Application No. 11/379,006, entitled "DISAMBIGUATION OF ICONS AND OTHER MEDIA IN TEXT-BASED APPLICATIONS," filed March 29, 2007, and 61/313,564, filed 3/12/10; U.S. Patent Application No. 12/498,338/ U.S. Patent Publication No. 2010/0121870 entitled "METHODS AND SYSTEMS FOR PROCESSING COMPLEX LANGUAGE TEXT, SUCH AS JAPANESE TEXT, ON A MOBILE DEVICE," filed July 6, 2009; and International Patent Application No. PCT/US2011/28387/ International Patent Publication No. WO2011/113057, entitled, "MULTIMODAL TEXT INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES," filed March 14, 2011, all of which are incorporated by reference.

Suitable System and Disambiguation/Recognition

[0051] Figure 6 and the following discussion provide a brief, general description of a suitable computing environment in which the disclosed technology can be implemented. Although not required, aspects of the disclosed technology are described in the general context of computer-executable instructions, such as routines executed by a general-purpose data processing device, e.g., a server computer, wireless device or personal computer. Those skilled in the relevant art will appreciate that aspects of

the disclosed technology can be practiced with other communications, data processing, or computer system configurations, including: Internet appliances, hand-held devices (including personal digital assistants (PDAs)), wearable computers, all manner of cellular or mobile phones (including Voice over IP (VoIP) phones), dumb terminals, media players, gaming devices, multi-processor systems, microprocessor-based or programmable consumer electronics, set-top boxes, network PCs, mini-computers, mainframe computers, and the like. Indeed, the terms “computer,” “server,” "host," "host system," and the like are generally used interchangeably herein, and refer to any of the above devices and systems, as well as any data processor.

[0052] Aspects of the disclosed technology can be embodied in a special purpose computer or data processor that is specifically programmed, configured, or constructed to perform one or more of the computer-executable instructions explained in detail herein. While aspects of the disclosed technology, such as certain functions, are described as being performed exclusively on a single device, the disclosed technology can also be practiced in distributed environments where functions or modules are shared among disparate processing devices, which are linked through a communications network, such as a Local Area Network (LAN), Wide Area Network (WAN), or the Internet. In a distributed computing environment, program modules may be located in both local and remote memory storage devices.

[0053] In one embodiment, the disclosed technology is implemented as a sequence of program instructions that are stored in a non-transitory computer readable media or computer readable memory. The instructions are executed by processor electronics to perform the functions described herein. Aspects of the disclosed technology may be stored or distributed on tangible computer-readable media, including magnetically or optically readable computer discs, hard-wired or preprogrammed chips (*e.g.*, EEPROM semiconductor chips), nanotechnology memory, biological memory, or other data storage media. Alternatively, computer implemented instructions, data structures, screen displays, and other data under aspects of the disclosed technology may be distributed over the Internet or over other networks (including wireless networks), on a propagated signal on a propagation medium (e.g.,

an electromagnetic wave(s), a sound wave, etc.) over a period of time, or they may be provided on any analog or digital network (packet switched, circuit switched, or other scheme).

[0054] Figure 6 illustrates a suitable data processing or computing system 600 in which a recognition engine 613 may operate in order to provide the user interface functionality described herein. The computing system may include a touch screen display 603, other input devices 608, an audio output component 604, other output devices 606, one or more processors or central processing unit (CPU) 601, and at least one memory 610, some or all of which may be carried or housed within a housing (not shown). As an alternative, or in addition to the CPU, the computing system 600 may include one or more digital signal processors (DSPs), application-specific integrated circuits (ASICs), field programmable gate arrays (FPGAs), or other logic/data processing circuitry.

[0055] The input and output components may include a global positioning system (GPS), a digital camera, a wireless LAN (WiFi) interface, a motion sensor, accelerometer, a Bluetooth® interface, an external USB or similar port, a headphone or headset jack adapter, projection display, haptic output device (e.g., a vibrator), as well as other components or a communication elements. For example, the Bluetooth® interface may communicate with an external wireless communications component, such as a wireless headset, to not only receive audio input but also provide audio output. In one implementation, the computing system 600 is a mobile phone, whereby the system also includes one or more radios coupled to the CPU 601 to permit wireless communications.

[0056] The output modalities of the system may include text-to-speech, audio, vibration, tactile, visual, etc. outputs. For instance the system can let the user know which input features, characters and/or letters have been recognized by adding a 'vibrate' or 'sound' feedback. Similarly, the system can provide the user with more detailed understanding of the features extracted and the level of uncertainty involved in its determinations.

[0057] The memory 610 may further comprise an operating system 611, a recognition engine 613, and one or more application programs (shown as application programs 1 through N 614-616). As described below, the recognition engine 613 can perform not only the character sequence process 200, but can also perform disambiguation and other recognition functions. The application programs can include word processing programs, slide presentation or image creation programs, email programs, SMS/MMS messaging programs, instant messaging programs, or other text-based communication or text-based document creation programs.

[0058] The recognition engine 613 receives user input data from the operating system, including data related to a user's input with the touch screen 603, and uses the received input data to identify a committed character sequence (e.g., one or more words), which it may provide to an application program. For example, the recognition engine 613 may receive a series of notifications from the operating system 611 of finger down events (when a user depresses a point on the touch screen), finger move events (e.g., when a user moves his finger while depressing the screen), and finger up events (e.g., when a user lifts their finger from the touch screen). (While generally described herein as using a finger, the user may use anything to touch or actuate the touch screen, such as a stylus.) Each of the received notifications may include a time series of position data, e.g., an X-Y set of coordinates (x, y) with a timestamp t (i.e., the coordinates (x, y, t)), which reflect the user's tactile input to the touch screen 603. Additionally, if the touch screen 603 comprises pressure sensors, the received notifications may include a time series of position and pressure data, e.g., a set of coordinates (x, y, t, p) that reflect the user's tactile input to the touch screen 603, including the applied pressure, p. The operation system 611 may also provide other kinds of input data to the recognition engine 613, including multi-touch inputs (e.g., additional sets of simultaneous coordinates (x, y, t) representing a second finger simultaneously contacting the touch screen), audio inputs (e.g., voice inputs), visual inputs, accelerometer inputs, location data, sensor data, etc.

[0059] The recognition engine may additionally access or receive and process, dynamic context information from the operating system and/or application program(s) in

order to facilitate its identification. Context information is any information that may help inform the recognition engine of the user's intent, and may include information such as sentence or word-pair context, language context, application-specific context (e.g. data fields/tags), user-specific context, location, time of day etc., as described in greater detail herein For example, the module may receive context information such as the last word selected by the user, other sentence-level context, the virtual keyboard layout utilized, the type of entry field into which the word will be entered (e.g., a "Contacts" field), location data (e.g. where the computing system includes a GPS receiver or accesses location data), calendaring data for the user, and/or context data or applications used or being used that may utilize the identified word. As another example, the recognition engine may receive a probabilistic "N-best" list from another mode of input. An N-best list is a rank-ordered list of suggested words, which may be capped at a fixed size (e.g., N). As one example, an N-best list may be generated from another type of disambiguation application program or module, such as a list of words generated from a speech recognition program (e.g., a list of homophones) or a handwriting-recognition program. As still another example, if a user is entering text in order to respond to an earlier email, the recognition engine may receive a list of words used in the earlier email.

[0060] The recognition engine may include a character selection submodule 618, a sequence list selection submodule 620, a keyboard mapping database 622, a vocabulary module 624, a user context database 626, an application context database 628 and a disambiguation parameter database 630. While depicted as separate modules, a single module, program or routine may incorporate two or more of the modules. While not shown in Figure 6, the recognition engine includes the buffer, as noted noted above.

[0061] The character selection submodule 618 is configured to analyze received user input or input data to extract input features (or "input features"), e.g., strokes, taps, corners, segments, and/or other features. The character selection submodule 618 is further configured to analyze the extracted input features using a language-independent database 622 to produce an input sequence that comprises an ordered set of feature

objects (e.g. rank ordered set of letters for a word being spelled) and may generate the best match character. Each feature object in the input sequence may be associated with a character associated with one or more input feature sequences. During its operation the character selection submodule may utilize parameters, policies, and preferences retrieved from the disambiguation parameter database. Further details on aspects of the character selection submodule 618 may be found, for example, in the assignee's U.S. Patent No. 7,177,473 entitled, "HANDWRITING DATA INPUT DEVICE WITH MULTIPLE CHARACTER SETS," and incorporated by reference herein.

[0062] The sequence list selection submodule 620 is configured to receive the input sequence of characters generated by the character selection submodule. The sequence list selection submodule 620 may analyze the input sequence using a variety of other inputs in order to generate a rank-ordered or otherwise structured sequence choice list, such as those shown in Figures 4A-4F and/or Figures 5A-5D. The other inputs that the sequence list selection submodule 620 may use include data from the linguistics engine 624, parameters retrieved from the disambiguation parameter database 630, received dynamic context data, and context data retrieved from the user context database 626 and the application context database 628. The sequence list selection submodule 620 is described in greater detail herein.

[0063] To facilitate sequence selection, the linguistics engine 624 provides one or more dictionaries that define a set or logical group of words. For example, an "American-English" dictionary may define a logical group of words in common usage by English-speaking Americans, while an "American-English-Msg" dictionary may define a logical groups of words (including emoticons) commonly used by English-speaking Americans in text and multimedia messages (e.g. SMS, MMS or similar messages). In some embodiments, Chinese, Japanese, and/or Korean dictionaries may also be included. The linguistics engine 624 may also provide additional language information, such as static or dynamic frequency information within a particular logical group of words (e.g., within a particular language) and/or particular context. For example, the additional language information may include frequency information in accordance with a linguistic model, which may include one or more of: frequency of occurrence of a word

in formal and/or conversational written text; frequency of occurrence of a word when following certain preceding word or words; proper or common grammar of the surrounding sentences; frequency of the word being utilized as a left-stem or right-stem (or prefix or suffix), etc. In addition to frequency, transition probabilities may be assigned to particular transitions, linking one class of prefixes to likely stems or stems with one or more classes of suffixes while rejecting prefixes with other words in the dictionary which would form illegal words. For example the word "work" may have high transition probabilities with suffixes –er, -ers, -ing, –s and –ed, which often form valid words.

[0064] The disambiguation parameter database 630 may store various parameters, policies, and preferences for performing interaction or input feature extraction, character selection and/or sequence selection. For example, the disambiguation parameter database may include parameters and policies that aid the system in selecting and applying distance functions, proximity metrics, matching metrics and post-processing steps, all of which are described herein.

[0065] To facilitate improved character and/or sequence recognition and/or selection, the user context database 626 and the application context database 628 may provide context information to the character selection submodule 618 and/or the sequence list selection submodule 620 to inform its processing; these submodules may also receive dynamic context information from an application program and/or the operating system. The entry of text, the selection amongst alternatives, contextual information and multiple modalities are managed by the recognition engine. The system may use inputs from the user, the context of the application, external sensors and context resources and disambiguation, and correction approaches to determine the user's intent as noted herein. Based on an understanding of the user's intent, the system maintains the context and state of the application, and manages the composition of inputs and synchronization across multiple input modalities. By interfacing with business logic, the system can produce multimodal output to be presented to the user. The interaction, the business logic and the context and state may be managed through an interaction script or more complex state machines (State

Chart XML or SCXML) or languages which are used for the control of user interfaces such as XHTML+Voice Profile or SALT.

[0066] The user context database 626 may include any historical information relating to the user's prior character and/or sequence selection behavior, such as previous words utilized by the user, the frequency of words entered by the user, and common phrases employed by the user Other examples of user context information include: word pairs entered by a user, a user's unique vocabulary in a specific application (text messaging vs. email, for example), a user's level of 'sloppiness' (increasing the character region size) while entering text into the system, etc. Additionally, user context information may reflect how frequently a user selects words from a particular language or what language the user primarily uses. For example, if the system utilizes both Chinese and English language dictionaries for a bilingual user, the user context database 626 may track the relative frequency with which the user selects Chinese words versus English words in order to determine the user's "primary language," and then words from that dictionary may be preferred or presented first over words from the other dictionary.

[0067] Alternatively or additionally, some user context information may be reflected in a user-specific dictionary and/or other data structures in the linguistics engine 624. Additionally or alternatively, the user context database 626 may also provide user-specific policies and parameters that may override default disambiguation parameters stored in the disambiguation parameters database 230.

[0068] The application context database 628 may permit the recognition engine 613 to access historical information related to character or sequence selection within a particular application program. The application context database 628 may also provide application-specific dictionaries and/or application-specific policies and parameters that may override default disambiguation parameters stored in the disambiguation parameters database 630. Context can also come from text fields in which the information is supposed to be entered. As an example, in some implementations, the recognition engine may be designed to integrate with specific types of application programs that define application-specific fields, tags or labels that

may be associated with a particular word entry. The text-field of a form ("Name" or "Email") may be a label that could be utilized to provide context information. The application context database 628 may then correlate a user's historical word entries with application-specific field(s) to provide additional context information. The system may define, in the application context database, application-specific fields and rules (e.g., grammar rules, matching metrics and/or post-processing rules) that reflect how the field information and other context information may be utilized during word selection. These rules may even specify that word suggestions for a particular field can depend on what words a user has entered in other fields.

[0069] The system informs the recognition engine of the intended textual information of the field (name, phone number, date, email address, password) and/or provides it with a grammar which describes the information. For instance a form which requires State, ZIP and City to be entered would use an approach that would be able to provide appropriate grammars based on the context and content of the other fields. If the State is “WA”, the grammar for cities is constrained by actual cities in the State of Washington and ZIP codes are similarly constrained. When City and State are entered, the range of ZIP codes is again constrained. Complex interactions between fields and grammars can simplify the entry of data in such “forms”. Alternatively, the system can learn the context for often used text fields.

[0070] To illustrate the use of this context information, consider the example of form filling, where the recognition engine may remember what words users have entered in particular field(s). In this example, in an order form a user may enter his work email into an email field and then the recognition engine would predict that the shipping address field would contain his work address. In contrast, if he enters his personal email address into an email field, the recognition engine would predict his home address in the shipping address field.

[0071] Other contextual information includes environmental parameters, such as time of day, location, calendar entries, user settings, application settings and system settings.

[0072] While shown as separate databases, two or more of the databases described herein may be combined, and may be implemented in any data structure or logical construct.

[0073] The character selection submodule 618 and/or the sequence list selection submodule 620 may keep the user context database 626 and/or the application context database 228 current by providing notifications about a user's present behavior. For example, the sequence list selection submodule 620 may return information to these databases when a user selects a sequence from a sequence selection list.

[0074] Additionally, as described previously, the recognition engine 613 may also receive additional dynamic context data from the operating system and/or an application program. Although not shown, the recognition engine may additionally comprise voice recognition software configured to disambiguate speech or audio inputs, as described herein.

Suitable Disambiguation Methods

[0075] The flow diagrams described herein do not show all functions or exchanges of data, but instead provide an understanding of commands and data exchanged under the system. Those skilled in the relevant art will recognize that some functions or exchange of commands and data may be repeated, varied, omitted, or supplemented, and other (less important) aspects not shown may be readily implemented. Further, although process steps, method steps, blocks, algorithms or the like may be described in a particular order, such processes, methods, blocks and algorithms may be configured to work in alternate orders. In other words, any sequence or order described herein does not necessarily indicate a requirement that the steps or blocks be performed in that order. The steps or blocks of processes and methods described herein may be performed in any order practical, and some steps may be performed simultaneously.

[0076] Figure 7A shows a process 700 for disambiguating a series of user input data that may correspond to multi-modal user input in order to permit the selection of a sequence from a sequence choice list. The process 700 is performed by the

recognition engine 613 and begins at block 710, when the recognition engine 613 waits for and receives input data before proceeding to block 730. Typically, the recognition engine 613 receives input data in the form of one or more user input notifications or input events from the operating system, but it may also receive input data from other processes, such as an application program. For example, at block 710 the recognition engine may wait for and receive from the operating system a finger down notification, a finger move notification, and/or a finger up notification, each of which is accompanied by a set of (x,y,t) or (x,y,t,p) coordinates, where x is the x-position of a user's finger on the display, y is the y-position of the user's finger, t is the time or a clock reference for those inputs, and p is an optional pressure measurement (for a pressure sensitive screen). The recognition engine 613 may also wait for other forms of input data, such as voice inputs, accelerometer input, external sensor data, location information. Although not shown, at block 710, the recognition engine 613 may receive additional dynamic context data, e.g., from the operating system and/or an application program. For example, it may receive information about the type of application program or the context in which the user is entering text (e.g., the type of field in which the user is typing, e.g., a date field versus a name field).

[0077] The period of time that the recognition engine waits for and receives user input data may vary. For example, in one implementation, the recognition engine may wait to receive an entire group of notifications corresponding to (1) a finger down notification, (2) the next finger up notification, and (3) all of the finger move notifications that occur in between these first two notifications, before proceeding to block 730.

[0078] At block 740, the recognition engine utilizes the character selection submodule 618 to identify what input features (e.g., strokes, taps, corners, segments, hovers, audio inputs, etc.), if any, are indicated by the received input data. Furthermore, at block 740, the recognition engine utilizes the character selection submodule to generate a feature object for each identified input feature. A feature object includes a character, and may include other information, such as a feature type (or set of types), and a proximity weight (or weight set). Under block 740, the system stores an inputted character in the buffer.

[0079] During block 740, the character selection submodule may also characterize each identified input feature using one or more feature types. For example, the character selection submodule may characterize each input feature as a tap, a corner, a segment, a hover, etc. Additionally, the character selection submodule may also determine whether an identified input feature is an "intentional input feature" (or "intentional feature"). An intentional input feature is an input feature that appears more likely to correspond to an intended stroke by a user as compared to other types of input features. If a feature is not an intentional input feature, it is instead characterized as an "incidental input feature" (or "incidental feature"). When matching candidate sequences to input features, intentional input features may be treated differently (e.g. weighted higher) than incidental features, as described herein.

[0080] At block 750, the recognition engine may increment an estimated input length variable (L) to reflect the number of characters or new intentional input features, if any, that were identified at block 740. As described herein, the recognition engine may later use the estimated input length L to pre-filter dictionaries or for other purposes when generating a sequence choice list. Similarly, at block 750 the recognition engine may additionally update other variables that reflect the composition of the input sequence (e.g., a variable that reflects the number of segment features present in the input sequence).

[0081] At block 750, the recognition engine appends any newly generated characters to an input sequence, which is stored in the buffer. The characters in the input sequence are ordered on the basis of time.

[0082] Figure 7B shows a process 705 for creating a character sequence choice list using an input sequence of characters. The process 705 begins at block 772, where the character sequence list selection submodule loads, receives or accesses applicable disambiguation parameters; context data, including semi-static context data retrieved from the user context database and application context database and dynamic context data received from an operating system and/or application program; and language data, including, e.g., frequency data from a vocabulary module, user context database, and/or application context database. At block 774, the character sequence

list selection submodule ("sequence submodule" for short) loads applicable dictionaries from the vocabulary submodule using the context data, disambiguation parameters, and/or any flags (e.g., language selection flags). For example, the dictionaries used may be selected on the basis of the type of application program that will receive the output of the recognition engine. As another example, the dictionary used may be generated by analyzing the user's speech using voice recognition software or by analyzing another mode of user input. For example, the dictionary may be an N-best list generated by voice recognition software, handwriting recognition software, etc.

[0083] At block 776, the sequence submodule may pre-filter the dictionaries using some portion of the input character sequence, the estimated input length L and/or the context to generate a subgroup of sequences. As a first example, the sequence submodule may pre-filter the dictionary on the basis of estimated input length L. For example, the sequence submodule may filter out any character sequences that are shorter than L minus X, where X is determined using disambiguation parameters. As a second example, the sequence submodule may pre-filter the dictionary to a list of character sequences generated by voice recognition software. As a third example, if the dynamic context indicates that the user is typing in a name field, it may filter the dictionary to only include proper nouns. Of course, the sequence submodule may use a combination of these filtering techniques.

[0084] At block 778, the sequence submodule selects the next character sequence in the subgroup on the basis of language data, context, sequence length, and/or any other suitable factors. For example, the sequence submodule may sort the subgroup on the basis of frequency of use and present these character sequences in that order.

[0085] At block 780, the sequence submodule determines the matching score for the selected character sequence by evaluating a match metric using input sequence, context, sequence length, and language data. At decision block 782, the sequence submodule may determine if the sequence has a matching score that exceeds a minimum threshold value that is determined using disambiguation parameters. If it does, the character sequence is added to the sequence choice list at block 784 before the process proceeds to block 786. Otherwise processing proceeds directly to

block 786. The sequence submodule may eliminate poorly matching character sequences and provide a sequence list of fixed or minimum size. Alternatively block 782 may be eliminated from the sequence submodule.

[0086] At block 786, the sequence submodule determines if there are more sequences to process in the subgroup. If there are, the processing returns to block 778 so that another character sequence may be evaluated.

[0087] Otherwise, the process proceeds to block 788, where the sequence choice list is post-processed. For example, the sequence submodule may sort the list by matching score and/or by selecting one or more default character sequences that have the highest matching score. As another example, after sorting, the sequence submodule may group or adjust the ordering of sequences in a logical fashion to facilitate improved user browsing behavior. For example, the sequence submodule may rearrange the list to group together words that have the same root (e.g., "interest," "interesting," and "interestingly") to permit a user to scan the sequence choice list more rapidly. As yet another example, dynamic or static context data may be utilized at block 790 to adjust the list, e.g., to promote or demote particular words in the list and/or to otherwise adjust the order of the list. For example, if a user has utilized a particular word in the same application program before, that word may be promoted. As another example, the word submodule may promote words that end with a punctuation mark over words that have embedded punctuation marks. As yet another example, if more than one language dictionary was utilized to generate a word list or the recognition engine is otherwise providing bilingual integration (e.g., to accommodate a bilingual user), the post-processing may promote words in the primary language of the user and/or demote words in a secondary language of the user. The "primary language" of the user may be determined by language parameters or flags and/or by user context data from the user context database 626.

[0088] As still another example of post-processing, the recognition engine may promote or demote particular words based on application-specific field information and/or rules or grammar retrieved from the application context database.

[0089] In another example of post-processing, the recognition engine may determine whether the user is attempting to utilize a word that may not be listed or found in a standard dictionary, such as neologism like "podcast," or an uncommon proper noun. If it determines, based on typical character sequences in a language that the user may be attempting to enter an "unlisted" word that does not appear in the dictionary, it will make the unlisted word the default word, and provide the word choice list as an alternative suggestion. Otherwise, it may utilize a high-scoring word selected from the dictionary as the default word.

[0090] To illustrate, if the user crisply inputs the letters "podcast," the recognition engine may keep "podcast" as default word, despite the fact that it may not be in a standard English dictionary, since the character sequences (the combinations of "po," "ca," and "st," etc.) are frequently seen in the English language. On the other hand, if the user crisply taps out the letters "Pfsx," the recognition engine may assume that the user has made a misspelling (or traced sloppily with a finger or fingers) and will not select "pfsx" as the default word, since the combinations of "pf" "fs" and "sx" are all infrequently seen in the English language. Instead the recognition engine will select a dictionary word with a high matching score found during blocks 772-786.

[0091] At block 790 the sequence choice list is output to the user, e.g., via a sequence choice list area on a display or otherwise. Alternatively, the sequence choice list and/or a default sequence may be provided to another process (e.g., an application program) that does not need user intervention to select a word.

Conclusion

[0092] Unless the context clearly requires otherwise, throughout the description and the claims, the words “comprise,” “comprising,” and the like are to be construed in an inclusive sense, as opposed to an exclusive or exhaustive sense; that is to say, in the sense of “including, but not limited to.” As used herein, the terms "connected," "coupled," or any variant thereof means any connection or coupling, either direct or indirect, between two or more elements; the coupling or connection between the elements can be physical, logical, or a combination thereof. Additionally, the words

“herein,” “above,” "below," and words of similar import, when used in this application, refer to this application as a whole and not to any particular portions of this application. Where the context permits, words in the above Detailed Description using the singular or plural number may also include the plural or singular number respectively. The word "or," in reference to a list of two or more items, covers all of the following interpretations of the word: any of the items in the list, all of the items in the list, and any combination of the items in the list.

[0093] The above Detailed Description of examples of the disclosed technology is not intended to be exhaustive or to limit the disclosed technology to the precise form disclosed above. While specific examples for the disclosed technology are described above for illustrative purposes, various equivalent modifications are possible within the scope of the disclosed technology, as those skilled in the relevant art will recognize. For example, while processes or blocks are presented in a given order, alternative implementations may perform routines having steps, or employ systems having blocks, in a different order, and some processes or blocks may be deleted, moved, added, subdivided, combined, and/or modified to provide alternative or subcombinations. Each of these processes or blocks may be implemented in a variety of different ways. Also, while processes or blocks are at times shown as being performed in series, these processes or blocks may instead be performed or implemented in parallel, or may be performed at different times. Further any specific numbers noted herein are only examples: alternative implementations may employ differing values or ranges.

[0094] The teachings of the disclosed technology provided herein can be applied to other systems, not necessarily the system described above. The elements and acts of the various examples described above can be combined to provide further implementations of the disclosed technology. Some alternative implementations of the disclosed technology may include not only additional elements to those implementations noted above, but also may include fewer elements.

[0095] Any patents and applications and other references noted above, including any that may be listed in accompanying filing papers, are incorporated herein by reference. Aspects of the disclosed technology can be modified, if necessary, to

employ the systems, functions, and concepts of the various references described above to provide yet further implementations of the disclosed technology.

[0096] These and other changes can be made to the disclosed technology in light of the above Detailed Description. While the above description describes certain examples of the disclosed technology, and describes the best mode contemplated, no matter how detailed the above appears in text, the disclosed technology can be practiced in many ways. Details of the system may vary considerably in its specific implementation, while still being encompassed by the disclosed technology disclosed herein. As noted above, particular terminology used when describing certain features or aspects of the disclosed technology should not be taken to imply that the terminology is being redefined herein to be restricted to any specific characteristics, features, or aspects of the disclosed technology with which that terminology is associated. In general, the terms used in the following claims should not be construed to limit the disclosed technology to the specific examples disclosed in the specification, unless the above Detailed Description section explicitly defines such terms.

CLAIMS

I/We claim:

1. A method for data input on a touchscreen of a mobile device, the method comprising:

receiving a first user input,

wherein the first user input is handwritten input received on the touchscreen of the mobile device;

determining a first recognized sequence based on the first user input;

wherein the first recognized sequence is a best match of the first user input;

writing the first recognized sequence to a memory storage buffer of the mobile device;

generating a first candidate sequence,

wherein the first candidate sequence is a best match of one or more recognized sequences;

presenting the first candidate sequence to the user,

wherein the presenting includes displaying the first candidate sequence to the user and allowing the user to edit the first candidate sequence;

identifying at least a first sequence portion of the first candidate sequence

wherein the identifying is at least partially based on one or more rules or dictionaries of words accessible to the mobile device;

removing the first sequence portion from the memory storage buffer,

wherein the removing is performed in the absence of receiving user input–

(i) editing the first candidate sequence, or

(ii) representing a space character or,

(iii) selecting a word; and

sending the first sequence portion to an application running on the mobile device.

2. The method of claim 1, further comprising:

receiving at least a second user input;

determining a second recognized sequence based on the second user input; and

revising the first candidate sequence, wherein the revised first candidate sequence is based on the first recognized sequence and the second recognized sequence.

3. The method of claim 1, further comprising:

determining at least a second candidate sequence based on the first user input; and

presenting at least the second candidate sequence to the user.

4. The method of claim 1 wherein the identifying is based on linguistic properties of the first user input and the first candidate sequence, and a probability of future editing of the first sequence portion by the user.

5. The method of claim 4, wherein the removing is performed when the probability is less than a predetermined amount.

6. The method of claim 1, wherein the first sequence portion is removed from the memory storage buffer a predetermined time after second user input is received.

7. The method of claim 1, wherein thedictionaries of words include words in Chinese, Japanese, or Korean languages..

8. The method of claim 1, wherein the first user input includes at least one of a Chinese character, a Japanese character, or a Korean character.

9. At least one computer-readable storage medium storing instructions for data input, wherein the data input is performed at a wireless device having a processor and a memory, comprising:

receiving a first user input and at least a second user input;

wherein the first and second user input are handwritten input received on a handwriting input area of the wireless device;

determining a first sequence based on a best match of the first and second user inputs,

wherein the first sequence includes at least the first input;

storing the first sequence to a memory of the mobile device;

automatically determining that at least a portion of the sequence matches a word or phrase in a database of acceptable words and/or phrases without the user inputting a space or selecting a word; and

sending the first sequence to an application or service running on, or accessible by, the wireless device,

wherein the sending comprises removing the first sequence from the memory storage buffer, and

wherein the sending is performed in the absence of user editing of the first sequence.

10. The computer readable medium of claim 9, further comprising:

determining at least a second sequence based on the first user input and the second user input;

presenting the second sequence to the user;

11. The computer readable medium of claim 9, wherein the first sequence is sent to the application or service a predetermined time after the first user input is received in the absence of user editing of the first sequence.

12. The computer readable medium of claim 9, further comprising:

presenting the first sequence to the user,

wherein the presenting includes displaying the first sequence to the user and allowing the user to edit the first sequence

13. The computer readable medium of claim 9, wherein the first user input and the second user input include at least one of a Chinese character, a Japanese character, or a Korean character.

14. A data processing apparatus, comprising:

at least one processor;

at least one memory coupled to the processor;

data input and data output components coupled to the processor,

wherein the data output component includes a visual display device; and

wherein the data input component includes at least an area for receiving hand written character input;

wherein the data processing apparatus is configured to –

receive first character data representing a first handwritten character input to the data input component;

determine a likely first displayable character associated with the first character data;

store the likely first character data in the memory;

receive second character data representing a second handwritten character input to the data input component;

determine a likely second displayable character associated with the second character data;

store the likely second character data in the memory;

receive third character data representing a third handwritten character input to the data input component;

determine a likely third displayable character associated with the third character data;

store the likely third character data in the memory;

determine a final value for at least the likely first character based on the likely first, likely second and likely third character data stored in the memory,

wherein determining the final value is performed without the user inputting a space gesture or selecting a button to accept the likely first character, and

wherein determining the final value is performed by comparing the likely first, second and third characters to a linguistic database; and,

remove the likely first data character from the memory after determining the final value for at least the first character.

15. The apparatus of claim 14, wherein the input and output components are a touch-sensitive display,

wherein the first character data is received on a select area of the touch-sensitive display, and

wherein the second and third character data are sequentially received on the same area of the touch-sensitive display.

16. The apparatus of claim 14, wherein the likely first, second and third characters are Asian characters, and wherein the likely first character can be edited until it is removed from the memory.

17. The apparatus of claim 14, wherein the likely first and second characters are displayed on the display component before receiving the third character data, and wherein the determining comprises determining whether the received third character data represents punctuation.

18. The apparatus of claim 14, wherein the memory stores first and second words for comparison with the linguistic database, and wherein a determined final first

word is removed from the memory when the first and second words acceptably match a phrase in the linguistic database.

19. The apparatus of claim 14, further comprising a recognition engine, wherein the recognition engine and the linguistic database are stored in the memory, and wherein the recognition engine is a software module configured to perform at least the determining of a likely displayable character based on a received handwritten character.

20 The apparatus of claim 14, further comprising:

a portable power source;

a wireless transceiver; and

a touch-sensitive display.

ABSTRACT

A system and method for receiving character input from a user includes a programmed processor that receives inputs from the user and disambiguates the inputs to present character sequence choices corresponding to the input characters. In one embodiment, a first character input is received and a corresponding first recognized character is stored in a temporary storage buffer and displayed to the user for editing. After a predetermined number of subsequent input characters and/or predetermined amount of time without being edited, the system determines that the first recognized character is the intended character input by the user and removes the first recognized character from the buffer, thereby inhibiting future editing.

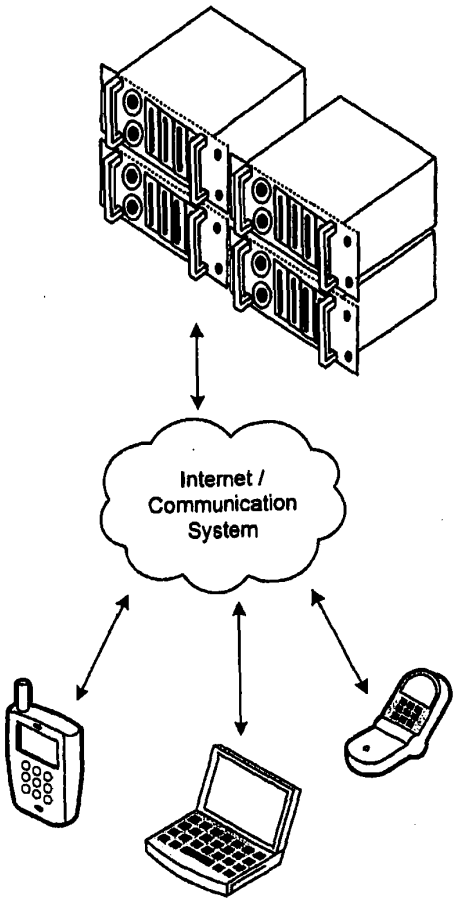


FIG. 1

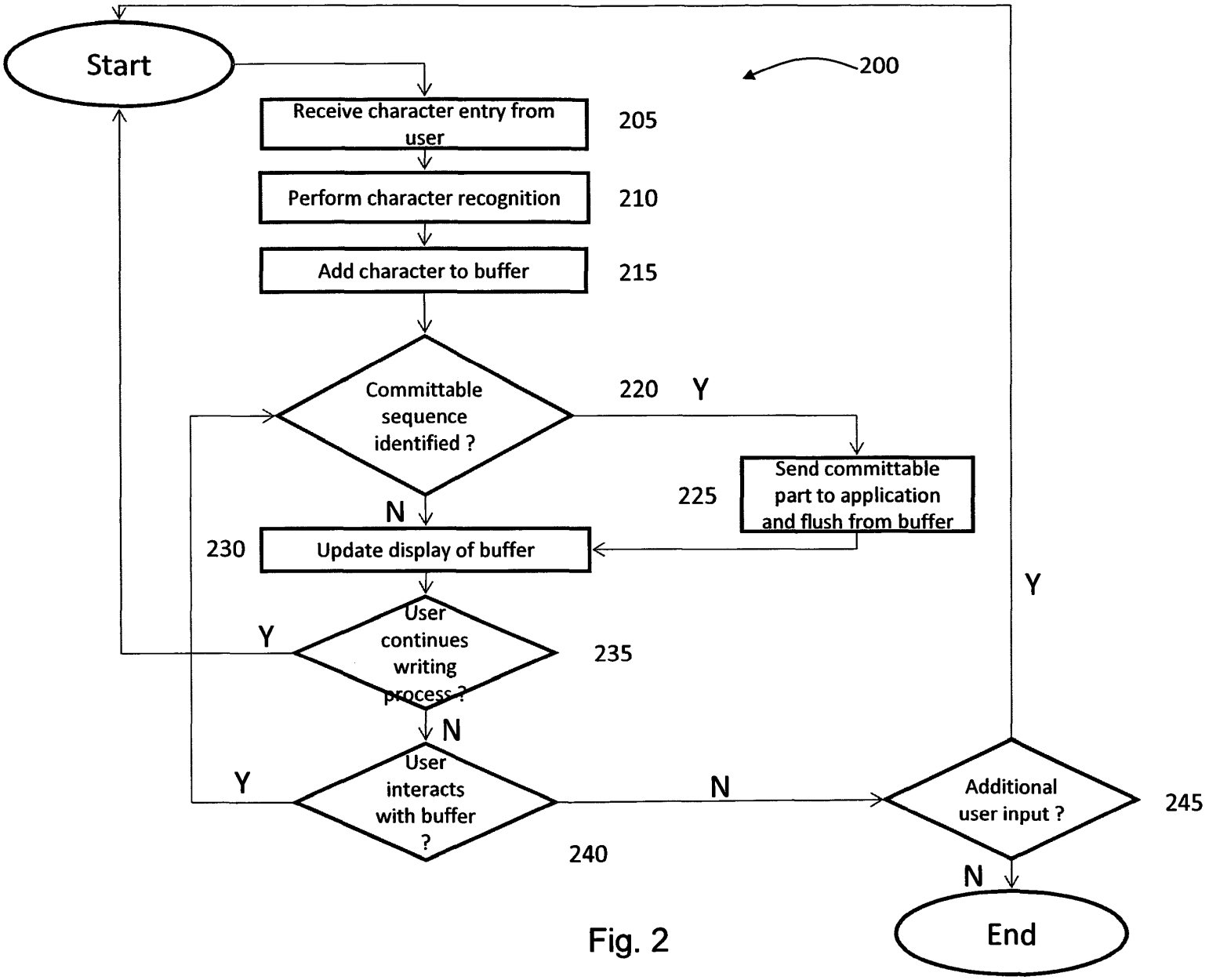

Start
200
Receive character entry from user
205
Perform character recognition
210
Add character to buffer
215
Committable sequence identified ?
220
Y
N
Send committable part to application and flush from buffer
225
Update display of buffer
230
User continues writing process ?
235
Y
N
User interacts with buffer ?
240
Y
N
Additional user input ?
245
Y
N
End

Fig. 2

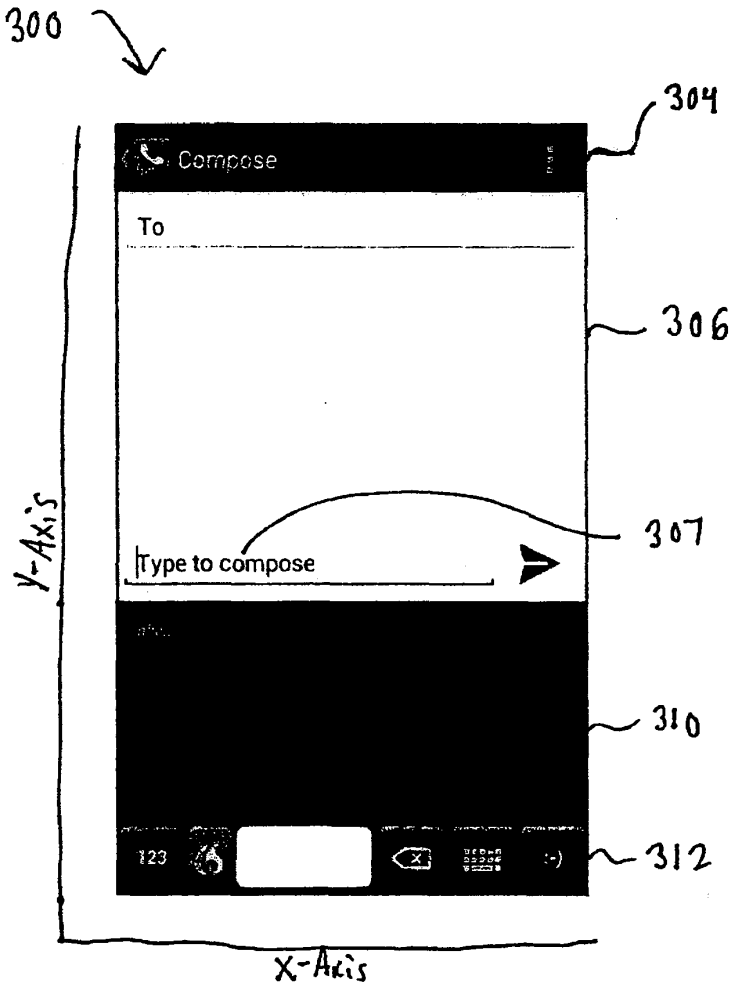


Figure 3A

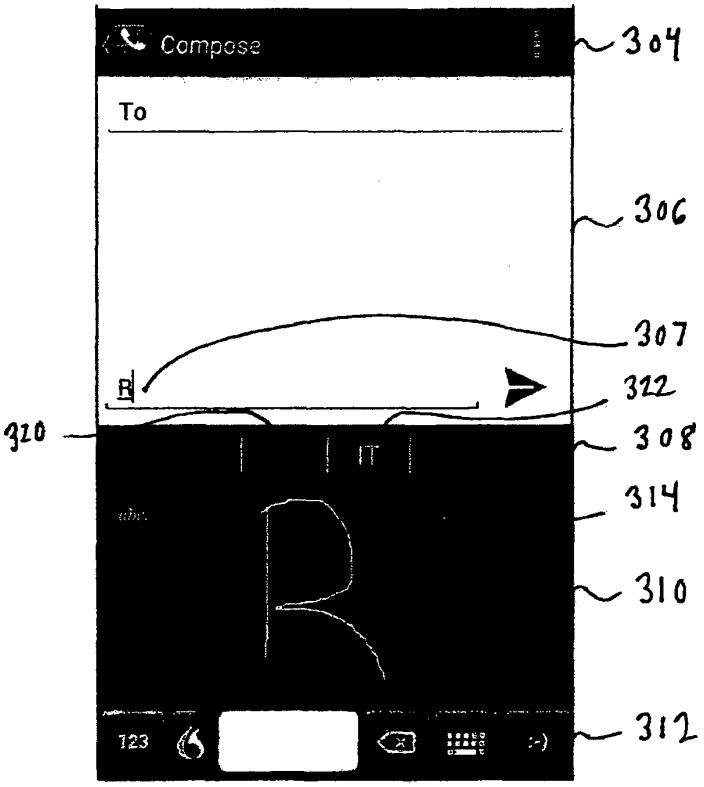


Figure 3B

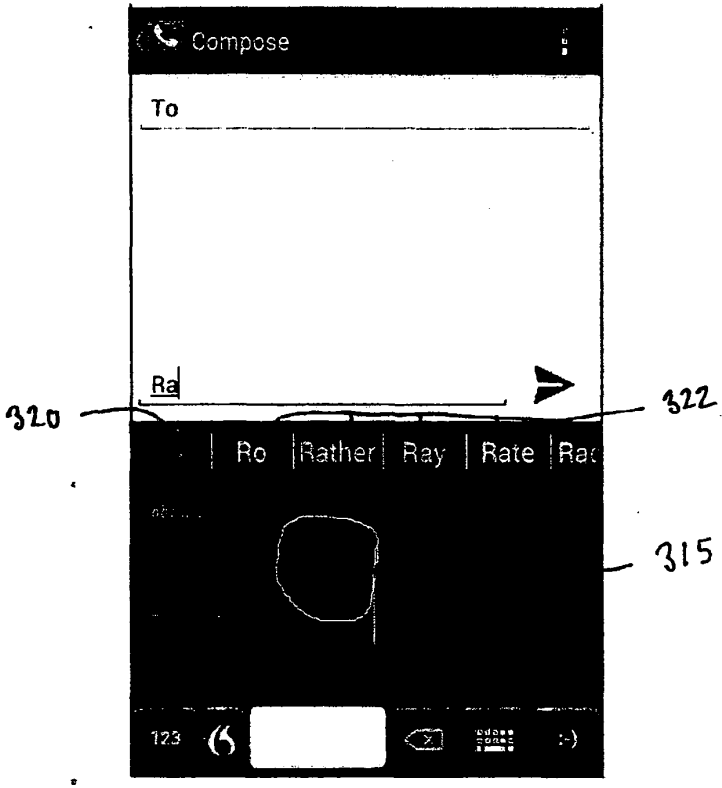


Figure 3C

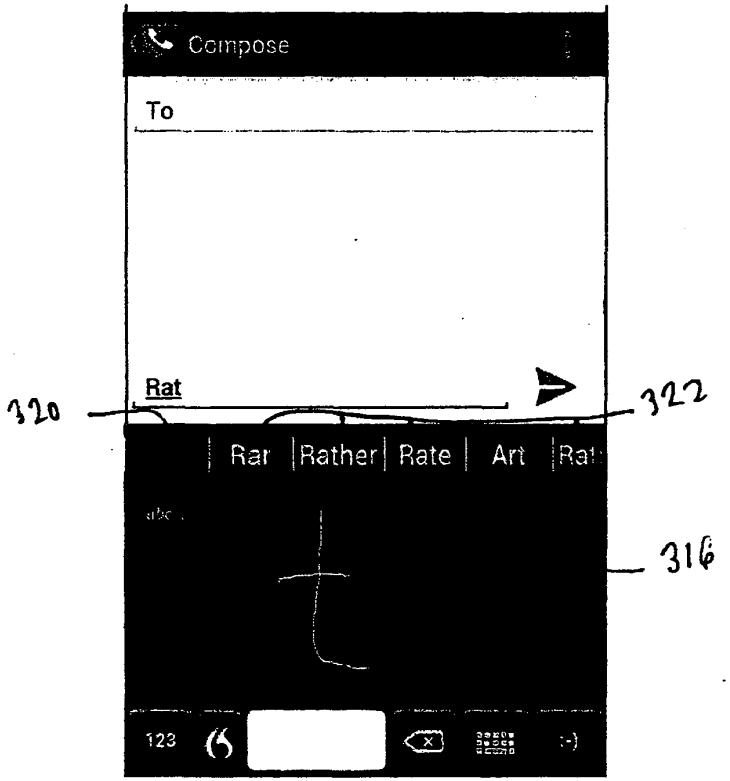


Figure 3D

Exhibit 1004
Page 053 of 435

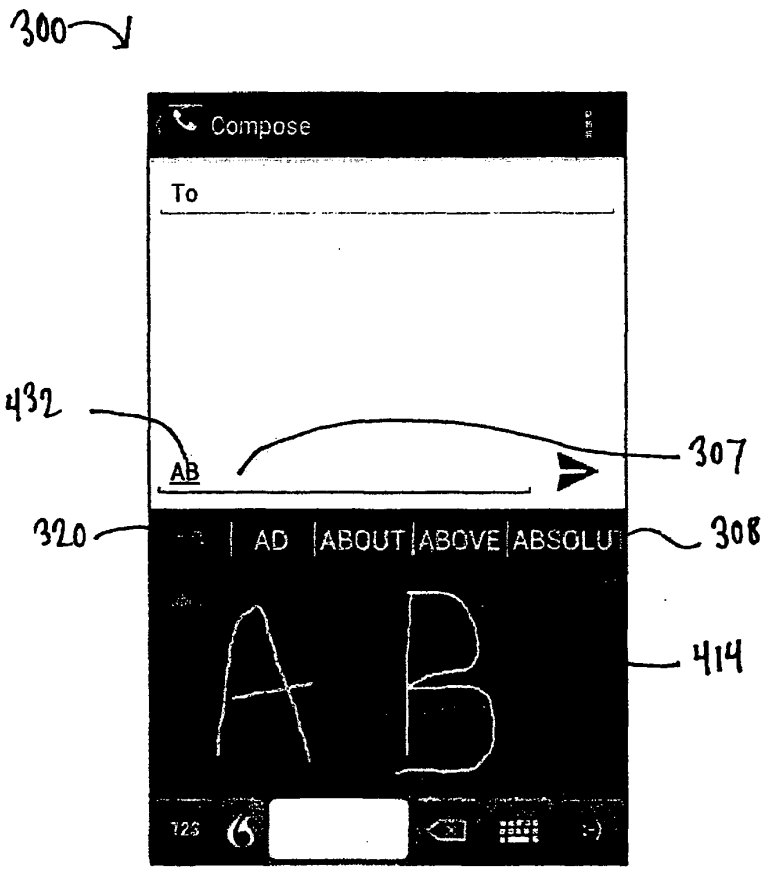


Figure 4A

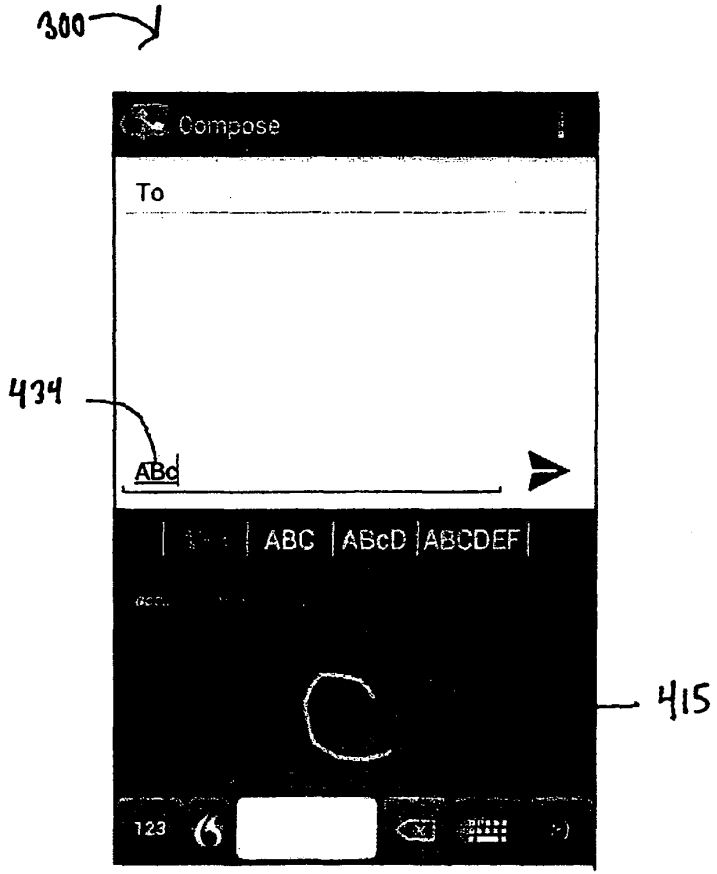


Figure 4B

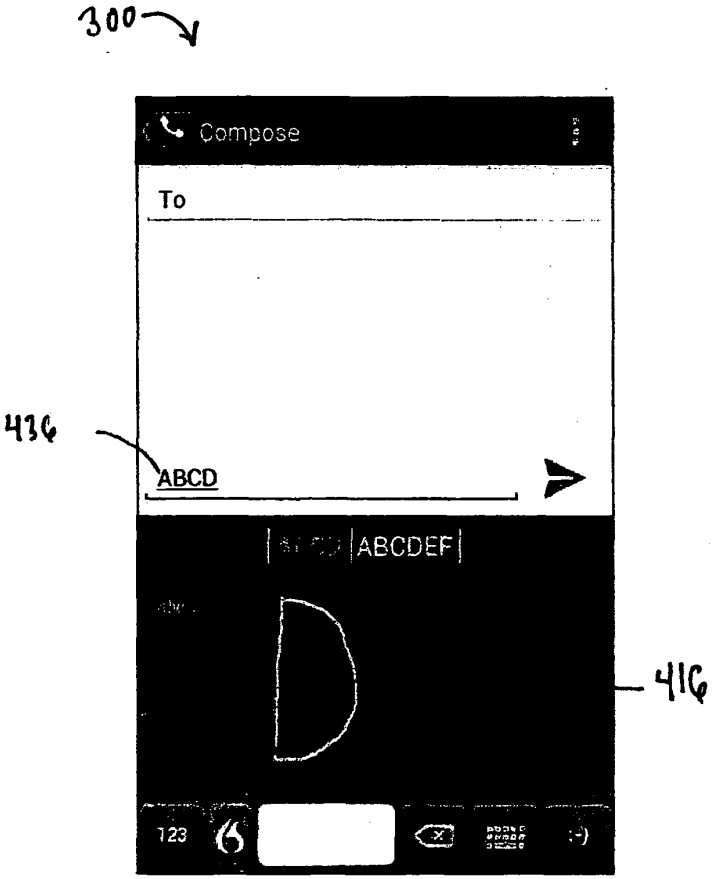


Figure 4C

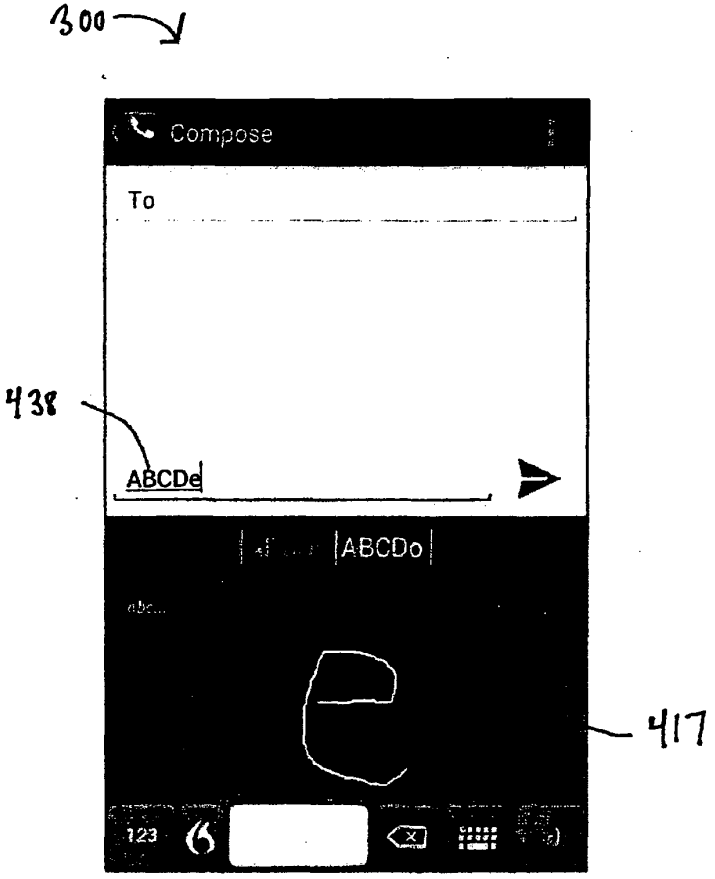


Figure 4D

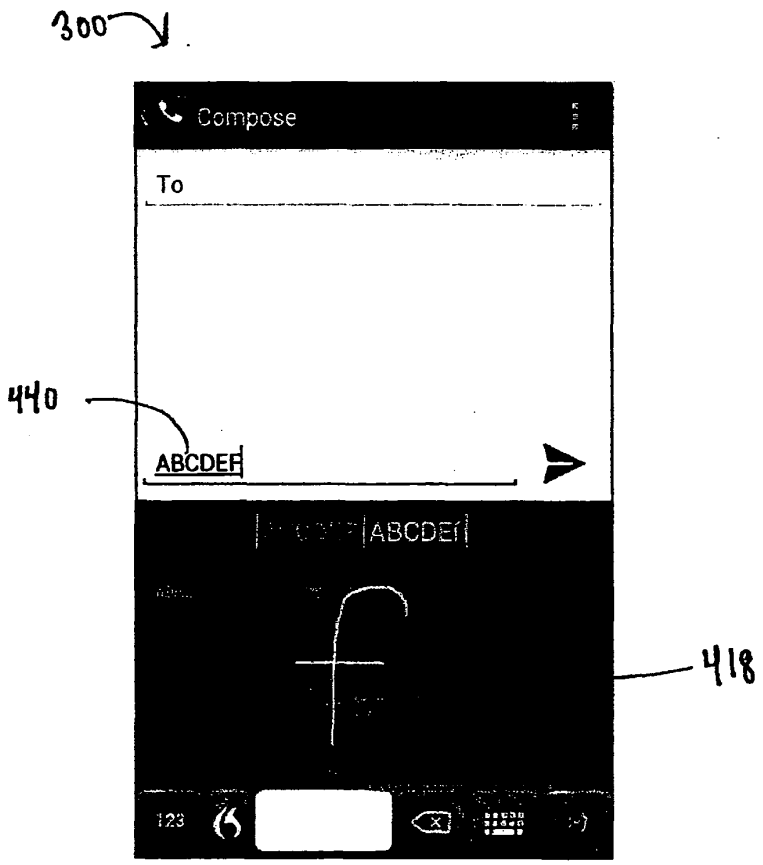


Figure 4E

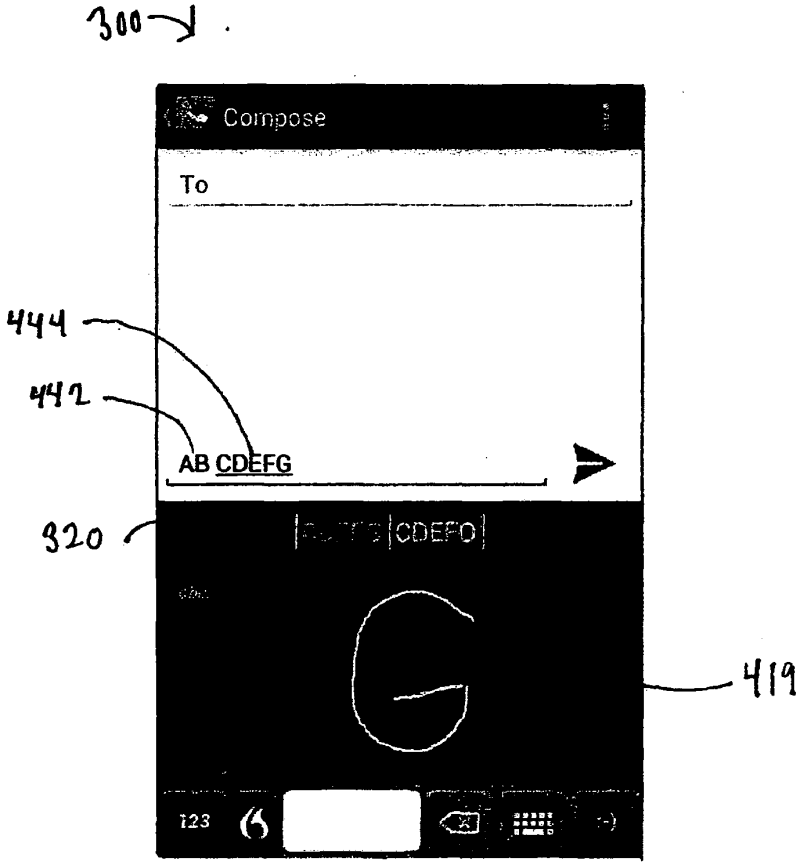


Figure 4F

Exhibit 1004
Page 056 of 435

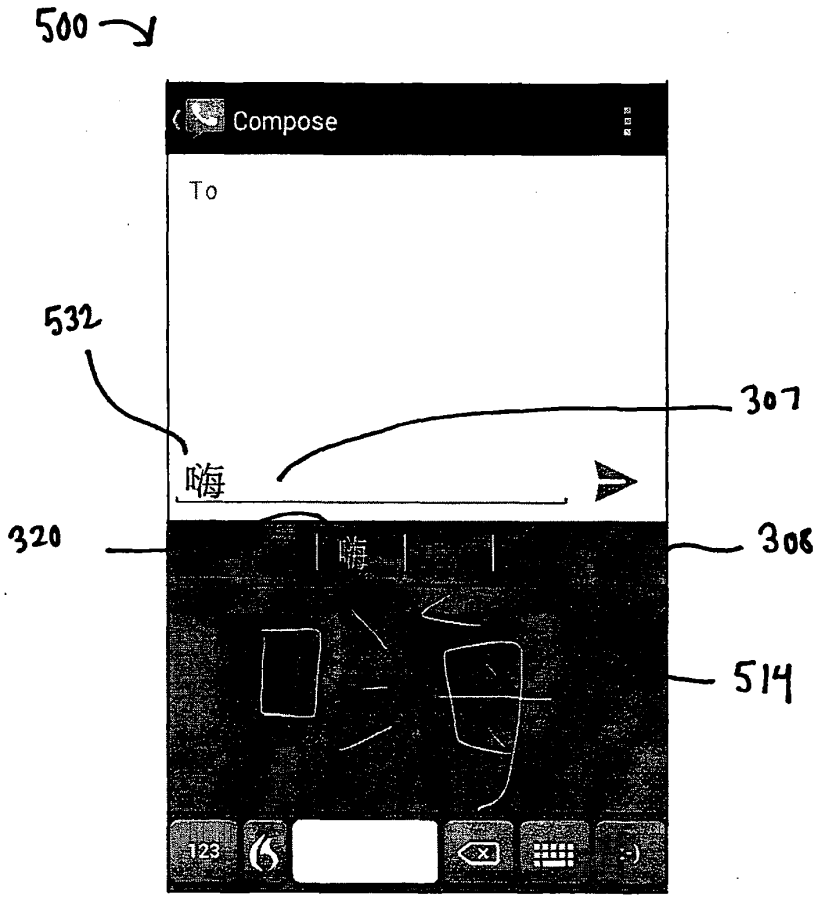


Figure 5A

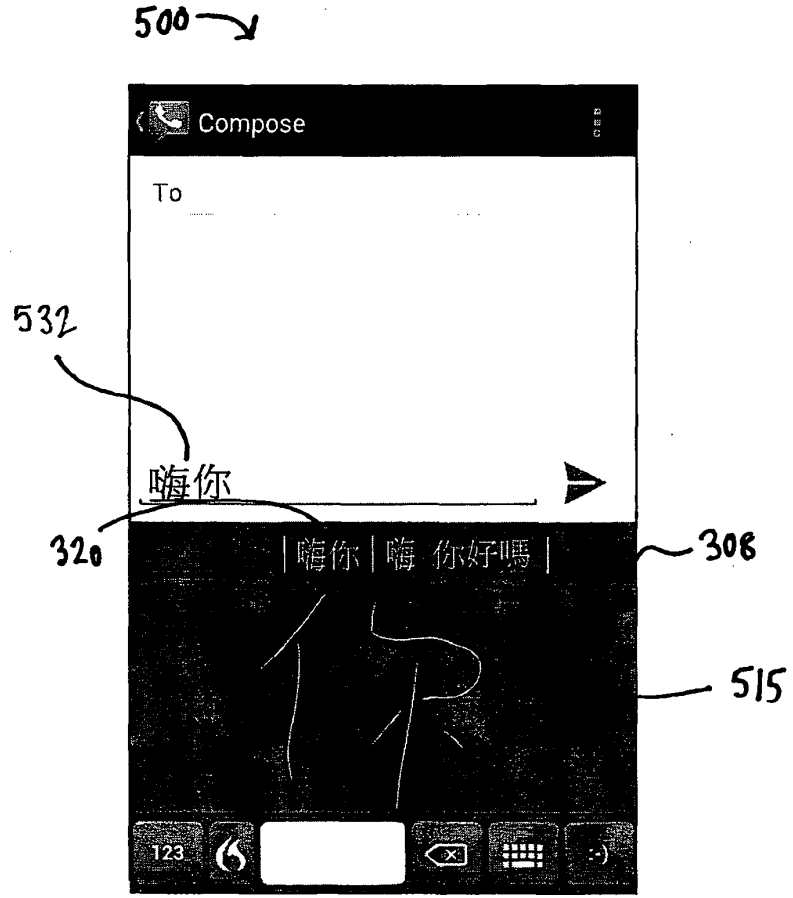


Figure 5B

Exhibit 1004
Page 057 of 435

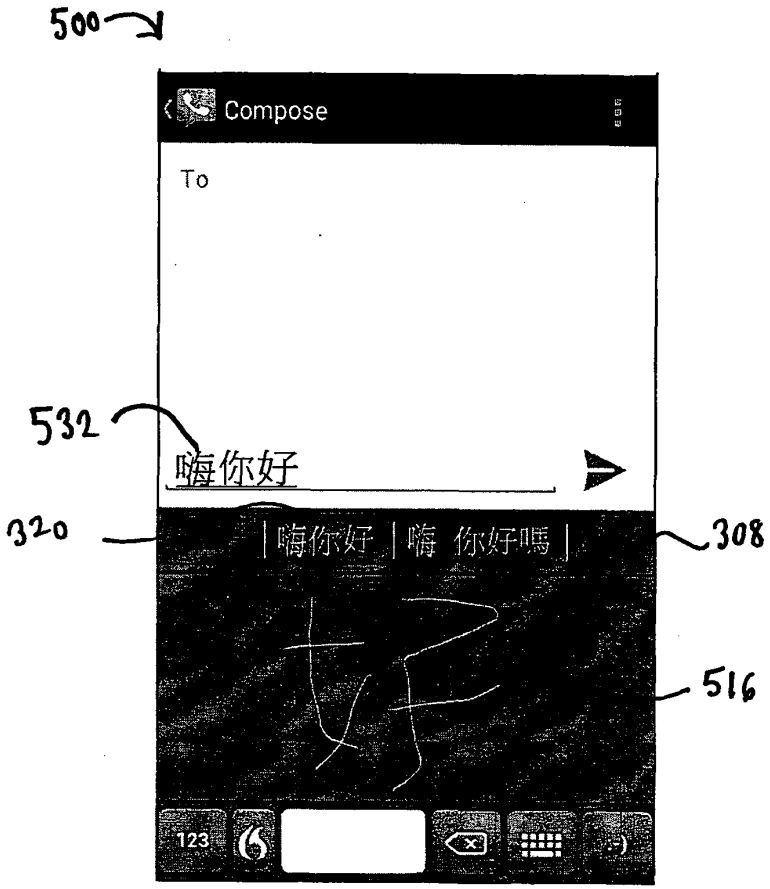


Figure 5C

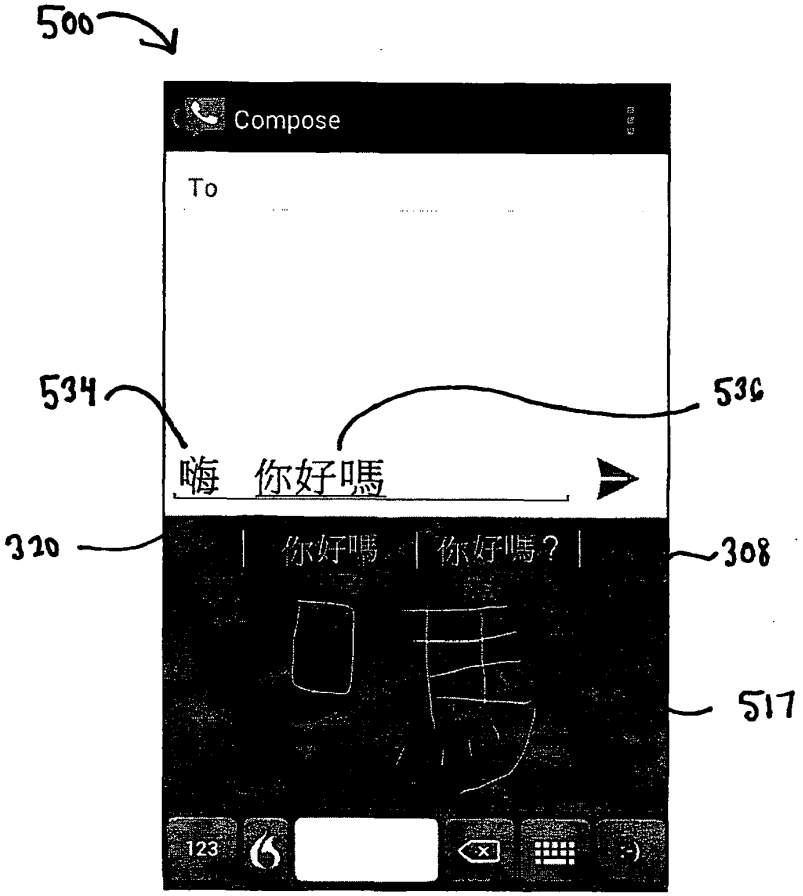


Figure 5D

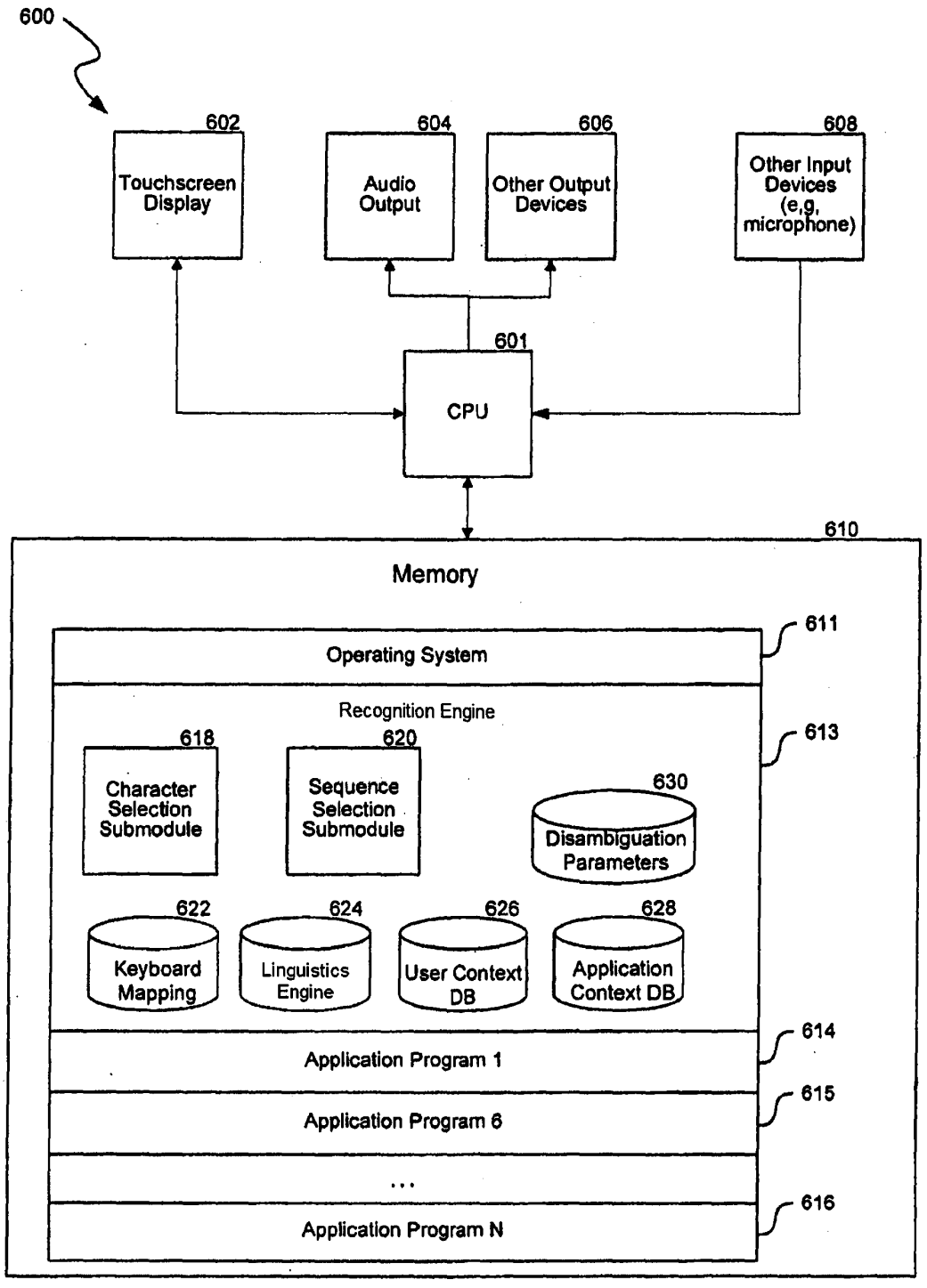

600
602
Touchscreen Display
604
Audio Output
606
Other Output Devices
608
Other Input Devices (e,g, microphone)
601
CPU
610
Memory
611
Operating System
Recognition Engine
613
618
Character Selection Submodule
620
Sequence Selection Submodule
630
Disambiguation Parameters
622
Keyboard Mapping
624
Linguistics Engine
626
User Context DB
628
Application Context DB
614
Application Program 1
615
Application Program 6
...
616
Application Program N

FIG. 6

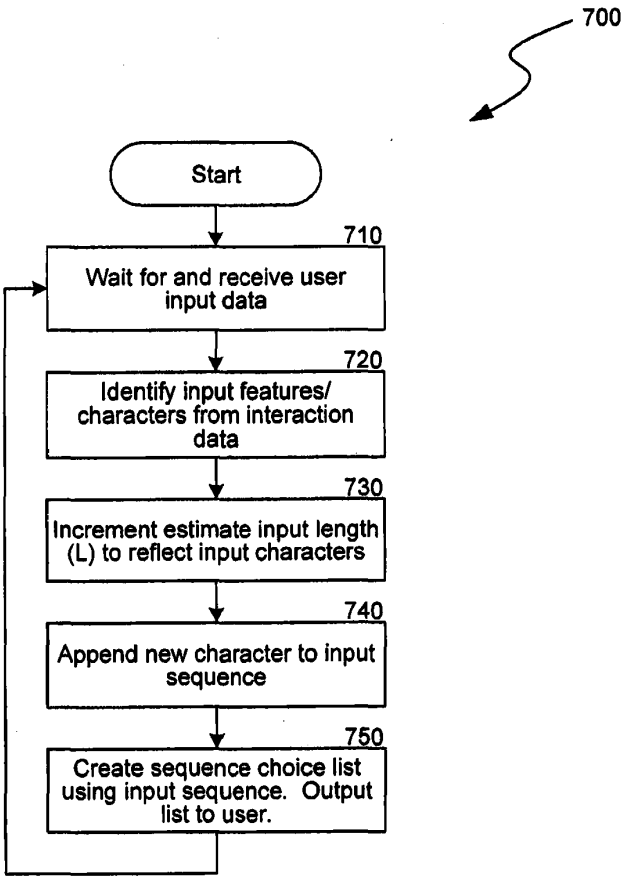

700
Start
710
Wait for and receive user input data
720
Identify input features/ characters from interaction data
730
Increment estimate input length (L) to reflect input characters
740
Append new character to input sequence
750
Create sequence choice list using input sequence. Output list to user.

FIG. 7A

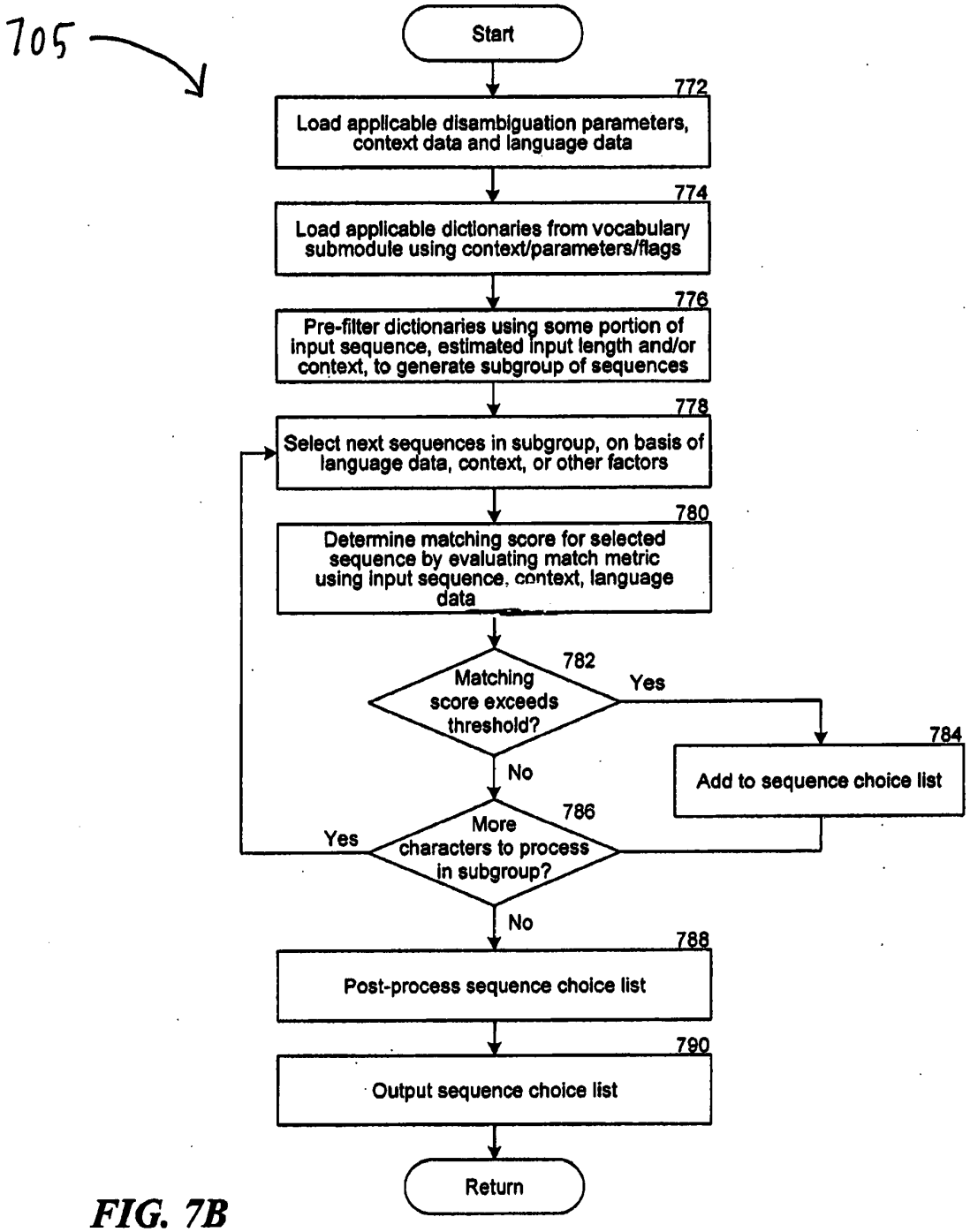

705
Start
772
Load applicable disambiguation parameters, context data and language data
774
Load applicable dictionaries from vocabulary submodule using context/parameters/flags
776
Pre-filter dictionaries using some portion of input sequence, estimated input length and/or context, to generate subgroup of sequences
778
Select next sequences in subgroup, on basis of language data, context, or other factors
780
Determine matching score for selected sequence by evaluating match metric using input sequence, context, language data
782
Matching score exceeds threshold?
Yes
784
Add to sequence choice list
No
786
More characters to process in subgroup?
Yes
No
788
Post-process sequence choice list
790
Output sequence choice list
Return

FIG. 7B

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES
First Named Inventor/Applicant Name:	Jakob Sternby
Filer:	Maurice J. Pirio/Sandy Reisman
Attorney Docket Number:	71007-8061.US00

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility application filing	1011	1	390	390
Utility Search Fee	1111	1	620	620
Utility Examination Fee	1311	1	250	250
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**1260**

Electronic Acknowledgement Receipt

EFS ID:	13990000
Application Number:	13652222
International Application Number:	
Confirmation Number:	4390
Title of Invention:	TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES
First Named Inventor/Applicant Name:	Jakob Sternby
Customer Number:	105412
Filer:	Maurice J. Pirio/Sandy Reisman
Filer Authorized By:	Maurice J. Pirio
Attorney Docket Number:	71007-8061.US00
Receipt Date:	15-OCT-2012
Filing Date:	
Time Stamp:	18:36:15
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$1260
RAM confirmation Number	6662
Deposit Account	500665
Authorized User	BELLO, RYAN M.

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

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

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)					
File Listing:					
Document Number	**Document Description**	**File Name**	**File Size(Bytes)/ Message Digest**	**Multi Part /.zip**	**Pages (if appl.)**
1		Nuance-8061US-Transmittals.pdf	2413348 7859511b9820726c26ce44edd41149d5ec1ad8fd	yes	9
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Transmittal of New Application		1	1	
	Fee Worksheet (SB06)		2	2	
	Authorization for Extension of Time all replies		3	3	
	Application Data Sheet		4	9	
Warnings:					
Information:					
2		Nuance-8061US-AP.pdf	202433 a504cc21081b0257a3d15bc6bbdc059bbec52197	yes	39
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Specification		1	32	
	Claims		33	38	
	Abstract		39	39	
Warnings:					
Information:					
3	Drawings-only black and white line drawings	Nuance-8061US-Drawings.pdf	490959 1d84797dfd2fd97ac48f0646c36fc9149807d3aa	no	12
Warnings:					
The page size in the PDF is too large. The pages should be 8.5 x 11 or A4. If this PDF is submitted, the pages will be resized upon entry into the Image File Wrapper and may affect subsequent processing					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	33502 d49fcbb0254e4f513ae5b5a515368cb980e30cdb	no	2
Warnings:					

Information:	
Total Files Size (in bytes):	3140242

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

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

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

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United States Patent and Trademark Office
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www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/652,222	10/15/2012	Jakob Sternby	710078061US

CONFIRMATION NO. 4390

105412
Perkins Cole LLP- Nuance
P.O. Box 1247
Seattle, WA 98111-1247

FORMALITIES LETTER

OC000000057372251

Date Mailed: 11/05/2012

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- A mailing address for each inventor has not been submitted. A new application data sheet (ADS) in compliance with 37 CFR 1.76 or inventor's oath or declaration in compliance with 37 CFR 1.63 identifying the mailing address and residence (if the inventor lives at a location which is different from where the inventor customarily receives mail) is required.

The applicant needs to satisfy supplemental fees problems indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- A surcharge (for late submission of the basic filing fee, search fee, examination fee or inventor's oath or declaration) as set forth in 37 CFR 1.16(f) of $ **130** for a non-small entity, must be submitted.

SUMMARY OF FEES DUE:

Total fee(s) required within **TWO MONTHS** from the date of this Notice is $ **130** for a non-small entity
- $ **130** Surcharge.

Items Required To Avoid Processing Delays:

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

A new oath or declaration, identifying this application number, or, if appropriate, an application data sheet (37 CFR 1.76), is required. The oath or declaration does not comply with 37 CFR 1.63 in that it:

- does not identify the complete mailing or post office address of each inventor.

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):
  all
  Applicant may submit the inventor's oath or declaration at any time before the Notice of Allowance and Fee(s) Due, PTOL-85, is mailed.

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Commissioner for Patents
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Alexandria VA 22313-1450

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https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html

For more information about EFS-Web please call the USPTO Electronic Business Center at **1-866-217-9197** or visit our website at http://www.uspto.gov/ebc.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

/bnguyen/

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

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 13/652,222

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	390
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	620
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	250
TOTAL CLAIMS (37 CFR 1.16(i))	20 minus 20 =	*			OR	x 62 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*				x 250 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	1260

APPLICATION AS AMENDED - PART II

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

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

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

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

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

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

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
13/652,222	10/15/2012	2819	1260	710078061US	20	3

CONFIRMATION NO. 4390

105412
Perkins Cole LLP- Nuance
P.O. Box 1247
Seattle, WA 98111-1247

FILING RECEIPT

OC000000057372250

Date Mailed: 11/05/2012

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Jakob Sternby, Residence Not Provided;
Jonas Morwing, Residence Not Provided;
Jonas Andersson, Residence Not Provided;
Christar Friberg, Residence Not Provided;

Applicant(s)

Nuance Communications, Inc., Burlington, MA

Assignment For Published Patent Application

Nuance Communications, Inc., Burlington, MA

Power of Attorney: None

Domestic Priority data as claimed by applicant

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)

If Required, Foreign Filing License Granted: 10/31/2012

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/652,222**

Projected Publication Date: To Be Determined - pending completion of Missing Parts

Non-Publication Request: No

Early Publication Request: No

Title

TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES

Preliminary Class

326

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

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

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For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

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Title 37, Code of Federal Regulations, 5.11 & 5.15

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

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage, facilitate, and accelerate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

Docket No.: 710078061US
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Sternby et al.

Application No.: 13/652,222 | Confirmation No.: 4390

Filed: October 15, 2012 | Art Unit: 2819

For: TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES | Examiner: Not Yet Assigned

RESPONSE TO NOTICE TO FILE MISSING PARTS OF APPLICATION

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

Madam:

In response to the Notice to File Missing Parts of Application – Filing Date Granted mailed November 5, 2012, Applicant respectfully submits four Declarations, a Power of Attorney, twelve sheets of replacement drawings (Figures 1-7B), and a Supplemental Application Data Sheet.

Please charge our Credit Card in the amount of $130.00 covering the fee set forth in 37 CFR § 1.16(f). The Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith

(or with any paper hereafter filed in this application by this firm) to our Deposit Account No. 50-0665, under Order No. 710078061US.

Dated: December 20, 2012

Respectfully submitted,

By _____

Ryan M. Bello
Registration No.: 67,556
PERKINS COIE LLP
P.O. Box 1247
Seattle, Washington 98111-1247
(206) 359-8000
(206) 359-7198 (Fax)
Attorney for Applicant

DECLARATION (37 C.F.R. § 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 C.F.R. § 1.76)

Title of Invention	TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES

As the below named inventor, I declare that:

This declaration is directed to:

☐ The attached application, or

☒ United States application or PCT international application number 13/652,222 filed on October 15th, 2012

☐ As amended on _____ (if applicable);

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

I believe the inventor(s) named below to be the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought.

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

I have reviewed and understand the contents of the above-identified application, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in 37 C.F.R. § 1.56.

All statements made herein of my own knowledge are true, and all statements made herein on information and belief are believed to be true.

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

LEGAL NAME OF SOLE OR FIRST INVENTOR

Inventor one: Jakob Sternby Date: November 8th, 2012

Signature: Jakob Sternby Citizen of: Sweden

LEGAL NAME OF ADDITIONAL JOINT INVENTOR, if any

Inventor two: Lars Jonas Morwing Date: _____

Signature: _____ Citizen of: Sweden

LEGAL NAME OF ADDITIONAL JOINT INVENTOR, if any

Inventor three: Jonas Andersson Date: _____

Signature: _____ Citizen of: Sweden

LEGAL NAME OF ADDITIONAL JOINT INVENTOR, if any

Inventor four: Christer Friberg Date: _____

Signature: _____ Citizen of: Sweden

☐ Additional inventors are being named on _____ additional form(s) attached hereto.

DECLARATION (37 C.F.R. § 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 C.F.R. § 1.76)

Title of Invention	TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES

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☐ As amended on _____ (if applicable);

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

LEGAL NAME OF SOLE OR FIRST INVENTOR

Inventor one: Jakob Sternby Date: _____

Signature: _____ Citizen of: Sweden

LEGAL NAME OF ADDITIONAL JOINT INVENTOR, if any

Inventor two: Lars Jonas Morwing Date: Nov-8-2012

Signature: _____ Citizen of: Sweden

LEGAL NAME OF ADDITIONAL JOINT INVENTOR, if any

Inventor three: Jonas Andersson Date: _____

Signature: _____ Citizen of: Sweden

LEGAL NAME OF ADDITIONAL JOINT INVENTOR, if any

Inventor four: Christer Friberg Date: _____

Signature: _____ Citizen of: Sweden

☐ Additional inventors are being named on _____ additional form(s) attached hereto.

DECLARATION (37 C.F.R. § 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 C.F.R. § 1.76)

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I have reviewed and understand the contents of the above-identified application, including the claims, as amended by any amendment specifically referred to above.

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LEGAL NAME OF SOLE OR FIRST INVENTOR

Inventor one: Jakob Sternby Date: _____

Signature: _____ Citizen of: Sweden

LEGAL NAME OF ADDITIONAL JOINT INVENTOR, if any

Inventor two: Lars Jonas Morwing Date: _____

Signature: _____ Citizen of: Sweden

LEGAL NAME OF ADDITIONAL JOINT INVENTOR, if any

Inventor three: Jonas Andersson Date: November 8, 2012

Signature: _____ Citizen of: Sweden

LEGAL NAME OF ADDITIONAL JOINT INVENTOR, if any

Inventor four: Christer Friberg Date: _____

Signature: _____ Citizen of: Sweden

☐ Additional inventors are being named on _____ additional form(s) attached hereto.

PTO/SB/80 (11-08)
Approved for use through 11/30/2011. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

POWER OF ATTORNEY 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:

[X] Practitioners associated with the Customer Number: 105412

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:

[X] The address associated with Customer Number: 105412

OR

[ ] Firm or Individual Name

Address					
City		State		Zip	
Country		Telephone		Email	

Assignee Name and Address:

Nuance Communications, Inc.
1 Wayside Road
Burlington, Massachusetts 01803

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	5/24/2012
Name	Leanne J. Fitzgerald	Telephone	
Title	Associate General Counsel Intellectual Property		

71007-8000/LEGAL17487326.1

PTO/AIA/96 (08-12)
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STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Sternby et al.

Application No./Patent No.: 13/652,222 Filed/Issue Date: October 15, 2012

Titled: TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES

Nuance Communications, Inc. (Name of Assignee) , a Corporation (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. [X] 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 evidence by either (choose **one** of options A or B below):

A. [X] 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: _____ To: _____
      The document was recorded in the United States Patent and Trademark Office at
      Reel _____, Frame _____, or for which a copy thereof is attached.

   2. From: _____ To: _____
      The document was recorded in the United States Patent and Trademark Office at
      Reel _____, Frame _____, or for which a copy thereof is attached.

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____
The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

4. From: _____ To: _____
The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____
The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____
The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

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

☒ As required by 37 CFR 3.73(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.

/R. M. B./	December 20, 2012
Signature	Date
Ryan M. Bello, Reg. No. 67,556	Attorney for Assignee
Printed or Typed Name	Title or Registration Number

ASSIGNMENT

For good and valuable consideration, the receipt of which is hereby acknowledged, and in fulfillment of my employment agreement, I , the undersigned Assignor, hereby:

1. Sell, assign and transfer to Nuance Communications, Inc., a Delaware Corporation having a place of business at One Wayside Road; Burlington, Massachusetts 01803, its successors, assigns and legal representatives, all hereinafter referred to as the Assignee, my entire right, title and interest for the United States and all foreign countries, in and to any and all inventions and designs which are disclosed in the application for United States Letters Patent filed on **October 15th, 2012** in the United States Patent and Trademark Office herewith, bearing US Application No. **13/652,222** and Attorney Docket No.**71007-8061US00**, and entitled **TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES**, and in and to the application and all corresponding provisional, non-provisional, divisional, continuing, substitute, renewal, reissue and all other applications for Letters Patent, utility models, industrial designs or similar intellectual property rights which have been or shall be filed in the United States, internationally, and in any foreign country, including but not limited to China, Japan and Korea, on any of the inventions; and in and to all original and reissued patents which have been or shall be issued in the United States or any other jurisdiction on the inventions, including the right to apply for patent rights in each foreign country and all rights to priority, including the right to claim priority for China, Japan and Korea;

2. Agree that the Assignee may apply for and receive Letters Patent and utility model and industrial design registrations for the inventions in its own name; and when requested, without charge to but at the expense of the Assignee, I agree to carry out in good faith the intent and purpose of this assignment, by executing all non-provisional, divisional, continuing, substitute, renewal, reissue, and all other patent, utility model and industrial design applications on any and all the inventions, by executing all rightful oaths, assignments, powers of attorney and other papers, by communicating to the Assignee all facts known to me relating to the inventions and the history thereof, and generally by doing everything reasonably possible which the Assignee shall consider desirable for aiding in securing and maintaining proper protection for the inventions and for vesting title to the inventions and all applications for patents and all patents on the inventions, in the Assignee;

3. Request the Director of the United States Patent and Trademark Office to issue the Letters Patent to the Assignee;

4. Authorize and request **Perkins Coie, LLP** to supply any missing patent/application identification information or correct any errors in the patent/application identification information provided above, whether discovered prior to or after recordation;

5. Covenant with the Assignee that no assignment, grant, mortgage, license or other agreement affecting the rights and property herein conveyed has been made to others by me and that full right to convey the same as herein expressed is possessed by me; and]

6. Appoint Assignee, through its designee, my attorney-in-fact to execute, in my name and on my behalf, any and all documents required to effectuate this Assignment, specifically including, but not limited to, those documents specified above and any necessary corrective assignments.

This instrument is executed under seal and signed under the pains and penalties of perjury under the laws of the United States of America.

November 8th, 2012
Date

Jakob Sternby

Inventor: Jakob Sternby
Address: Körsbärsvägen 6
Lund
223 55
SWEDEN
Citizenship: Sweden

Witness:

November 8th, 2012
Date

Daniel Ståhl
Signature

Name: Daniel Ståhl
Address: Stora Kvarngatan 53 lgh 1301
211 29 Malmö

Nov-8-2012
Date

Inventor: Lars Jonas Morwing
Address: Friisgatan 1
Malmö
214 21
SWEDEN
Citizenship: Sweden

Witness:

Nov-8-2012
Date

Daniel Ståhl
Signature

Name: Daniel Ståhl
Address: Stora Kvarngatan 53 lgh 1301
211 29 Malmö

November 8, 2012
Date

Inventor: Jonas Anderséon

Address: Zenithgatan 30
lgh 1501
Malmö
21214
SWEDEN

Citizenship: Sweden

Witness:

November 8, 2012
Date

Daniel Ståhl
Signature

Name: Daniel Ståhl

Address: Stora Kvarngatan 53 lgh 1301
21129 Malmö

November 8, 2012
Date

Inventor: Christer Friberg
Address: Annehemsvägen 81
Lund
22648
SWEDEN
Citizenship: Sweden

Witness:
November 8, 2012
Date

Signature

Name: Anneli Friberg
Address: Annehemsv. 81
22648 Lund, Sweden

Supplemental Application Data Sheet

Inventor Information

Inventor Number::	1
Name Prefix::	Mr.
Given Name::	Jakob
Family Name::	Sternby
City of Residence::	Lund
Country of Residence::	Sweden
Street of mailing address::	Körsbärsvägen 6
City of mailing address::	Lund
Country of mailing address::	Sweden
Postal or Zip Code of mailing address::	22355

Inventor Number::	2
Name Prefix::	Mr.
Given Name::	~~Jonas~~ Lars
Middle Name::	Jonas
Family Name::	Morwing
City of Residence::	Malmö
Country of Residence::	Sweden
Street of mailing address::	Friisgatan 1
City of mailing address::	Malmö
Country of mailing address::	Sweden

Postal or Zip Code of mailing address::	21421

Inventor Number::	3
Name Prefix::	Mr.
Given Name::	Jonas
Family Name::	Andersson
City of Residence::	Malmö
Country of Residence::	Sweden
Street of mailing address::	Zenithgatan 30
City of mailing address::	Malmö
Country of mailing address::	Sweden
Postal or Zip Code of mailing address::	21214

Inventor Number::	4
Name Prefix::	Mr.
Given Name::	Christer
Family Name::	Friberg
City of Residence::	Lund
Country of Residence::	Sweden
Street of mailing address::	Annehemsvägen 81
City of mailing address::	Lund
Country of mailing address::	Sweden
Postal or Zip Code of mailing address::	22648

Correspondence Information

Correspondence Customer Number::	105412

Application Information

Application Number::	13/652,222
Filing Date::	10/15/12
Application Type::	Nonprovisional
Subject Matter::	Utility
CD-ROM or CD-R?::	None
Sequence submission?::	None
Computer Readable Form (CRF)?::	No
Title::	TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES
Attorney Docket Number::	710078061US
Request for Early Publication?::	No
Request for Non-Publication?::	No
Total Drawing Sheets::	12
Small Entity?::	No
Petition included?::	No
Secrecy Order in Parent Appl.?::	No
Authorization to Permit Access::	No

Representative Information

Representative Customer Number::	105412

Domestic Priority Information

Foreign Priority Information

Applicant Information

Applicant Number::	1
Applicant Type::	Assignee
Organization Name::	Nuance Communications, Inc.
Street of mailing address::	1 Wayside Road
City of mailing address::	Burlington
State or Province of mailing address::	MA
Postal or Zip Code of mailing address::	01803

Signature:

A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature.			
Signature		Date	December 20, 2012
Name (Print/Type)	Ryan M. Bello	Registration No. (Attorney/Agent)	67,556

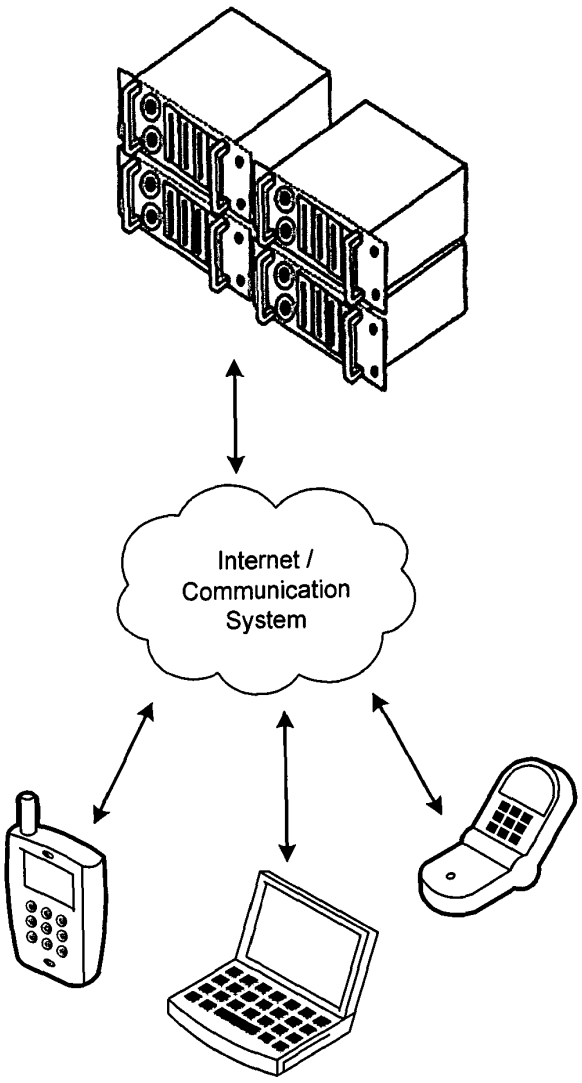


FIG. 1

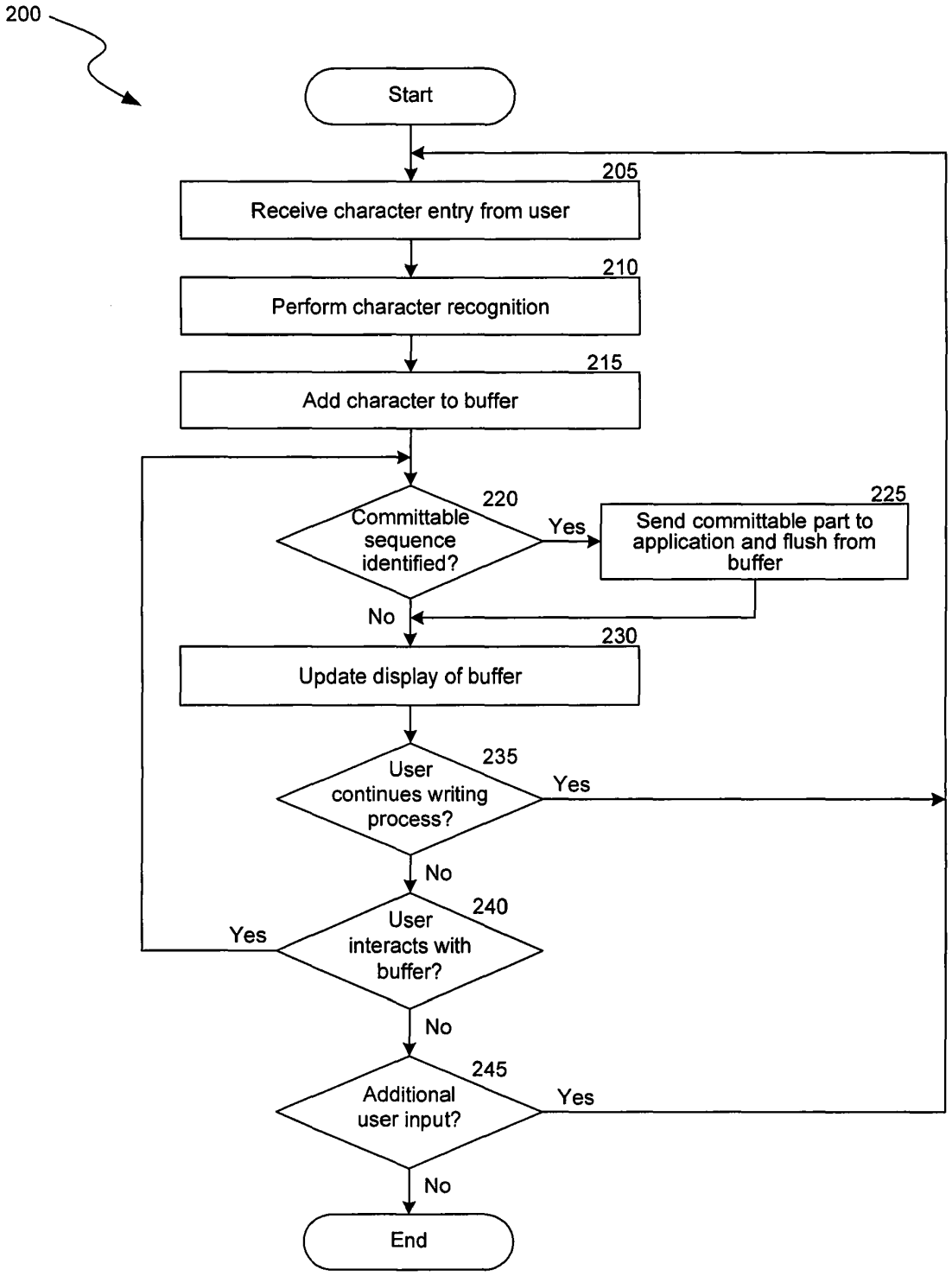

200
Start
205
Receive character entry from user
210
Perform character recognition
215
Add character to buffer
220
Committable sequence identified?
Yes
225
Send committable part to application and flush from buffer
No
230
Update display of buffer
235
User continues writing process?
Yes
No
240
User interacts with buffer?
Yes
No
245
Additional user input?
Yes
No
End

FIG. 2

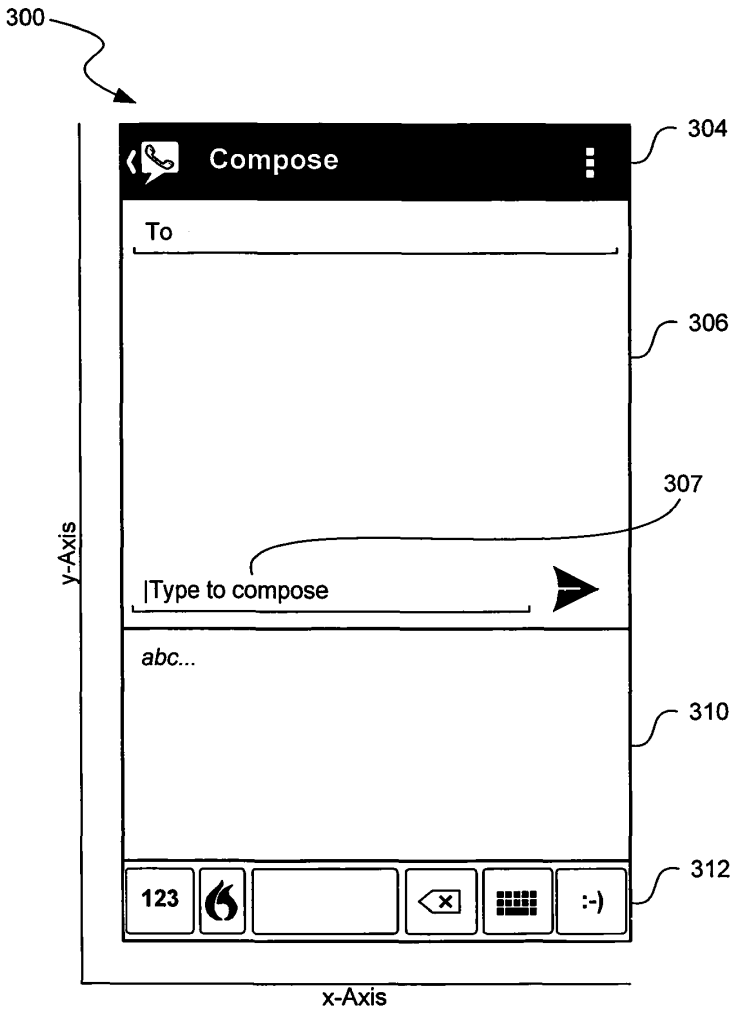


FIG. 3A

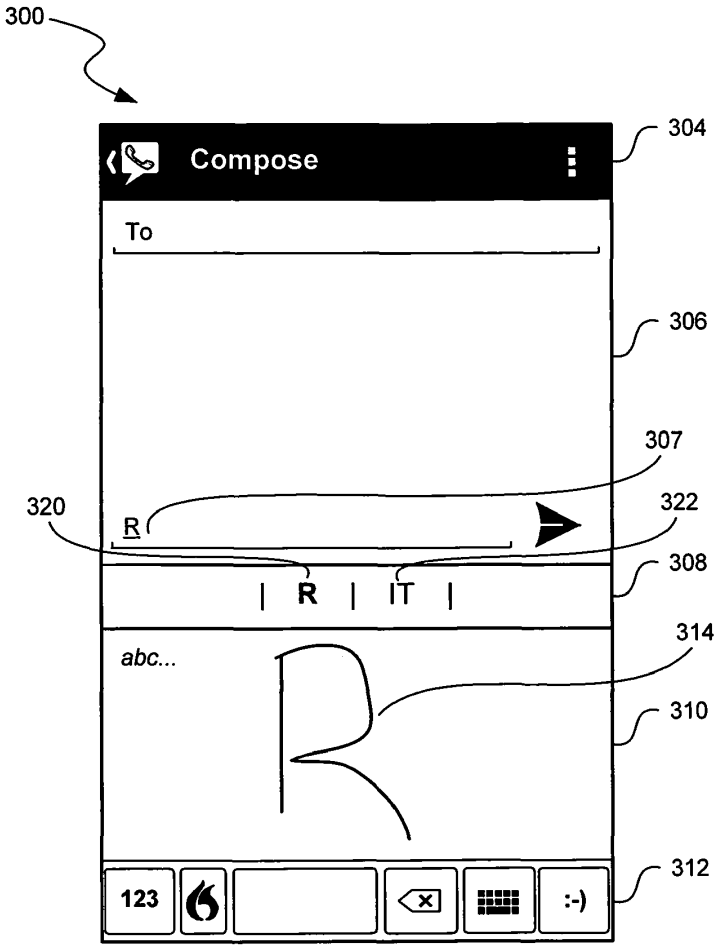


FIG. 3B

REPLACEMENT SHEET

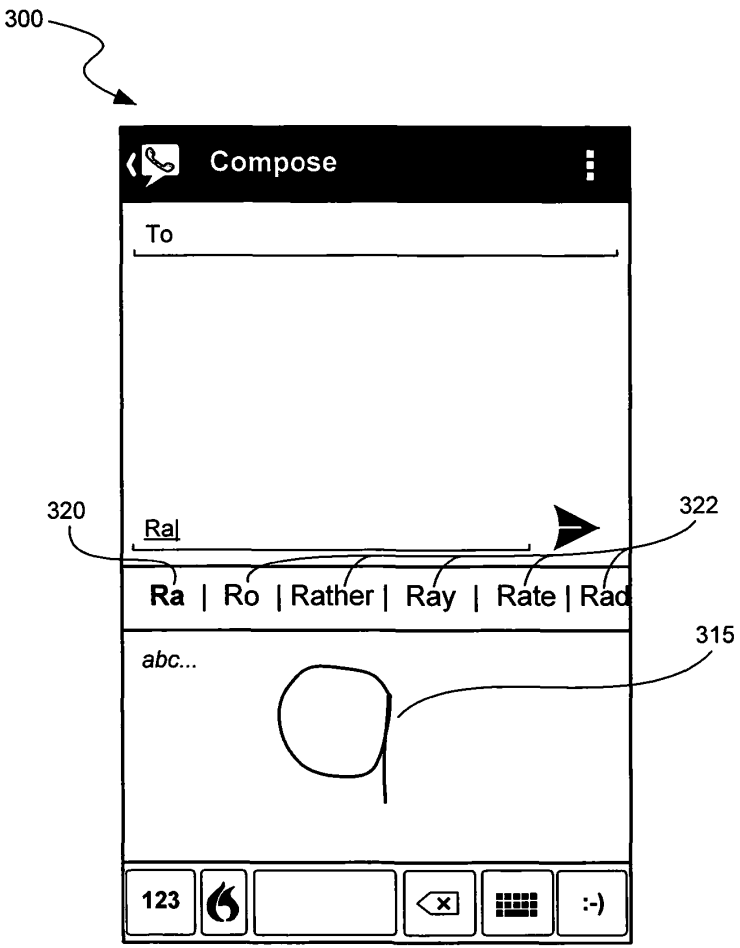


FIG. 3C

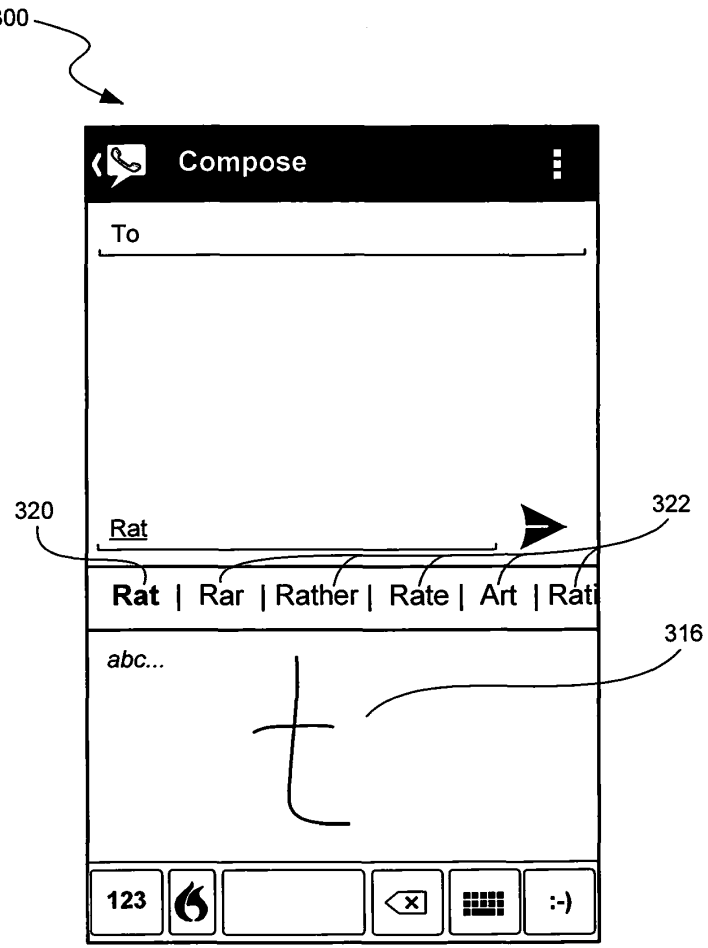


FIG. 3D

REPLACEMENT SHEET

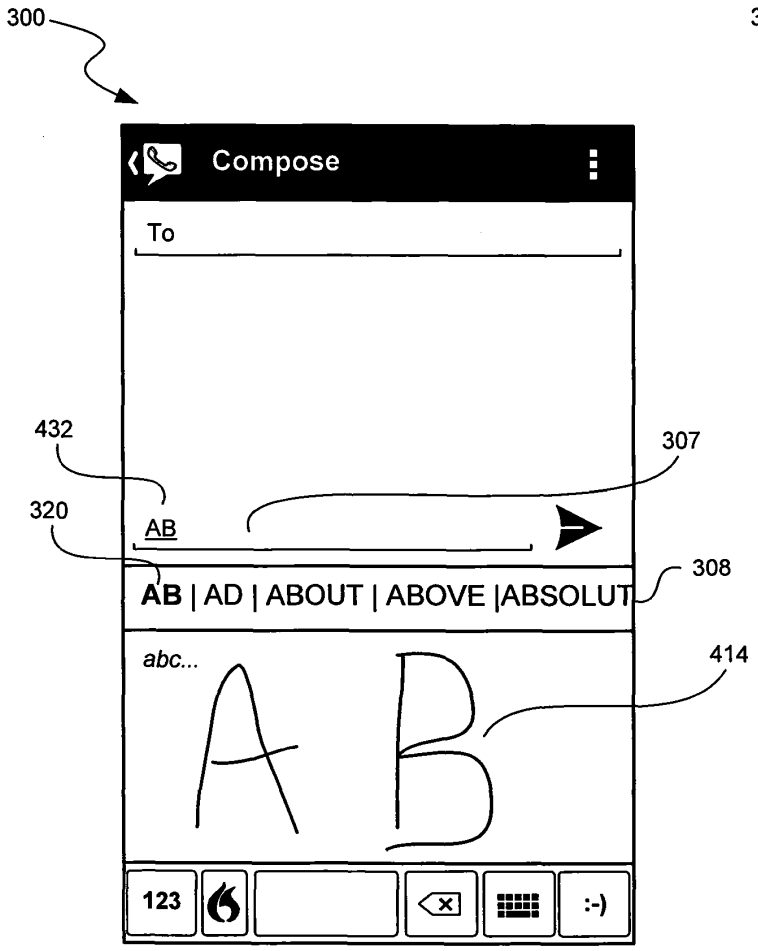


FIG. 4A

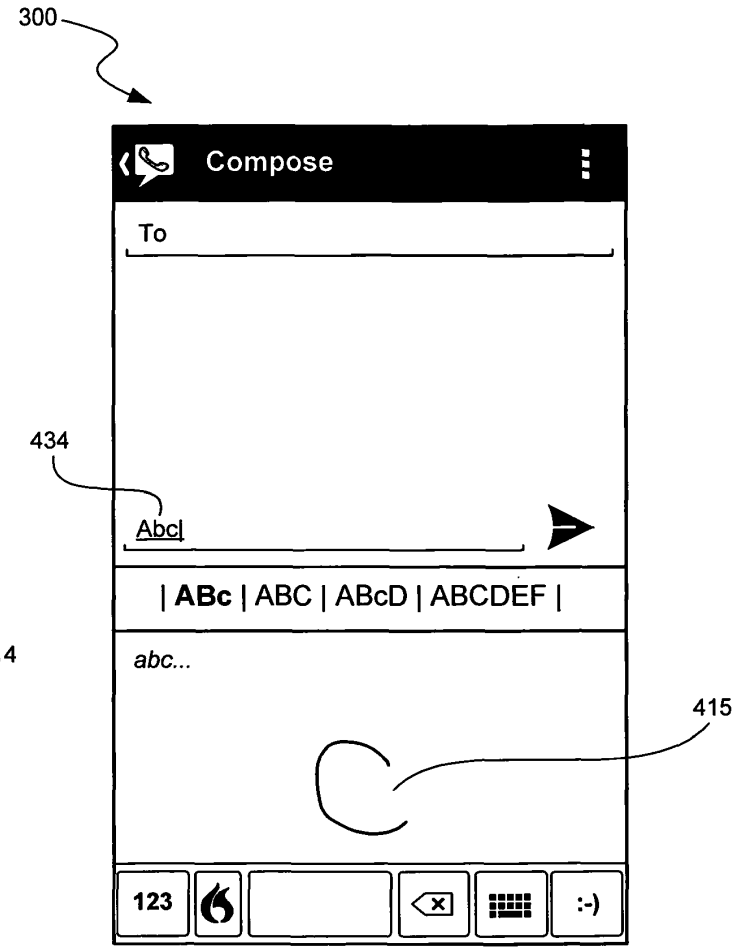


FIG. 4B

REPLACEMENT SHEET

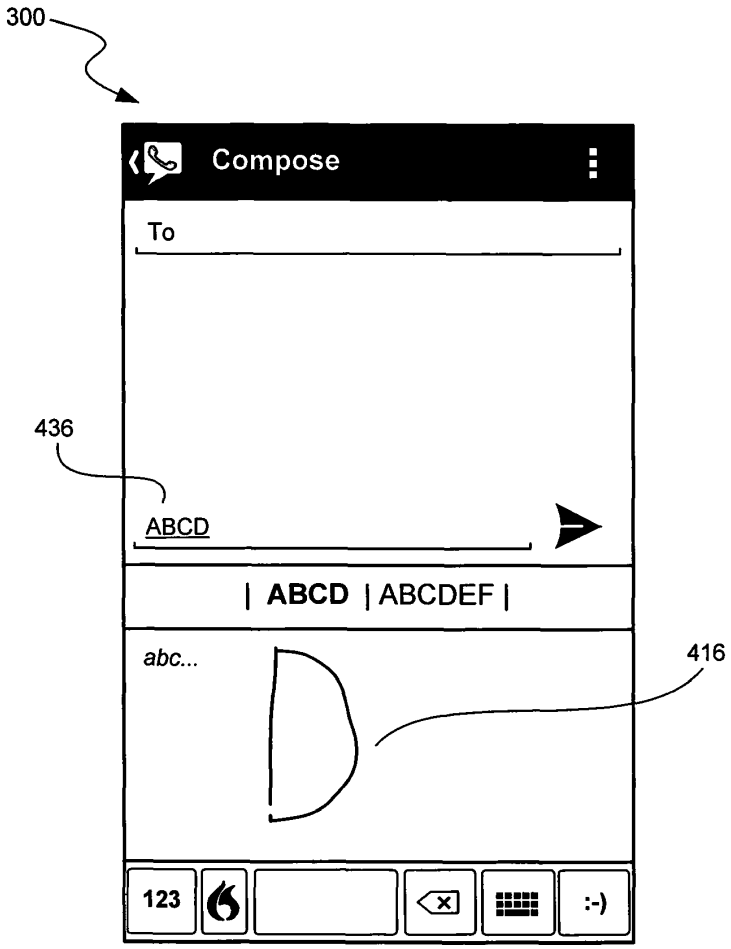


FIG. 4C

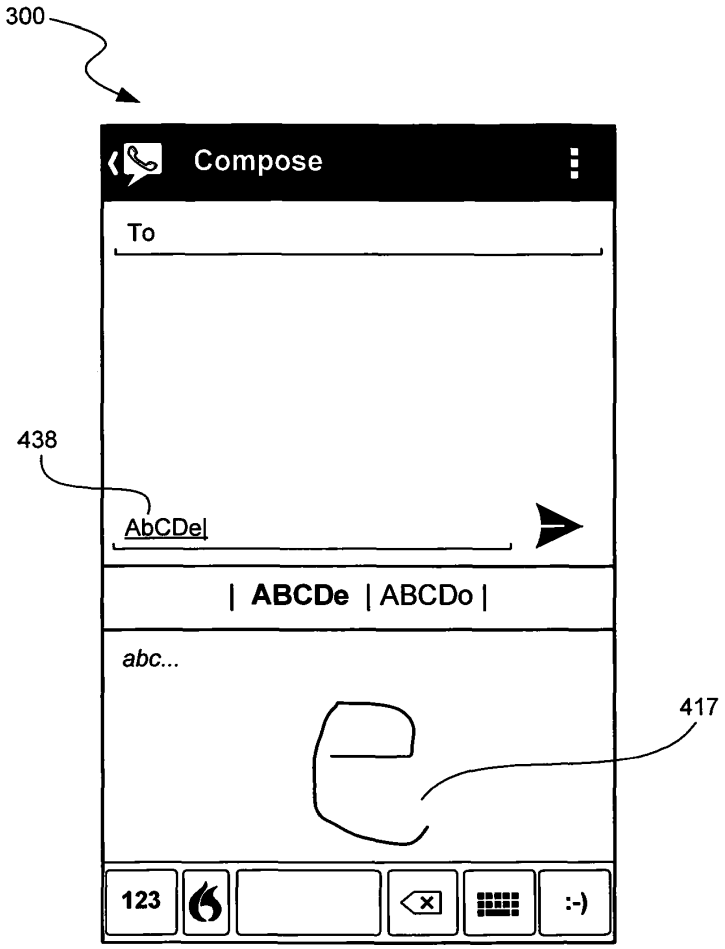


FIG. 4D

REPLACEMENT SHEET

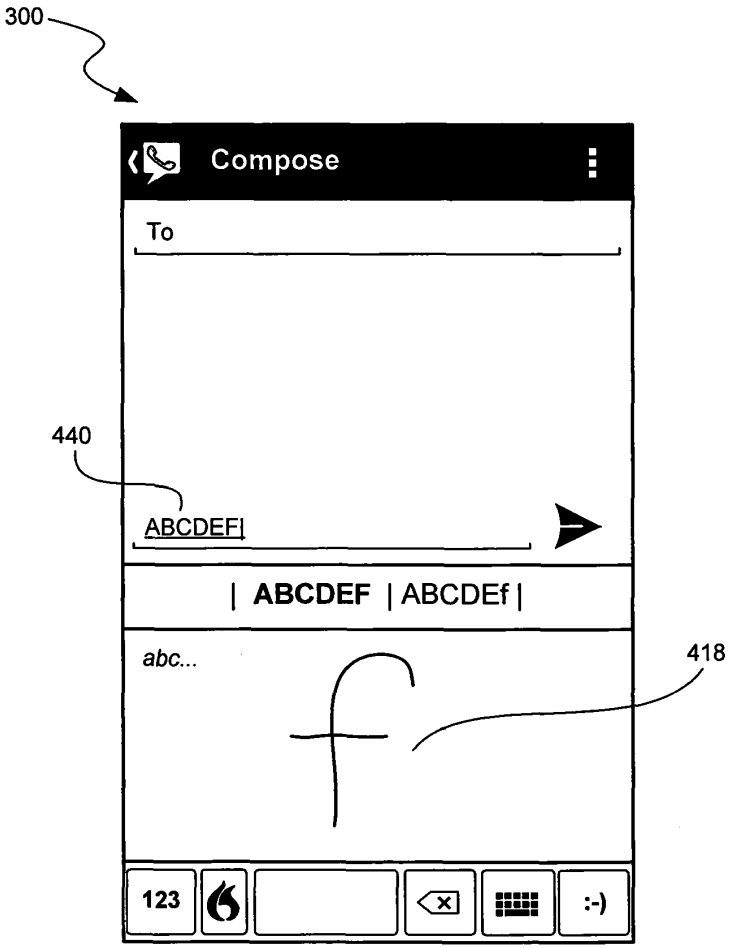


FIG. 4E

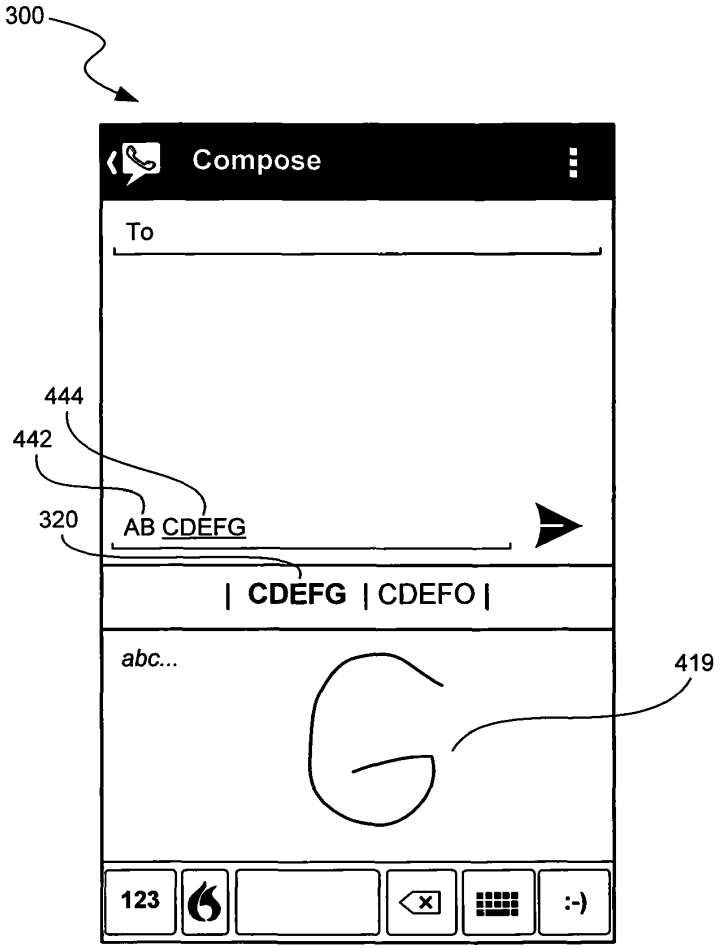


FIG. 4F

REPLACEMENT SHEET

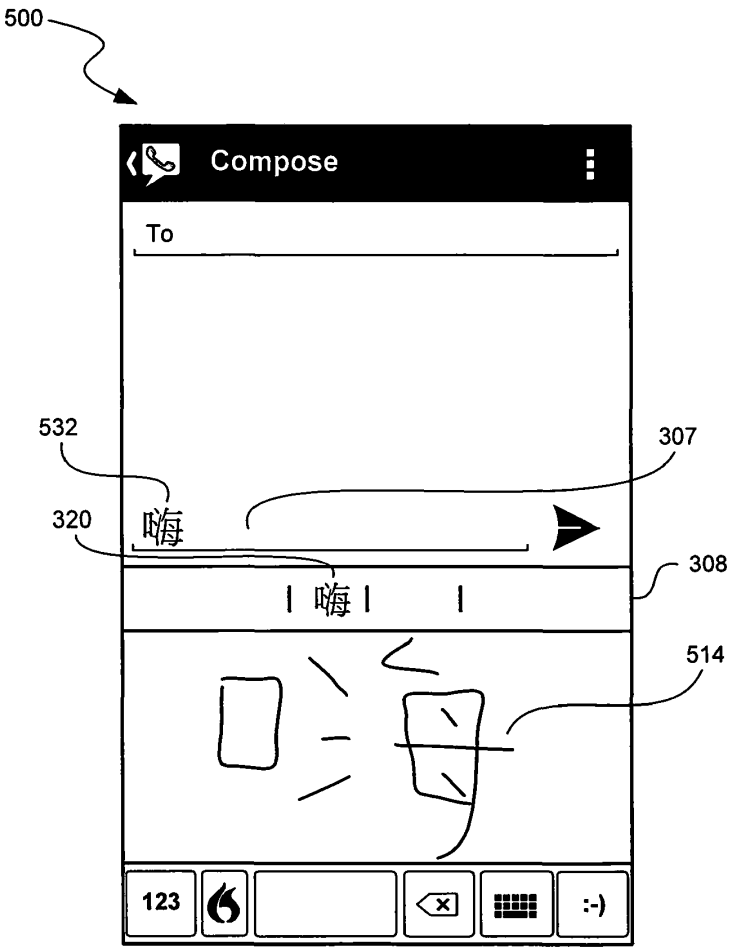


FIG. 5A

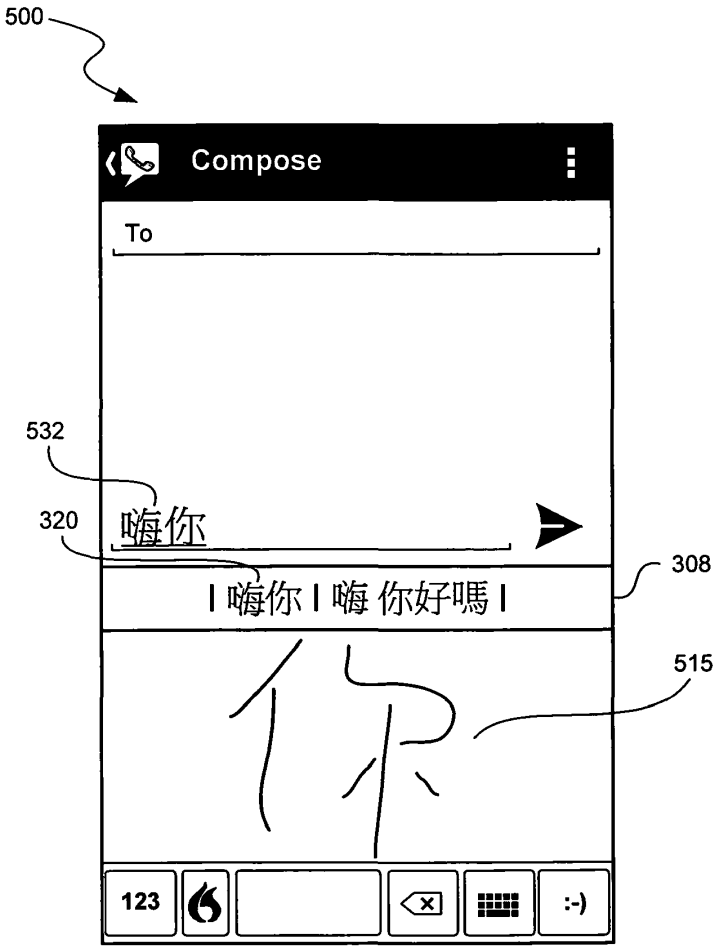


FIG. 5B

REPLACEMENT SHEET

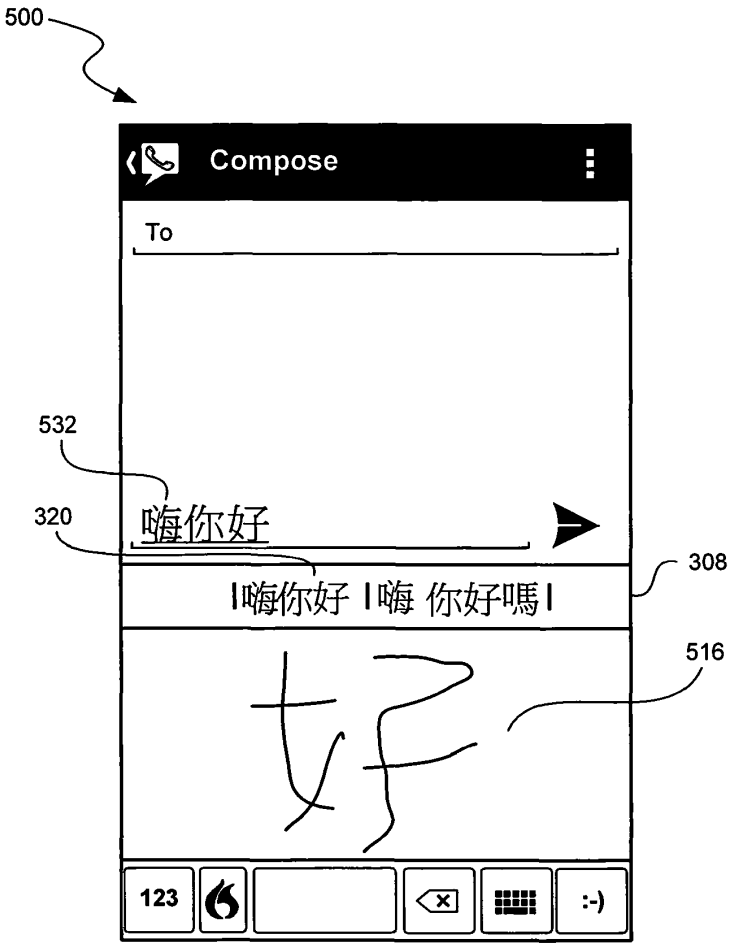


FIG. 5C

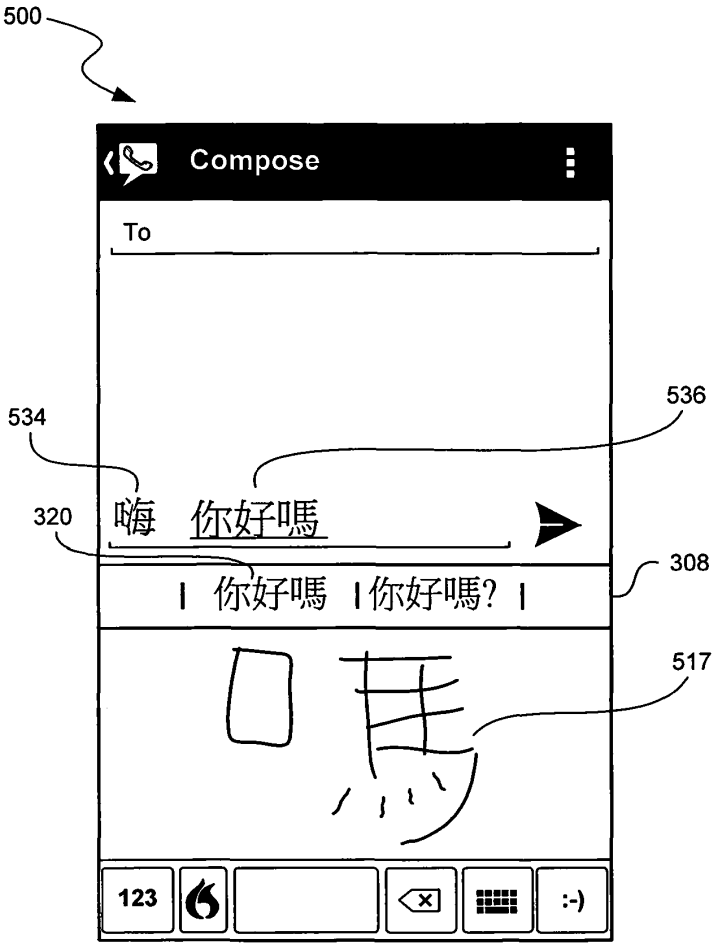


FIG. 5D

REPLACEMENT SHEET

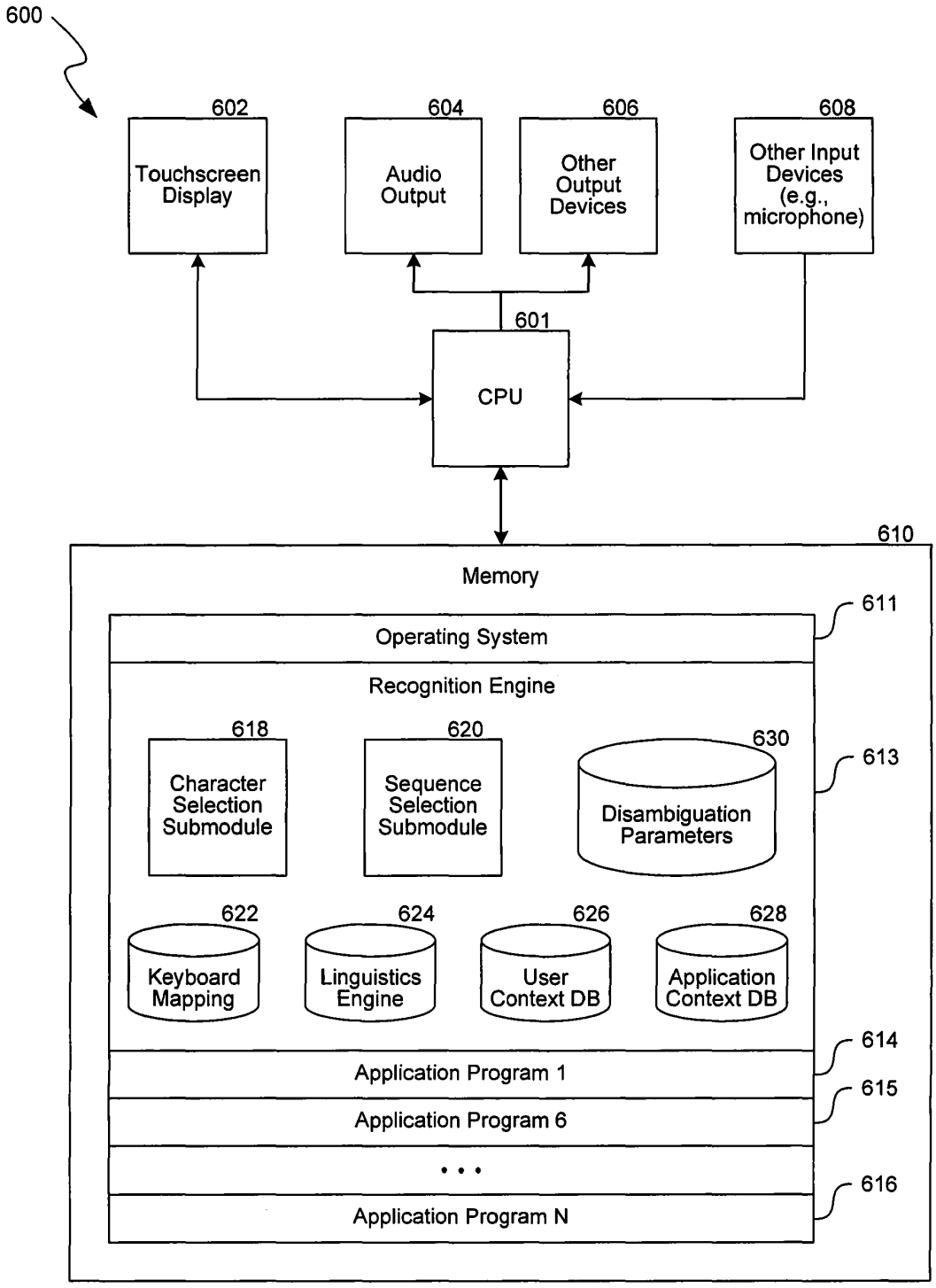

600
602
Touchscreen Display
604
Audio Output
606
Other Output Devices
608
Other Input Devices (e.g., microphone)
601
CPU
610
Memory
611
Operating System
Recognition Engine
618
Character Selection Submodule
620
Sequence Selection Submodule
630
Disambiguation Parameters
613
622
Keyboard Mapping
624
Linguistics Engine
626
User Context DB
628
Application Context DB
614
Application Program 1
615
Application Program 6
• • •
616
Application Program N

FIG. 6

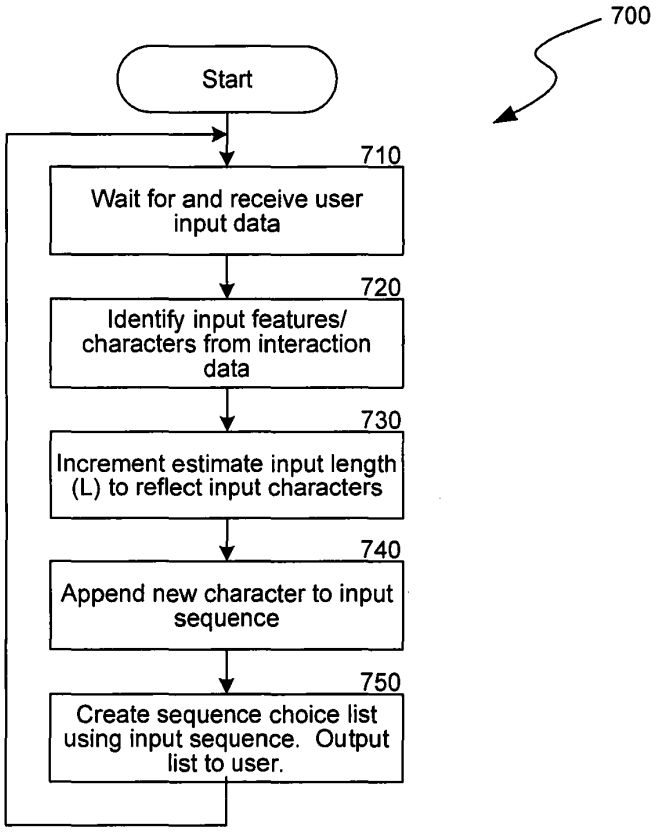

700
Start
710
Wait for and receive user input data
720
Identify input features/ characters from interaction data
730
Increment estimate input length (L) to reflect input characters
740
Append new character to input sequence
750
Create sequence choice list using input sequence. Output list to user.

FIG. 7A

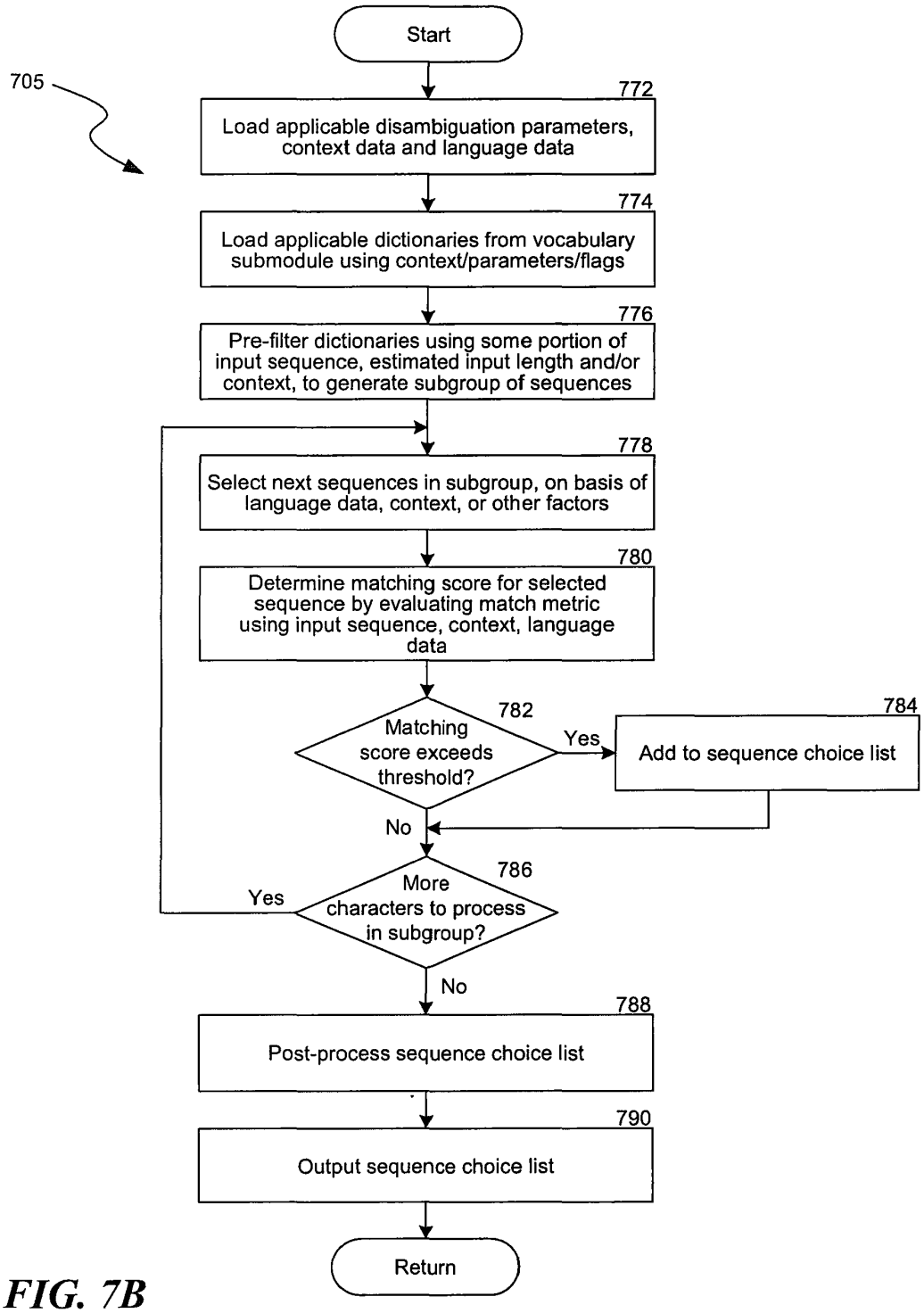

Start
705
772
Load applicable disambiguation parameters, context data and language data
774
Load applicable dictionaries from vocabulary submodule using context/parameters/flags
776
Pre-filter dictionaries using some portion of input sequence, estimated input length and/or context, to generate subgroup of sequences
778
Select next sequences in subgroup, on basis of language data, context, or other factors
780
Determine matching score for selected sequence by evaluating match metric using input sequence, context, language data
782
Matching score exceeds threshold?
Yes
784
Add to sequence choice list
No
786
More characters to process in subgroup?
Yes
No
788
Post-process sequence choice list
790
Output sequence choice list
Return

FIG. 7B

Electronic Patent Application Fee Transmittal

Application Number:	13652222
Filing Date:	15-Oct-2012
Title of Invention:	TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES
First Named Inventor/Applicant Name:	Jakob Sternby
Filer:	Maurice J. Pirio/Sandy Reisman
Attorney Docket Number:	710078061US

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:				
Late filing fee for oath or declaration	1051	1	130	130
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
			Total in USD ($)	**130**

Electronic Acknowledgement Receipt

EFS ID:	14527149
Application Number:	13652222
International Application Number:	
Confirmation Number:	4390
Title of Invention:	TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES
First Named Inventor/Applicant Name:	Jakob Sternby
Customer Number:	105412
Filer:	Maurice J. Pirio/Sandy Reisman
Filer Authorized By:	Maurice J. Pirio
Attorney Docket Number:	710078061US
Receipt Date:	20-DEC-2012
Filing Date:	15-OCT-2012
Time Stamp:	14:13:33
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$130
RAM confirmation Number	580
Deposit Account	500665
Authorized User	BELLO, RYAN M.

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

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

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

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)					
File Listing:					
Document Number	**Document Description**	**File Name**	**File Size(Bytes)/ Message Digest**	**Multi Part /.zip**	**Pages (if appl.)**
1		2012-12-20-ResponseMP-Declarations-POA-Dwgs-SuppADS-71007-8061US.PDF	1989821 90d4f0ba77810f4b4114514f92920016a40cb0cc	yes	19
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Applicant Response to Pre-Exam Formalities Notice		1	2	
	Oath or Declaration filed		3	3	
	Oath or Declaration filed		4	4	
	Oath or Declaration filed		5	5	
	Oath or Declaration filed		6	6	
	Power of Attorney		7	14	
	Application Data Sheet		15	19	
Warnings:					
Information:					
2	Drawings-only black and white line drawings	Nu-8061US-Drawings.pdf	363403 e9c99791b81ebd158c23819c9370095446c732c4	no	12
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30307 8f455a248ef371aa507b9624b7851f26e20d200c	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	2383531		

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.

DECLARATION (37 C.F.R. § 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 C.F.R. § 1.76)

Title of Invention	TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES

As the below named inventor, I declare that:

This declaration is directed to:

☐ The attached application, or

☒ United States application or PCT international application number 13/652,222 filed on October 15th, 2012

☐ As amended on _____ (if applicable);

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

I believe the inventor(s) named below to be the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought.

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

I have reviewed and understand the contents of the above-identified application, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in 37 C.F.R. § 1.56.

All statements made herein of my own knowledge are true, and all statements made herein on information and belief are believed to be true.

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

LEGAL NAME OF SOLE OR FIRST INVENTOR

Inventor one: Jakob Sternby Date: _____

Signature: _____ Citizen of: Sweden

LEGAL NAME OF ADDITIONAL JOINT INVENTOR, if any

Inventor two: Lars Jonas Morwing Date: _____

Signature: _____ Citizen of: Sweden

LEGAL NAME OF ADDITIONAL JOINT INVENTOR, if any

Inventor three: Jonas Andersson Date: _____

Signature: _____ Citizen of: Sweden

LEGAL NAME OF ADDITIONAL JOINT INVENTOR, if any

Inventor four: Christer Friberg Date: November 8, 2012

Signature: _____ Citizen of: Sweden

☐ Additional inventors are being named on _____ additional form(s) attached hereto.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 13/652,222

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	390
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	620
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	250
TOTAL CLAIMS (37 CFR 1.16(i))	20 minus 20 =	*			OR	x 62 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*				x 250 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	1260

APPLICATION AS AMENDED - PART II

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

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

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

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

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

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

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United States Patent and Trademark Office
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www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
13/652,222	10/15/2012	2819	1390	710078061US	20	3

CONFIRMATION NO. 4390

105412
Perkins Cole LLP- Nuance
P.O. Box 1247
Seattle, WA 98111-1247

UPDATED FILING RECEIPT

OC000000058391407

Date Mailed: 01/07/2013

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Jakob Sternby, Lund, SWEDEN;
Jonas Morwing, Malmo, SWEDEN;
Jonas Andersson, Malmo, SWEDEN;
Christer Friberg, Lund, SWEDEN;

Applicant(s)

Nuance Communications, Inc., Burlington, MA

Assignment For Published Patent Application

Nuance Communications, Inc., Burlington, MA

Power of Attorney: The patent practitioners associated with Customer Number 105412

Domestic Applications for which benefit is claimed - None.
A proper domestic benefit claim must be provided in an Application Data Sheet in order to constitute a claim for domestic benefit. See 37 CFR 1.76 and 1.78.

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

If Required, Foreign Filing License Granted: 10/31/2012
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/652,222**
Projected Publication Date: 04/17/2014
Non-Publication Request: No

Early Publication Request: No
Title

TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES

Preliminary Class

326

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

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

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

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

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

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

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Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/652,222	10/15/2012	Jakob Sternby	710078061US

CONFIRMATION NO. 4390

105412
Perkins Cole LLP- Nuance
P.O. Box 1247
Seattle, WA 98111-1247

POA ACCEPTANCE LETTER

OC000000058391437

Date Mailed: 01/07/2013

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 12/20/2012.

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.

/nbekele/

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
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/652,222	10/15/2012	Jakob Sternby	710078061US

CONFIRMATION NO. 4390

105412
Perkins Cole LLP- Nuance
P.O. Box 1247
Seattle, WA 98111-1247

IMPROPER CFR REQUEST

OC000000058418244

Date Mailed: 01/07/2013

RESPONSE TO REQUEST FOR CORRECTED FILING RECEIPT

Continuity, Priority Claims, Petitions, and Non-Publication Requests

In response to your request for a corrected Filing Receipt, the Office is unable to comply with your request because:

- Any request to correct or change the inventorship once the inventorship has been set must be by way of a request under 37 CFR 1.48(a) for a nonprovisional application or 37 CFR 1.48(d) for a provisional application.

/nbekele/

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

PTO/SB/08a (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 2

Complete if Known	
Application Number	13/652,222-Conf. #4390
Filing Date	October 15, 2012
First Named Inventor	Jakob Sternby
Art Unit	2658
Examiner Name	Not Yet Assigned
Attorney Docket Number	710078061US

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-20060274051-A1	12-07-2006	Longe et al.	
		US-20080244446	10-02-2008	LeFevre et al.	
		US-20100121870	05-13-2010	Unruh et al.	
		US-6,307,549	10-23-2001	King et al.	
		US-7,177,473	02-13-2007	Aharonson	
		US-7,610,189	10-27-2009	Mackie	
		US-7,756,335	07-13-2010	Sternby	
		US-8,036,645	10-11-2011	Roundtree et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]
		WO-201113057	09-15-2011			

Examiner Signature		Date Considered	

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(54) Title: MULTIMODAL TEXT INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES

(57) Abstract: A system and method for entering text from a user includes a programmed processor that receives inputs from the user and disambiguates the inputs to present word choices corresponding to the text. In one embodiment, inputs are received in two or more modalities and are analyzed to present the word choices. In another embodiment, a keyboard is divided into zones each of which represents two more input characters. A sequence of zones selected by the user is analyzed to present word choices corresponding to the zone selected.

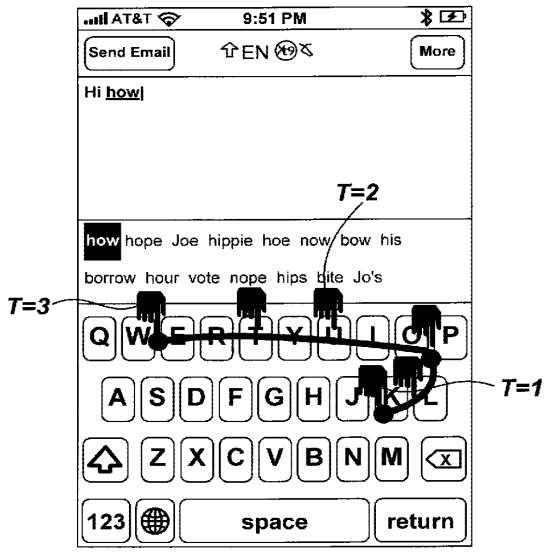


FIG. 5C

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MULTIMODAL TEXT INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES

CROSS-REFERENCE TO RELATED APPLICATION(S)

[0001] This application claims priority to the following commonly assigned U.S. Patent Application Nos., all of which are incorporated by reference in their entirety: 61/313,454, filed March 12, 2010 (attorney docket number 71007.8045) and 61/313,864, filed March 15, 2010 (attorney docket number 71007.8047), both entitled Method and Apparatus for Text Input; 61/313,423, filed March 12, 2010 (attorney docket number 71007.8044), entitled Method and Apparatus for Secure Data Transmission; and, 61/316,799, filed March 23, 2010, entitled Multimodal Text Input System, Such as for Use with Touch screens on Mobile Phones (attorney docket number 71007.8036).

[0002] This application is also related to commonly assigned U.S. Patent No. 6,307,549, entitled "REDUCED KEYBOARD DISAMBIGUATION SYSTEM;" U.S. Patent Application No. 11/379,006/ U.S. Patent Publication No. 2006/0274051 entitled "VIRTUAL KEYBOARD SYSTEMS WITH AUTOMATIC CORRECTION," filed April 17, 2006; and U.S. Patent Application No. 11/379,006, entitled "DISAMBIGUATION OF ICONS AND OTHER MEDIA IN TEXT-BASED APPLICATIONS," filed March 29, 2007, and 61/313,564, filed 3/12/10, all of which are incorporated by reference.

BACKGROUND

[0003] Users enter text into computers and other data processing systems using a variety of input devices, including many types of keyboards. Most standard keyboards are large so as to accommodate both hands of a typist, but this leads to a less portable device. Laptop computers have attempted to shrink the size of a keyboard, sometimes at the expense of typing efficiency for some users.

[0004] Certain mobile devices such as cell phones, smart phones and the like, require an even smaller keyboard to maintain the form factor common with such devices. Some phones include a small key pad with physical buttons to distinguish

each key on the keyboard, with which a user may use her thumbs to actuate the buttons. Other devices use a touch screen that displays a similar sized keyboard. Both of these smaller keyboards are cramped and can provide for slower and/or error prone text entry.

[0005] Although touch screen devices have become increasingly popular, consumers continue to demand simpler ways to input text, such as for e-mail, text messaging, instant messaging, and other activities. These touch screen keyboards, however, may suffer from more problems than their small key pad counterparts. The soft keys on the touch screen of such keyboards provide less tactile feedback to a user, which can lead to input errors, as well as other problems.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] Figure 1 is a graphical representation of a communication interface between one or more remotely located devices and a centralized enterprise server;

[0007] Figure 2 is a flowchart of a process of creating a word choice in accordance with an embodiment of the disclosed technology;

[0008] Figures 3 depicts a keyboard including various suggested word choices in accordance with an embodiment of the disclosed technology;

[0009] Figure 4 illustrate a method of entering text in accordance with an embodiment of the disclosed technology;

[0010] Figures 5A through 5I are screen shots illustrating user interface methods for inputting text under various implementations of the disclosed technology;

[0011] Figure 6 is a block diagram illustrating a suitable computing system that may employ aspects of the disclosed technology;

[0012] Figure 7A is a flowchart illustrating a process for creating a word choice list based on user input to a device;

[0013] Figure 7B is a flowchart illustrating special function handling;

[0014] Figure 8A is a flow diagram illustrating a process to determine input features, character sets and proximity weight sets from input data.

[0015] Figure 8B is a flow diagram illustrating a process to identify character sets and appropriate weights for input features;

[0016] Figures 8C through 8F are screen shots illustrating how a character selection sub-module may identify character sets for different types of input features;

[0017] Figure 9A is a flow diagram illustrating a process to generate a word choice list;

[0018] Figure 9B is a flow diagram illustrating a process for calculating matching metrics for words;

[0019] Figure 10 is a graphical representation of a displayed keyboard, including zone output keys and a selected zone, constructed in accordance with an embodiment of the disclosed technology;

[0020] Figure 11 is a flowchart depicting entry of a password by a user in accordance with an embodiment of the disclosed technology;

[0021] Figure 12 is a flowchart diagram depicting receipt of a password at a receiving device in accordance with an embodiment of the disclosed technology;

[0022] Figure 13 depicts the mapping of a numeric keypad to zone output keys on a QWERTY keyboard in accordance with an embodiment of the disclosed technology;

[0023] Figures 14A and 14B depict selection of zones employing a pointing device in accordance with an embodiment of the disclosed technology;

[0024] Figure 15 depicts a reduced zone configuration in accordance with the disclosed technology; and

[0025] Figure 16 depicts an alternative zone definition scheme in accordance with an alternative embodiment of the disclosed technology.

DETAILED DESCRIPTION

[0026] Various examples of the disclosed technology will now be described. The following description provides specific details for a thorough understanding and enabling description of these examples. One skilled in the relevant art will understand, however, that the disclosed technology may be practiced without many of these details.

Likewise, one skilled in the relevant art will also understand that the disclosed technology may include many other obvious features not described in detail herein. Additionally, some well-known structures or functions may not be shown or described in detail below, so as to avoid unnecessarily obscuring the relevant description.

[0027] The terminology used below is to be interpreted in its broadest reasonable manner, even though it is being used in conjunction with a detailed description of certain specific examples of the disclosed technology. Indeed, certain terms may even be emphasized below; however, any terminology intended to be interpreted in any restricted manner will be overtly and specifically defined as such in this Detailed Description section.

I. ENTERPRISE/CLOUD ENVIRONMENT

[0028] As will be explained in further detail below, the technology described herein relates to systems and methods for increasing the speed and accuracy with which a user can enter text into devices and in particular into mobile devices. In accordance with one embodiment, upon entry of text by the user, data representative of such text entry is transmitted to a centralized location via the Internet, wireless communication system, or other appropriate data transmission method to a remote centralized server.

[0029] Referring first to Figure 1, a first embodiment in accordance with the disclosed technology is shown. In Figure 1, one or more remotely located devices are shown. The devices include cellular telephones, smart phones, netbooks or laptop computers or the like. Each of these devices is preferably provided with a communication system, such as a standard Internet connection or other proprietary wireless or wired communication system, as is well known to one of ordinary skill in the art. Thus, actions taken or data entered on one or more of the remote devices are communicated as appropriate to a centralized enterprise server. Such synchronizing communications may comprise for example, updating an enterprise email inbox or outbox when an email is sent or received. Traditionally, each of these remote devices performs all major functions on the device and synchronizes information with the enterprise server, such as with the user of email as noted above.

[0030] In accordance with one embodiment of the disclosed technology, certain functions previously limited to implementation on one or more of the remotely located devices are transferred to the enterprise server, thus providing a more similar user experience for all users of the enterprise system. In particular, when entering text into one or more of the remotely located devices, as noted above, typically all functionality regarding text correction and auto suggestion and auto fill of text entry words is performed in accordance with information retained on the remotely located device. There exists, therefore, a problem related to updating of data and the like used in such selection, and in particular with potentially frequently updated information on an enterprise wide basis such as email addresses. Thus, if an email address list is updated for a particular enterprise across an entire group of enterprise users, such update may not be transmitted to one or more of the remotely located devices. If the enterprise is sufficiently large, it may not be practicable to download an entire email list to such a remote device. Thus, the remote device may maintain a local cache with a limited number of text entries, typically such entries determined in accordance with a locally-maintained address list or the like. If an email address is not found for a particular indicated individual, the user may be provided with the option of searching for the email address on a remote server, but this process requires additional steps to be performed by a user. There is further no automatic integration of such a system into the user experience of the individual enterprise user. Additionally, such a system may not employ any error tolerant text entry as the user must complete the text entry before asking for access to information stored on the enterprise server. Thus, there has traditionally been no way for such a system to aid in text entry to determine user intent when a complete dictionary of word is not available to the remotely located device.

[0031] Therefore, in accordance with the disclosed technology, a method and apparatus are provided that employ error tolerant text entry techniques at the remote device level, while using such error tolerant text entry results to select suggested text entry information from a centralized database location.

[0032] For example, in one embodiment of the disclosed technology error tolerant text entry is provided to a user by providing the user with preferably nine, or other appropriate number of zones each comprising one or more keys. When a zone is selected, a predetermined number of keys comprising the zone are also selected.

Innovative software is able to determine a desired selected word based upon the zone selection sequence, rather than needing each individual key to be selected. A more detailed description of one example of such a zone text entry method is described at US Patent Application Serial No. 12/500,675 filed July 10, 2009 titled METHOD AND APPARATUS FOR TEXT ENTRY, the contents thereof being incorporated herein by reference.

[0033] In other embodiments of the disclosed technology, such zone key entry may be performed in the background without providing indications of such zones to a user. Thus, while a user may be encouraged to be as accurate as possible when typing, great accuracy is not necessary. Other error tolerant text entry systems, such as that described in co-assigned United States Patent Application No. 12/186,425 to Matthew Cecil, el al., filed June 14, 2007 entitled "A PROBABILITY-BASED APPROACH TO RECOGNITION OF USER-ENTERED DATA", the entire contents thereof being incorporated herein by reference, may also be employed. In still further embodiments of the disclosed technology, more traditional text entry systems, and other known predictive text entry systems may be employed.

[0034] Further in accordance with aspects of the disclosed technology, in a particular embodiment of the disclosed technology, an error tolerant text entry system may be provided as described in U.S. Patent Application No. 12/500,675 referenced above. Thus, a described zone entry text system may be employed on the remotely located device, even without having the complete word dictionary located on such remotely located device. Such error tolerant text entry system may also maintain zone definitions in a manner not displayed to the user. Finally, other error tolerant text entry systems may also be employed in accordance with the present disclosed technology.

[0035] Referring next to Figure 2, a user first enters text in accordance with a provided text entry system accompanying a particular remotely located computing device at step 210. In a preferred embodiment of the present disclosed technology, as the user enters one or more keys through the user of the zone entry system of the 12/500,675 application, or any other error tolerant text entry system, an initial text input processing step is performed to begin to determine possible letter sequences that may be intended by the user. Thus, a dictionary search is not performed at this time, but

rather locally on the remotely located computing device, information related to the text entry is determined to be used at a later time in a dictionary search.

[0036] Thereafter, at step 230, one or more a dictionary search or other database search is performed by transmitting the predictive text entry information to the enterprise server. Importantly, it is not merely text keys entered that are transmitted, but rather such data as has been determined in accordance with the initial error tolerant text entry processing is transmitted. In accordance with the preferred embodiment of the disclosed technology, for each key that is input by a user, all other keys defined to be in the zone with the selected key, whether these zones are fixed or dynamic, available to the user or not, are transmitted to the enterprise server for further processing in accordance with the disclosed technology. In such a manner, the received predictive text entry information entered in any of the one or remote devices can be applied to any number of consistently maintained enterprise wide databases.

[0037] Figure 3 shows a keyboard 100 in which the keys are divided to be in a number of zone. Thus, in accordance with the disclosed technology described in the error tolerant text entry system of the 12/500,675 application, each time one or more keys indicating a particular zone is selected from the keyboard 100, all of the keys in the zone represented by the selected key are passed to the predictive text algorithm. In one embodiment, candidate words represented by the keys selected in each zone are determined locally and transmitted to the enterprise server. In another embodiment, a list of the zones selected by the user is send to the enterprise server to determine a list of possible candidate words. The list of possible words is analyzed by the enterprise server to determine one or more suggestions of potential word selections to the user that are then displayed on a screen of the remotely located device, such as is shown in Figure 3 at 310. These word suggestions 330 are based upon the entered key sequence, taking into account all of the keys at each entry associated with the zone of the selected key. At 320, the sequence of keys selected by a user is shown. Word choice 340 depicts the most likely, or most common, word determined to be intended by the user as determined from one or more applicable databases located on the enterprise server. Upon determination of these word suggestions by the enterprise server, they are transmitted back to the remotely located device and displayed to the user as shown in Figure 3 for selection by the user at step 240 of Figure 2.

[0038] Selecting a suggested word replaces the entered word with the selected suggestion at step 250. If none of the words are selected, processing passes back to step 210 in Figure 2 where further text entry is received from a user. Upon such additional text entry, the steps noted above are preformed again, thus providing potentially different words for user selection, or narrowing choices down for a user. Upon selection of one of the presented words by the user, such selected word is input to the remotely located computing device, and processing ends until the entry of another text sequence by the user.

[0039] In an alternative embodiment of the disclosed technology, in order to speed processing at the remote device, based upon a determined size of a particular dictionary, it may prove beneficial to download a dictionary to the remote device prior to the beginning of text entry by the user. Thus, in a case where entries into a particular field in a form or the like are limited to a small number of possible entries, downloading such a dictionary upon entry of the field by the user may allow for only a single data transfer to be employed. Similarly, if a user is visiting a form or the like with a number of fields, dictionaries for each of the fields in a particular form may be downloaded in advance, or upon entry of a first field of the form. Of course, if any particular field were found to have a very large dictionary, access to this dictionary on the enterprise server may be provided as noted above.

[0040] The user can train the system to add words to its dictionary or the system can be set to add words automatically after a preset number of times that the word has been entered. Thus, in accordance with the disclosed technology, not only can a dictionary be modified on an enterprise wide platform, entry of text by a particular user employing a remotely located computing device may result in the addition of such a text entry to a database or dictionary for subsequent use by any enterprise user. Of course, local databases may also be maintained for text entries that need not be made available to the enterprise as a whole.

[0041] An exemplary predictive text algorithm is depicted in United States Patent Application No. 12/186,425 referenced above. Such an algorithm utilized in accordance with the present disclosed technology addresses the predictive text requirements of the disclosed technology. A user interface provided to a user on one or

more of the remotely located computing devices will provide a character (or string of characters associated with one or more selected zones) to an algorithm at an enterprise location, and the algorithm will interpret that set of characters and return a result from the enterprise server to a user interface at the remotely located computing device in the form of one or more suggested word selections. Alternatively the enterprise server may return an indication of an inability to properly parse out a word selection, thereby indicating that the user has not yet entered enough letters as of yet.

[0042] In one embodiment, user context, history or the like, in accordance with the particular individual user, or in accordance with the collective experience of the full set of enterprise users may be employed to aid in such suggested word selection. Additionally, while the described predictive text algorithm may be employed, the present disclosed technology may be used with any appropriate text parsing or predictive text algorithm.

[0043] Using a matrix of probabilities the predictive text algorithm knows that for each character pressed, the user could have meant characters to the left, right, above or below, or the other characters in the zone indicated in as described above. Once the algorithm knows which characters are probable (based upon the keys associated with a selected key, the algorithm then runs a search against a dictionary preferably provided at an enterprise server location as accessible to a plurality of enterprise users, as is more completely described in the '425 application referenced above. Any words that match the string of probable characters are designated and then preferably scored based on distance between characters, frequency, probability, and any number of other characteristics that may be indicative of a user intention.

[0044] The system may also adopt over time to give a higher probability of selection to frequently used patterns of a particular user, or to particular groups of users in an enterprise setting. Thus, the prediction mechanism may be personalized for a particular user, even if that user is selecting words from a common centralized enterprise dictionary or database. Such personalization may comprise providing selections based upon a frequency of selection of words by a particular user during a predetermined preceding time period. Thus, the more a user uses a particular word, the more likely it may be to be selected again, and the more likely it will be suggested to

the user. This personalization may be particularly useful in such a situation as when a user is entering an email address from a centralized, enterprise wide email list. As a particular user sends email to one or more particular recipients, the names of these recipients are more likely to be entered by the user in the future. Furthermore, such personalization need not be limited to a single person. Rather, entry of particular email addresses may be accumulated for a group of people or the like, thus allowing for a department or the like to generate a preferred list of email addresses. This selection may also be applied to standard words or other sequences that may be selected in accordance with a text entry system. Such personalization may provide a weighted selection system in which the words or email addresses that are selected most recently or frequently are provided first to a user followed by words selected at an earlier time, or less frequently.

[0045] In another embodiment, the personalization of a user dictionary is not limited to words commonly or recently selected by a user. The dictionary may also be customized based on recent behavior of the user. If a user is searching the internet for web pages devoted to particular topic, words from those web pages can be classified and added to the dictionary as more likely choices. For example, if a user is viewing web pages on their remote device associated with food and cooking, then when the user enters the keys "d i s e r t" the word search algorithm uses the recent history to suggest the word "dessert" before the word "desert." Similarly, temporal and geographical considerations can be used by the text selection algorithm. For example, the GPS location of the remote device can be detected and sent to the enterprise server. If is known that a user is located in the mountains, then the text prediction algorithm is trained to suggest that a text entry of "how is the snor?" should be "How is the snow?" as opposed to "How is the show?"

[0046] In this embodiment, information about the recent browsing history, current location, e-mails read, GPS location etc. is send to the enterprise server and maintained in a file associated with user in order to customize a dictionary or to aid in selecting likely words for the user based on their recent behavior.

[0047] A can be seen in Figure 3, a displayed keyboard represents a full QWERTY keyboard, but may comprise any other desired configuration. Such keyboard may

comprise a virtual keyboard, or a physical keyboard including hard keys associated with one or more letters to be provided for text entry. While the disclosed technology has been described as generally making reference to such a keyboard, any number of input devices, mechanisms, or schemes may be employed. The disclosed technology is similarly applicable to text input on a traditional mobile phone with 9 or 12 key number pad or 4-way directional key. The disclosed technology may be applicable to use of a scroll type wheel, such as that provided on an Apple Ipod ® device. In such a situation, it may be beneficial to define zones in a circular configuration so that movement along the scroll wheel results in movement along a circle of zone selection.

[0048] The disclosed technology may also be applied to a mobile or other device using a scrolling device, or otherwise comprising only one or two directional indication keys. With a scrolling device or one or two direction keys, the predefined zones are preferably provided with a predefined sequence, such as perhaps left to right, then top to bottom, so that upon scrolling or utilizing a directional key, a user is forwarded through each of the predefined zones, highlighting or otherwise indicating the presently selected zone. Pressing in the scrolling device, or other method of selection allows a user to choose the zone, and then scrolling is employed to move to a next zone for selection.

[0049] The disclosed technology may further be applied to a projected keyboard where various sensing mechanisms determine where a user touches a projected keyboard. As the accuracy of such sensing is likely difficult to determine, allowing a user to select from a smaller number of larger zones would be quite beneficial.

II. MICROGESTURE INPUT

[0050] In accordance with another aspect of the disclosed technology, a rapid text entry system and method are provided that leverage error tolerant predictive text algorithms. A user can employ his familiarity with QWERTY keyboard (or other common keyboard layouts) and enter shorter microgestures of two or three letters that comprise less than an entire word. Shorter words can be entered with one such microgesture, while longer words may use two or more microgestures. Thus, the text entry system described below overcomes at least one major drawback of prior systems namely, the

requirement that the user enter the entire intended word entry without lifting his finger and thus provide a single trace for an entire intended word.

[0051] In accordance with one embodiment, a text entry system notes a starting and ending location for each microgesture. Furthermore, if a bend is detected in the microgesture entered by the user, it is determined that a third, middle letter was intended. A number of different methods may be used to determine the intended middle letter. First, a location of the bend in the microgesture may be determined. Second, a direction moved from the starting position may be provided to a text parsing algorithm to help select among a number of possible next letter text entries, given the start and endpoint inputs. Alternatively, a recognition of the existence of such a bend may be determined, thus indicating that a middle letter was intended. The text parsing algorithm may then assist in determining such letter without any additional help, as if it had encountered a missing letter in a more traditional text entry system.

[0052] Once a first microgesture is determined, the selected letters are input to a text selection algorithm, and word suggestions and the like are provided to a user in a more traditional format. If no word is selected, a next tap of a key, or a next microgesture is determined to be part of text entry for a same, longer word.

[0053] In one embodiment, users slide their fingers between a number of characters on the keyboard instead of lifting and pressing each intended letter to be entered. It has been determined that some users prefer such sliding to neighboring characters instead of tapping each character individually, because it is more convenient and reduces the potential for text entry error as compared to a traditional tap entry system where the user may tap the wrong key if required lift their finger and press each key in succession. Further, the user is able to avoid any type of repetitive stress issues, and may be able to enter text more quickly.

[0054] When using smaller, typically mobile, touch screen devices users have been found to generally type using one or two fingers instead of all fingers as they would on a more traditional regular laptop/PC keyboard. The use of only one/two fingers can result in finger fatigue and discourage users from typing on a touch screen device. The required act of lifting and placing the finger for each letter to be entered is often associated with repetitive stress injuries such as carpal tunnel syndrome and the

like. In accordance with an embodiment of the disclosed technology, a user has the option to either slide their fingers to enter a few letters, or tap the entry of a particular letter as desired. Thus, rather than requiring tapping as in traditional text entry systems, or tracing the letters for an entire word as noted in the prior art patents listed above, the user has the option and flexibility of entering text as he or she prefers. Such preferences may be based upon particular input device, particular word being entered, etc. Ultimately, users are provided with a most flexible option and can choose to enter with microgestures, tapping, or a combination of both based on convenience.

[0055] Microgestures allow users to select 2 or 3 characters at a time with a single microgesture. One further benefit of such microgestures is that users do not have to mentally or physically trace a complete path for a word before the predictive text algorithm begins suggesting corresponding words. Tracing a path for longer words can be confusing and difficult. Users tend to forget which characters of a word they have already entered and tend to misspell. Tracing paths for long words may also result in mental and/or physical fatigue. Further, because an apparatus receiving a path tracing an entire word must wait for completion of that word before processing the input data, it is not possible to provide automatic completion of such text entry, or suggestion of possible intended word entries. Thus, the user must complete tracing of the entire word, and only then can the system provide word suggestions.

[0056] The microgeture input system of the disclosed technology is also useful to input text or words in languages whose alphabets do not fit onto a single keyboard and therefore require getting letters/characters from alternative/function/shift keyboards.

[0057] At the completion of each microgesture, however, the system in accordance with one embodiment of the disclosed technology is able to auto-complete an input. The ability to use such an auto-complete enables the user to enter only a partial word and choose from the suggestions provided. This enhances the user experience, helps in faster text entry, and even further improves over prior art systems requiring tracing of an entire word because a user will often be able to select a desired input word after simply entering a first microgesture. In this manner, the predictive text algorithm in accordance with the disclosed technology supports error tolerant input for gliding or tapping. The user can be sloppy in entering text and need not provide the

exact character input to get the desired word. In effect, letters that are selected in a microgesture entry are considered by a text parsing algorithm as if they had been tapped in a traditional text entry system. Thus, existing text parsing algorithms can be leveraged, and a far simpler and flexible system is provided to a user. Thus, missing and/or incorrect letters can be received and the system is still able to determine correct and intended text entry by a user.

[0058] Selecting letters for text entry through the use of gliding allows users to trace the path for fewer than all the characters of a word as shown by the example in Figure 4. In accordance with this example, it is assumed that a user is interested in entering the word INPUT. Traditionally, the user would tap each of the five keys. If they hit all of the five keys, the word INPUT would be presented to the user.

[0059] However, in accordance with an embodiment of the disclosed technology, a user need not tap each of the five letters, and indeed may employ one or more microgesture glides to enter the desired letters. There are a number of different sequences for entering the word INPUT in accordance with the disclosed technology.

[0060] As shown in Figure 4, the user can glide their finger(s) over the letters "i-n-p" and tap the letters "u", "t". As is shown in the above figure, the user begins their microgesture glide at "i", then glides to "n" and finishes the microgesture glide at "p". Thereafter the letters "u" and "t" are tapped to input the full word. The following alternative input sequences would also result in the word INPUT being recognized by the text prediction algorithm:

[0061] Glide "i-n-p" and glide "u-t"

[0062] Tap "i", "n" and glide "p-u-t"

[0063] Tap "i", "n", "p" and glide "u-t"

[0064] In order to further ease a user experience any glide or tap entered by the user may be maintained on the display for a period of time to provide sufficient feedback to the user to determine what was entered. As noted above, however, such maintenance of glide entry is useful only for the user and preferably may not play a role in determining user input (Of course, it would be possible to use such glide location to determine text input in an alternative embodiment of the disclosed technology.) Thus,

while the trace shown in Figure 4 shows the path that a user may observe on the device, internally the text prediction algorithm in accordance with the disclosed technology is preferably different, only keeping track of the initial and last character of a glide entered by the user. A middle character, if any, is deciphered using vectors associated with movement directions between the first and last letters of the glide, or less preferably, using an approximate location of a bend in the glide entered by the user. Therefore, in accordance with the disclosed technology, the inventive algorithm tries to find words from a database by using the first and last character input with a particular first glide and a middle character, if any. Based upon a determination of a bend in the glide, or use of a wildcard character assuming a three letter glider, the text prediction algorithm returns results. Further calculations may then be performed to filter words where the middle character does not meet the vector direction as drawn by the user.

[0065] The following example further depicts the use of such glide and vector algorithms. If the user traces a path "t-h-e, "h" is lower and to the right of "t". An initial pass through the algorithm will return words like "tie", "toe" and "the". Upon viewing of a vector of movement after entering the first letter "t", it can be determined that the user moved down towards the letter "h". Because both the letters "o" and "i" are to the right of the letter "t", they will be discarded (or provided as lower valued selections to the user) as there is a closer option that the algorithm will find. The letter "h" from the potential suggestion choice "the" more closely meets the vector proximity of the input and hence will preferably be chosen as the middle character. Furthermore, error tolerant text entry may be provided, and thus, the user could trace "r-j-w" and still get "the" as a suggested word. The letter "j" is located downward and to the right of the letter "r" and the letter "h" is located downward and to the right of the letter "t". Since both vectors are in close proximity, the letter "h" will be chosen as the middle character.

[0066] An explanation of vector direction will now be described, and is more completely described in US Patent Application Serial No. 12/091,700 to Sharan et al., filed June 14, 2007, entitled "DATA ENTRY SYSTEM AND METHOD OF ENTERING DATA", the entire contents of which is herein incorporated by reference. The disclosed technology advantageously encodes the user inputs with regard to the translational

movements i.e. the directions of one key relative to another when actuated sequentially by the user.

[0067] The translational movements are preferably coded within a set of predetermined primary directions, these being a reduced set of all possible directions which can be taken between two consecutive key actuations. One example of the reduced set would be the four directions: "up", "down", "left" and "right". Thus, rather than registering each translational movement according to the actual direction taken, the system preferably assigns one of the reduced sets. For example, if the actual direction of movement between two actuations is 10° off vertical, the transitional movement would be assigned, for example to "up", this being the closest of the primary to a real 10° heading.

[0068] Reducing possible directions from an infinite number to a small number, such that all translational directions are categorized within a reduced group, e.g. to "up", "down", "left" and "right", means that many disparate translational directions will be assigned the same primary direction. For example, all movements with a bearing up to ±44° with respect to a direction straight up could be assigned the same primary direction "up". Moreover, this will include translational movements with the same actual bearing, but with completely different starting points, such that the same vertical movement occurring at many different points on the keyboard could all be represented simply by "up".

[0069] An exemplary predictive text algorithm for use in accordance with the microgesture text entry system of the present disclosed technology is described in United States Patent Application No. 12/186,425 referenced above. Such an algorithm utilized in accordance with the present disclosed technology addresses the predictive text requirements of the disclosed technology. The user interface will pass the algorithm a character (or string of characters associated with a particular jumper point and zone) and the algorithm will interpret that character (or characters) and return a result to the user interface in the form of one or more suggested word selections, or may return an indication of an inability to properly parse out a word selection thereby indicating that the user has not yet entered enough letters as of yet. Of course, user context, history or the like may be employed to aid in such suggested word selection.

Additionally, while the described predictive text algorithm may be employed, the present disclosed technology may be used with any appropriate text parsing or predictive text algorithm. As long as jump points can be associated with a number of different inputs, and these inputs can be differentiated from each other and used to select an intended input by a user, the disclosed technology may be employed.

[0070] Thus, using a matrix of probabilities the algorithm knows that for each character pressed the user could have meant characters to the left, right, above or below, or the other characters in the zone indicated in accordance with the disclosed technology as described above. Once the algorithm knows which characters are probable (based upon the keys associated with a selected jumper point, or alternatively, a dynamic or other determination of user intention, i.e. which letters it is likely the user intended, even if a predefined zone is not provided, the algorithm then runs a search against a dictionary, as is more completely described in the '425 application referenced above. Any words that match the string of probable characters are designated and then preferably scored based on distance between characters, frequency, probability, and any number of other characteristics that may be indicative of a user intention. The system can also adopt over time to give a higher probability of selection to frequently used patterns of a particular user. Thus, the prediction mechanism may be personalized for a particular user.

[0071] In order to additionally aid in determining user intention, in accordance with the disclosed technology the predictive algorithm of the proposed system may, in addition to relying upon a traditional dictionary, attempt to further determine user intention by determining the context of a particular text input, such as determining whether the input is for an email, chat, search, or the like, or whether the text input is taking place during a particular television show, or while a music application is playing a song. To the extent a user is likely to use different words and/or other language differences, such context determination may aid in the accuracy of the predictive text algorithm. The algorithm may also receive information about information from stored content, the content of one or more databases, such as a user's contact list or the like, to improve the reliability of the prediction. Such context may be stored within a device being used for text entry, or may be stored remotely in a database accessible over the Internet, or other available network. The list of words is then sorted based on that

score and returned to the user interface. Thus, the disclosed technology uses the redundancy in the input language or the possible input functionalities to map approximate input into non-ambiguous input per the user intention. Additionally, device features and functionality may be considered when determining user input, thus perhaps taking into account device limitations when determining such input.

[0072] While the present disclosed technology has been described in one embodiment employing the predictive text algorithm of the '425 application, it is possible to use other text parsing algorithms. One such alternative text entry system is described in US Patent Application Serial No. 12/500,676 to Sharan et al., filed July 10, 2009, entitled "METHOD AND APPARATUS FOR TEXT INPUT", the entire contents of which is herein incorporated by reference. The '676 application describes a system and method for dividing the keyboard into a plurality of zones, and then considering any text entry in a particular zone to be a selection of all of the letters in the zone. Thus, the user is able to be less precise when entering text. This system may be used in conjunction with the microgesture entry method described above, and thus, each determined starting point, ending point, and any vector directions or bend determination need only indicated zones that include the intended letter, thus further easing the difficulty of text entry for a user.

[0073] Additionally, while the disclosed technology has been described for a user making contact with a displayed or touch screen keyboard, it would be equally applicable to a keyboard that did not require contact, but might allow for text entry upon a user drawing a finger or the like in proximity to a particular key or the like. A microgesture may comprise the finger moving above the keyboard to a final key, which might be considered entered when the user removes the finger. Thus, processing may proceed in accordance with the systems and methods described above, but relying on proximity detection rather than contact for key selection and entry.

[0074] While a primary use for the method and system of the disclosed technology may be for small mobile devices or other small electronic devices such as cameras, personal assistants, netbooks and the like, such input system may be equally applicable for entry on, for example, set top boxes or television using a remote control, or other input device, such as a Wii® controller or the like. Thus, a user may begin

entry by pointing to a key (or zone), depressing a selection button, holding down the button while the user moves an indicator through a second letter (if desired) to a third and final letter of the microgesture, indicated by release of the selection button. A more complete description of entry employing the zone input system and such a remote control in the '676 application, previously incorporated herein by reference. Indeed, it is contemplated that the present disclosed technology may be applicable to any input scheme or technology noted in the '676 application, including but not limited to remote control, Wii® remote, hand gestures, or other entry technique.

III. SUITABLE USER INTERFACE

[0075] Figure 5A illustrates a user interface suitable for receiving multi-modal user inputs (e.g., a mixture of taps, traces, hovers, other tactile inputs and/or non-tactile inputs) and outputting words. The user interface described herein may form part of any system where it is desirable to convert user input into words, including, but not limited to, mobile phones, personal digital assistants, portable audio systems, laptop computers (including ultra-mobile personal computers), desktop computers, other computing systems, video game systems, televisions, and myriad other consumer and commercial electronic systems or appliances (including, e.g. refrigerators, kiosks, etc.)

[0076] The user interface comprises a touch screen or similar display that facilitates both tactile input from a user (e.g., by fingertip or by stylus) and visual output. As indicated by the illustrative axes, each point on the display may be described by a unique X-Y coordinate. Additionally, although not shown in Figure 5A, the user interface may receive other inputs, including inputs from a system accelerometer and/or pressure sensors in the touch screen, audio inputs, visual inputs, etc. Additionally, the user interface may produce other outputs, including other visual outputs, audio outputs, haptic outputs, etc.

[0077] The sample display shown in Figure 5A (and other depicted displays) is for a wireless mobile device, and includes an upper horizontal portion 502 that provides certain system information, such as signal strength, wireless carrier name, time, battery strength, etc. Below the upper horizontal portion 502 is an application bar 504 that includes some information and input buttons for an application, which in the depicted

displays is an email application. A text display portion or output area 506 displays text input by the user, which for example, may be associated with an application program. A word suggestion portion or word choice area 508 (described below) displays suggested words to the user based on user input.

[0078] The user interface display includes at the bottom a virtual soft-key keyboard area 510 that is configured to display a virtual keyboard and receive tactile user input that indicates character selection from that virtual keyboard. As shown, a virtual keyboard has multiple defined areas arranged in a particular layout on the display. Each defined area circumscribes a key. Except for special function keys, each key in the virtual keyboard is associated with one or more characters, as described in greater detail herein. As used herein, the term "characters" may include alphabetic letters (with or without diacritic markers such as accents), digits, characters or symbols that represent a phonetic or sub-word component, including Japanese kana, Korean jamos, and Chinese zhuyin, or another linguistic and non-linguistic characters such as digits, and punctuation that are contained in abbreviations, chat slang, emoticons, user IDs or URLs. Special function keys in a virtual keyboard are associated with the performance of special functions related to the input of textual information (e.g., capitalization of a letter, deletion of characters). Special function keys may include, but are not limited to, a shift key, delete key, numerical input key (e.g., to select a keyboard layout suitable for faster entry of numerical and symbolic characters), a multi-keyboard selection key (e.g., to select a different keyboard layout and/or virtual keyboard that supports a different character set), a return key, and a space key.

[0079] A user may provide different types of tactile input to the virtual keyboard area 510, as described in greater detail herein, in order to indicate his selection of a sequence of characters. The user may intend for a set of his tactile inputs to collectively result in the formation of a particular intended word in the output area 506 shown in the user interface display (or at another output), For clarity, unless the context clearly requires otherwise, the term "word" as used herein denotes any type of linguistic object, including, but not limited to, a string of characters, word stem, prefix, suffix, phrase, sentence, abbreviation, chat slang, emoticon, user ID, URL or ideographic character sequence, emoticons or icons.

[0080] Without system intervention, a user's raw tactile input to a virtual keyboard might result in an unintended word being added to the output area that is different than his intended word, if for example, the (1) user is sloppy or inaccurate with his tactile inputs, (2) the user misspells the word, (3) multiple keystrokes are required in order to select a particular character (e.g., if a diacritical marker is needed, or if the virtual keyboard has a half-QWERTY or 12-key layout, such as the one shown in Figure 1H), (4) the intended word is particularly long, and/or (5) other reasons. Any of these factors may delay the user's entry of the intended word.

[0081] Thus, to facilitate an improved user experience, the disclosed user interface may provide user input received from the virtual keyboard area 510 (and other areas of the touch-sensitive display and/or other inputs) to a disambiguation system or module such as the disambiguation module disclosed herein. The disambiguation module resolves the received user input to generate a suggested list of word choices (a "word choice list") that may be rank-ordered or otherwise organized in a logical fashion. The user interface may then display a subset of the word choice list generated by the disambiguation module in the word choice list area 508 (e.g., in an ordered or grouped fashion). Within the word choice list area, one or more default words may be highlighted (e.g., "are" as shown in Fig. 5A) and/or displayed in the output area. The user may select a word displayed in the word choice area to indicate his intended word (e.g., by providing tactile input within the word choice list area; by depressing a point on the display at or near a special key, such as the space bar; or by providing other input indicative of selection). The user may alternatively review additional results from the word choice list in the word choice list area (e.g., by scrolling or swiping within the word choice area) before selecting a word. After a user indicates his selection from the word choice list, the user interface may then add the selected word to the output area 506 (or otherwise output the selected word).

[0082] Although the user interface display is described herein primarily as a touch-sensitive touch screen, one having skill in the art will appreciate that the user interface and disambiguation systems and methods described herein may be implemented instead using laser projection keyboards, muscle sensing keyboards, fabric keyboards, motion-sensitive video systems (such as the Nintendo Wii®), virtual reality systems, etc. since these systems are capable of displaying a virtual keyboard and translating

user actions into positional information within the displayed keyboard that is analogous to the tactile input of a touch screen.

Modes of User Input

[0083] Figures 5B-G illustrate various types of user inputs that may be received by the suitable user interface shown in Figure 5A and analyzed by a disambiguation module to produce a word choice list that is displayed within the user interface. For simplicity, tactile user inputs to a touch screen display are described herein in conjunction with a user's depressing the display with a fingertip. However, one having skill in the art will appreciate that the user may depress a touch screen by any suitable means, e.g., a finger, a stylus, or any other suitable input tool.

Tap Inputs

[0084] Figure 5B illustrates how the user interface may receive a series of taps and output a word choice list in response. A tap consists of a user briefly depressing the touch screen at a localized point before lifting his finger. In the example of Figure 5B, the user interface may receive a series of three taps (at time (T)=1 near the "A" key, at T=3 on the "D" key, and at T= 4, on the "E" key.). In this example, using these three tap features, the disambiguation module produces a word choice list, including the default choice "are." This default choice illustrates how a disambiguation module may correct apparent user errors, since in the English language it is more like a user would intend to create the word "are" instead of the word "ade."

Trace Inputs

[0085] Figure 5C illustrates how the user interface may receive a trace input from a user and output a word choice list in response. To input a trace, a user depresses or places his finger on a point on the touch screen display, and while continually depressing the display, he traces a line within the display with his finger before eventually lifting his finger from the screen. As will be described in greater detail herein, a trace input may be further broken into at least two different types of discrete features: corners and segments. As described in greater detail herein, a "corner feature" results upon the occurrence of different types of events during a trace, including, but not limited to a user: (1) initially depressing the screen at the beginning of

a trace, (2) lifting a finger off the screen at the end of the trace, and/or (3) abruptly changing direction during the trace. Each pair of corners then demarcates a segment feature that runs along the user's trace path between the two corners.

[0086] In the example shown in Figure 5C, the user inputs a trace starting at T=1 by depressing his finger on the screen near the "K" key in the keyboard area 510, tracing his finger upward to a point near the "P" and "O" keys, abruptly changing his direction near that point by moving across the top row of the virtual keyboard, and finally, at time T = 3, lifting his finger from the screen at a point near the "W" key. As shown by the three dots, this single continuous trace may be broken into three distinct corner features (corner 1, corner 2, corner 3) and two segment features (segment 1 extending between corners 1 and 2, and segment 2 between corners 2 and 3). As shown in Figure 5C, using the five extracted input features (three corners and 2 segments), a disambiguation module may produce a word choice list, including the default word "how," that is displayed to the user via the user interface.

Hover

[0087] Figure 5D illustrates how the user interface may receive a hover input feature from a user. A hover feature comprises any user input where the user gives special emphasis to a point within the display in a specified manner, which may include pausing a finger near a point, wiggling, encircling or scribbling a finger around a point, decelerating near a point during a trace, providing additional pressure at a point (e.g., as detected by a pressure-sensitive touch screen display), providing a second tap with another finger simultaneously during a trace, etc. For example, as shown in Figure 5D, during the trace described previously with respect to Figure 5C, a user may input a hover feature at a point near the "T" key by lingering there during the time window T=[2:5]. Although Figure 5D shows a hover feature occurring in conjunction with a trace feature, a hover feature may occur in other instances (e.g., in conjunction with a tap feature, e.g. if a tap depression extends beyond a threshold duration).

Multi-modal inputs: multiple tactile features

[0088] The user interface described herein permits a user to input different types of input features in any order (e.g., to input a trace followed by two taps, followed by

three traces, etc.). Furthermore, the user interface permits a user to pause after inputting a first feature (e.g., a trace), and then resume his input (e.g., to input a second trace or to input a tap). After a pause, a disambiguation module may utilize both the input features detected before the pause and after the pause in order to generate a word choice list.

[0089] Figure 5E illustrates how the user interface may receive an input from a user that comprises different types of tactile input features and, in response, displays a word list that is generated using all of the multiple input features. In the example of Figure 5E, from T=[1:3], the user provides the same input as shown in Figure 5C by tracing out a line that results in the default word "how" being displayed in the word choice list. The user then pauses until T=7, when he taps between the "E" and "R" keys (which may result in the display of an updated word choice list). He again pauses until T=9, when he initiates a new trace near the "V" key that ends near the "F" and "R" keys at T=10. At the conclusion of this trace, using the totality of all of the input features (i.e., a first trace (consisting of three corners and two segments), a tap, and the second trace (consisting of two corners and one segment), the disambiguation module updates the word choice list so that the default word displayed in the user interface is "however."

Multi-modal inputs: Tactile input features and audio inputs

[0090] As illustrated by Figures 5F-G, the user interface described herein also permits a user to mix multiple tactile inputs and audio inputs in a complementary fashion. In such examples, the user interface and/or disambiguation module may further comprise a voice recognition module configured to parse and/or disambiguate an audio input into words and/or word choice lists. As a first example, the user interface may permit a user to provide an audio input in order to select a word from a word choice list that was initially generated by tactile user input. In the example shown in Figure 5F, during time T=[1:10], the user provides the same input described in Figure 5E by inputting multiple tactile features that result in the display of a word choice list that includes the default word "however," as well the word "howdy." At time T=11, the user indicates his intent to select the latter word by saying "howdy" aloud in order to produce an audio input to the user interface that is indicative of that choice (e.g., by

speaking into a microphone that is coupled to the device providing or carrying the user interface).

[0091] As another example, the user interface may permit a user to select, via tactile input (e.g., a trace input), a word from a word choice list, wherein the word choice list was generated by audio input (e.g., a word choice list generated using voice recognition software), free form handwriting input (e.g., a word choice list generated using handwriting recognition software) or another mode of input. In the example of Figure 5G, the user begins his input at time T=1 by stating out loud "I am using voice recognition software to enter text initially and using tracing to correct mistakes." In response to this audio input, the user interface (e.g., using a voice recognition module) generates a textual version of the user's sentence in the output area 506, but with an erroneous fourth word ("reconnaissance"). To correct the error, the user, at time T2, selects the erroneous word via a tactile input (e.g., a tap) in the keyboard area 510. The user interface may optionally display a word choice list in the word choice area 508 consisting of the phonetically similar words reconnaissance, recognizable and recognition that is generated by a voice recognition module. The user then traces out the correct word ("recognition") using the virtual keyboard as described previously. By analyzing the trace to determine which word choice it best matches, the system can recognize the user's intended word and correct the mistake. The multimodal nature of the system means that words entered using any particular modality such as speech, tapping, hand writing, speech, etc., can be selected/reselected and corrected. In some modalities, the nature of the ambiguity may result in a single word having more than one word (phrase segment) as an alternative selection, or parts made of more than one word can have a shorter alternative selection. An example is when the user utters: "Do little" which may be recognized as "Doolittle" with alternates of "Do Little" and "Do let a".

[0092] The above examples demonstrate the more general ability of the user interface to mix multiple kinds of disambiguation in a complementary fashion. In these examples, a first modality of disambiguation (e.g. textual disambiguation or audio disambiguation) generates a first word choice list (e.g. an N-best list), the members of which share a common characteristic (e.g., similar character arrangements on a keyboard or a phonetic similarity). Next, when it comes time to disambiguate a second type of user input, the set of possible words that must be searched to disambiguate the

second input (e.g., the "dictionary" searched) is limited to the members of the first word choice list (e.g., an N-best list).

Alternate Keyboard Layouts and Other Features

[0093] The suitable user interface of Figure 5A shows a full QWERTY virtual keyboard that displays at most a single character in conjunction with each key. However, all of the input, output and disambiguation functionalities described herein (tapping, tracing, hovering, multi-modal inputs, etc.) may be suitably implemented with a user interface that utilizes any style of keyboard layout, including keyboard layouts where a single key is displayed in conjunction with two or more characters. For example, Figure 5H shows a user interface that comprises a virtual keyboard with 12 primary keys arranged in a 4x3 configuration and 2 additional function keys to the side (a space key and a delete key). In such a layout, most of the primary keys are displayed in conjunction with 1-4 different characters. In conventional systems that use a similar 12-key layout, a user must typically utilize multiple keystrokes to indicate certain characters (e.g., in conventional systems, four repeated keystrokes or a sustained depression of a key may be required to indicate the letter "i"). In contrast, as shown in Figure 5H, the disambiguation methods described herein permit a user to generate a word list that includes the intended word "imminent" with only a few traces and a tap. In the user interface, multiple input features (e.g., four sequential taps or a long hover over the "4GHI" key) are not required to select the initial letter of the intended word, "i."

[0094] Similarly, unlike conventional systems, in the systems described herein, repeated or prolonged user input features (e.g., multiple input taps or hovers) are not required to select accented characters (or other alternate characters) that may not be visually displayed on a virtual keyboard. As an example, in conventional systems, to select the accented character è on a QWERTY keyboard layout such as the one shown in Figure 5A, a user may need to execute several keystrokes, one of which includes the "E" key. In contrast, the disambiguation methods described herein permit a user to generate a word list that includes words having the accented letter "è" with only a single input feature (e.g., a single tap or corner) to the user interface that implicates the "E" key. In addition to having multiple, similar letters mapped to a single key, the

disambiguation methods described herein may also be practiced with a keyboard layout where numbers show up as alternatives to the letters on the top row.

[0095] Additionally, the user interfaces described herein do not require repeated or additional input features from a user to indicate repeated characters and/or repeated keystrokes. For example, to efficiently input the intended word "moonlight" using the full-QWERTY user interface shown in Figure 5A, a user need only input one tactile feature near the "O" key in order to produce the intended word in the generated word list, despite the occurrence of a repeated "oo" within the intended word. As another example, to efficiently input the word "his" using the interface of Figure 5H, the user need only indicate their selection of the "4GHI" button via a single input feature (e.g., a single tap or corner), since the same key is utilized for both the first letter ("h") and second letter ("i") in the intended word.

Context-driven tracing

[0096] Figure 5I illustrates an example of how context information may be used to provide more efficient text entry. In Figure 5I, a user is searching for a contact name within a contacts application program. In order to enter her friend's name, she traces out a three-cornered trace. When disambiguating this trace entry, the disambiguation module 213 may limit its word lookup to a dictionary that only comprises words (e.g., mostly proper nouns) in the user's contact list. Furthermore, the disambiguation module may use more than just trace matching to rank the word choice list and to suggest a default name. For example, the disambiguation module may promote names that the user frequently enters or accesses, either in the contacts application program, in an email program, or in all application programs. To illustrate, although the trace shown in Figure 5I starts at "D", turns at "A" and ends on the letter "N," forming the common name "DAN," the disambiguation module may still promote the name "DAVID" if the user enters that name with a much higher frequency and/or recency than "DAN."

[0097] Although Figures 5A-5I have emphasized tactile inputs such as taps, traces, hovers and multi-modal inputs related to virtual keyboards, one having skill in the art will appreciate that the disambiguation systems and methods described herein may also utilize other kinds of user inputs, including multi-touch inputs (e.g., two or more fingers upon a touch screen), accelerometer inputs (e.g. inputs that indicate

acceleration of the larger system), handwriting/gesture inputs (e.g., free-form tactile input), and/or signals from input buttons.

Suitable System and Disambiguation Modules

[0098] Figure 6 and the following discussion provide a brief, general description of a suitable computing environment in which the disclosed technology can be implemented. Although not required, aspects of the disclosed technology are described in the general context of computer-executable instructions, such as routines executed by a general-purpose data processing device, e.g., a server computer, wireless device or personal computer. Those skilled in the relevant art will appreciate that aspects of the disclosed technology can be practiced with other communications, data processing, or computer system configurations, including: Internet appliances, hand-held devices (including personal digital assistants (PDAs)), wearable computers, all manner of cellular or mobile phones (including Voice over IP (VoIP) phones), dumb terminals, media players, gaming devices, multi-processor systems, microprocessor-based or programmable consumer electronics, set-top boxes, network PCs, mini-computers, mainframe computers, and the like. Indeed, the terms "computer," "server," "host," "host system," and the like are generally used interchangeably herein, and refer to any of the above devices and systems, as well as any data processor.

[0099] Aspects of the disclosed technology can be embodied in a special purpose computer or data processor that is specifically programmed, configured, or constructed to perform one or more of the computer-executable instructions explained in detail herein. While aspects of the disclosed technology, such as certain functions, are described as being performed exclusively on a single device, the disclosed technology can also be practiced in distributed environments where functions or modules are shared among disparate processing devices, which are linked through a communications network, such as a Local Area Network (LAN), Wide Area Network (WAN), or the Internet. In a distributed computing environment, program modules may be located in both local and remote memory storage devices.

[00100] In one embodiment, the disclosed technology is implemented as a sequence of program instructions that are stored in a non-transitory computer readable

media or computer readable memory. The instructions are executed by processor electronics to perform the functions described herein.

[00101] Aspects of the disclosed technology may be stored or distributed on tangible computer-readable media, including magnetically or optically readable computer discs, hard-wired or preprogrammed chips (*e.g.*, EEPROM semiconductor chips), nanotechnology memory, biological memory, or other data storage media. Alternatively, computer implemented instructions, data structures, screen displays, and other data under aspects of the disclosed technology may be distributed over the Internet or over other networks (including wireless networks), on a propagated signal on a propagation medium (e.g., an electromagnetic wave(s), a sound wave, etc.) over a period of time, or they may be provided on any analog or digital network (packet switched, circuit switched, or other scheme).

[00102] Figure 6 illustrates a suitable data processing or computing system 600 in which a disambiguation module 613 may operate in order to provide the user interface functionality described herein. The computing system may include a touch screen display 603, other input devices 608, an audio output component 604, other output devices 606, one or more processors or central processing unit (CPU) 601, and at least one memory 610, some or all of which may be carried or housed within a housing (not shown). As an alternative, or in addition to the CPU, the computing system 600 may include one or more digital signal processors (DSPs), application-specific integrated circuits (ASICs), field programmable gate arrays (FPGAs), or other logic/data processing circuitry.

[00103] The input and output components may include a global positioning system (GPS), a digital camera, a wireless LAN (WiFi) interface, a motion sensor, accelerometer, a Bluetooth® interface, an external USB or similar port, a headphone or headset jack adapter, projection display, haptic output device (e.g., a vibrator), as well as other components or a communication elements. For example, the Bluetooth® interface may communicate with an external wireless communications component, such as a wireless headset, to not only receive audio input but also provide audio output. In one implementation, the computing system 600 is a mobile phone, whereby the system

also includes one or more radios coupled to the CPU 601 to permit wireless communications.

[00104] The output modalities of the system may include text-to-speech, audio, vibration, tactile, visual, etc. outputs. For instance the system can let the user know which input features, characters and/or letters have been recognized by adding a 'vibrate' or 'sound' feedback. Similarly, the system can provide the user with more detailed understanding of the features extracted and the level of uncertainty involved in its determinations.

[00105] The memory 610 may further comprise an operating system 611, a disambiguation module 613, and one or more application programs (shown as application programs 1 through N 614-616). The application programs can include word processing programs, slide presentation or image creation programs, email programs, SMS/MMS messaging programs, instant messaging programs, or other text-based communication or text-based document creation programs.

[00106] The disambiguation module 613 receives user input data from the operating system, including data related to a user's input with the touch screen 603, and uses the received input data to identify a user-selected word, which it may provide to an application program. For example, the disambiguation module 613 may receive a series of notifications from the operating system 611 of finger down events (when a user depresses a point on the touch screen), finger move events (e.g., when a user moves his finger while depressing the screen), and finger up events (e.g., when a user lifts their finger from the touch screen). (While generally described herein as using a finger, the user may use anything to touch or actuate the touch screen, such as a stylus.) Each of the received notifications may include a time series of position data, e.g., an X-Y set of coordinates (x, y) with a timestamp t (i.e., the coordinates (x, y, t)), which reflect the user's tactile input to the touch screen 603. Additionally, if the touch screen 603 comprises pressure sensors, the received notifications may include a time series of position and pressure data, e.g., a set of coordinates (x, y, t, p) that reflect the user's tactile input to the touch screen 603, including the applied pressure, p. The operation system 611 may also provide other kinds of input data to the disambiguation module 613, including multi-touch inputs (e.g., additional sets of simultaneous

coordinates (x, y, t) representing a second finger simultaneously contacting the touch screen), audio inputs (e.g., voice inputs), visual inputs, accelerometer inputs, location data, sensor data, etc.

[00107] The disambiguation module may additionally receive and process dynamic context data from the operating system and/or application program(s) in order to facilitate its word identification. Context information is any information that may help inform the disambiguation module of the user's intent, and may include information such as sentence or word-pair context, language context, application-specific context (e.g. data fields/tags), user-specific context, location, time of day etc., as described in greater detail herein For example, the module may receive context information such as the last word selected by the user, other sentence-level context, the virtual keyboard layout utilized, the type of entry field into which the word will be entered (e.g., a "Contacts" field), location data (e.g. where the computing system includes a GPS receiver or accesses location data), calendaring data for the user, and/or context data or applications used or being used that may utilize the identified word. As another example, the disambiguation module may receive an "N-best" list from another mode of input. An N-best list is a rank-ordered list of suggested words, which may be capped at a fixed size (e.g., N). As one example, an N-best list may be generated from another type of disambiguation application program or module, such as a list of words generated from a speech recognition program (e.g., a list of homophones) or a handwriting-recognition program. As still another example, if a user is entering text in order to respond to an earlier email, the disambiguation module may receive a list of words used in the earlier email.

[00108] The disambiguation module may include a character selection submodule 618, a word list selection submodule 620, a keyboard mapping database 622, a vocabulary module 624, a user context database 626, an application context database 628 and a disambiguation parameter database 630. While depicted as separate modules, a single module, program or routine may incorporate two or more of the modules.

[00109] The character selection submodule 618 is configured to analyze received user input or input data to extract input features (or "input features"), e.g., taps, corners,

segments, hovers, or other features. The character selection submodule 618 is further configured to analyze the extracted input features using a language-independent keyboard mapping database 622 to produce an input sequence that comprises an ordered set of feature objects (e.g. rank ordered set of letters for a word being spelled). Each feature object in the input sequence is associated with a set of characters associated with corresponding keys for one of multiple virtual keyboards or key layouts, a set of proximity weights, and one or more feature types. The proximity weights reflect the likelihood that a user intended to effectuate a particular keystroke via a particular input feature (e.g., a tap, corner, segment, or hover). This likelihood may be based on the proximity between the location(s) of the input feature and the location of the key on the virtual keyboard. During its operation the character selection submodule may utilize parameters, policies, and preferences retrieved from the disambiguation parameter database. Further details on aspects of the character selection submodule 618 may be found in the assignee's U.S. Patent Publication No. 2006/0274051 entitled "VIRTUAL KEYBOARD SYSTEMS WITH AUTOMATIC CORRECTION, and incorporated by reference herein.

[00110] The keyboard mapping database 622 permits the character selection submodule 618 to evaluate the likelihood that that a user intended to effectuate a particular keystroke by inputting a particular input feature. For each type of virtual key layout utilized by the system and displayed to the user on the touch screen, such as a full QWERTY (e.g. 28-key, 32-key, or more), 14-key half-QWERTY keyboard, 12-key "numeric" keypad, etc. The keyboard mapping database 622 provides an area-to-key mapping that maps a particular key to a particular defined area or point on the touch screen display, and vice versa. For example, in a full 28-key QWERTY key layout, an area-key mapping may define the "E key" using the set of four points of the display: {(x1,y1), (x2,y2), (x3,y3), (x4,y4)}. As another example, in a 4x3, 12-key layout, such as the one shown in Figure 1-H, an area-key mapping may define the "5JKL" key using the set of four points: {(x11,y11), (x22,y22), (x33,y33), (x44,y44)}. Of course, other mappings are possible, such as an x-y center location and radius to define a circle for the virtual keyboard and a map to a corresponding character for that virtual keyboard (where the circles may be intersecting).

[00111] Additionally, for each type of character layout utilized by the system, (e.g., an American English full QWERTY character layout vs. a French full AZERTY character layout) the keyboard mapping database provides a key-character mapping that maps a particular key (e.g., the "E key") to one or more characters (or for special function keys, to a particular function), and conversely, maps characters to a particular key. A key-character mapping may describe a one-to-many relationship, wherein a particular key is associated with more than one character, including characters that are not displayed on the virtual keyboard to the user of the touch screen. For example, in a key-character mapping related to a full QWERTY key layout, an "E key" may be mapped to two or more of the following characters: E, e, ë, ê, é, è, Ĕ, ę, Ę, ė, Ė, ĕ, Ĕ, ē, Ē. As another example, in a key-character mapping that is related to a 12-key layout like the one shown in Figure 5H, the "5JKL" key may be mapped to the following characters: 5, %, J, j, K, k, L, l. A single area-key mapping may be related to more than one key-character mapping, e.g., to permit easier multi-lingual input via a single virtual keyboard layout. The use of a keyboard mapping database 622 to disambiguate user input is described in greater detail herein.

[00112] In addition, keys may combine to form Romanization, transliteration or transcription inputs allowing the user to enter foreign characters using standard Latin-1 based keyboard. Users can type a word using the Latin-1 based keyboard the way it sounds, and the transliteration component will produce a word in its native script. For example typing “serodija” results in the Russian word “сегодня”. One or more Latin1 characters can combine to form one or more Russian characters. These mappings can be implemented in a variety of ways, using state machines, or other commonly used methods. This translation, or transliteration layer adds a layer of mapping or additional submodule implemented as probabilities. In cases where there is a one to one mapping, the implementation is straightforward. When there are multiple interpretations, each mapping can be assigned a probability value. For example, in Hindi, letters may have more than one valid mapping. For instance: the character इ has the following mappings: i, yi, ee and yi. Similarly the character ई maps to i and yi. Context or other parameters noted here may be used to further disambiguate or order the displayed listed of options to the user.

[00113] The word list selection submodule 620 is configured to receive the input sequence generated by the character selection submodule. The word list selection submodule 620 may analyze the input sequence using a variety of other inputs in order to generate a rank-ordered or otherwise structured word choice list, such as those shown in Figures 5A-5I. The other inputs that the word list selection submodule 620 may use include data from the vocabulary module 624, parameters retrieved from the disambiguation parameter database 630, received dynamic context data, and context data retrieved from the user context database 626 and the application context database 628. The word list selection submodule 620 is described in greater detail herein.

[00114] To facilitate word selection, the vocabulary module 624 provides one or more dictionaries that define a set or logical group of words. For example, an "American-English" dictionary may define a logical group of words in common usage by English-speaking Americans, while an "American-English-Msg" dictionary may define a logical groups of words (including emoticons) commonly used by English-speaking Americans in text and multimedia messages (e.g. SMS, MMS or similar messages). The vocabulary module 624 may also provide additional language information, such as static or dynamic frequency information within a particular logical group of words (e.g., within a particular language) and/or particular context. For example, the additional language information may include frequency information in accordance with a linguistic model, which may include one or more of: frequency of occurrence of a word in formal and/or conversational written text; frequency of occurrence of a word when following certain preceding word or words; proper or common grammar of the surrounding sentences; frequency of the word being utilized as a left-stem or right-stem (or prefix or suffix), etc. In addition to frequency, transition probabilities may be assigned to particular transitions, linking one class of prefixes to likely stems or stems with one or more classes of suffixes while rejecting prefixes with other words in the dictionary which would form illegal words. For example the word work may have high transition probabilities with suffixes –er, -ers, -ing, –s and –ed, which often form valid words.

[00115] Notably, the disambiguation module does not need to change its dictionary if the user changes his keyboard configuration. Furthermore, by using a keyboard

mapping database 622, the disambiguation module may be utilized within any system regardless of the keyboard layout.

[00116] The disambiguation parameter database 630 may store various parameters, policies, and preferences for performing interaction or input feature extraction, character selection and/or word selection. For example, the disambiguation parameter database may include parameters and policies that aid in the selection and application of distance functions, proximity metrics, matching metrics and post-processing steps, all of which are described herein.

[00117] To facilitate improved character and/or word selection, the user context database 626 and the application context database 628 may provide context information to the character selection submodule 618 and/or the word list selection submodule 620 to inform its processing; these submodules may also receive dynamic context information from an application program and/or the operating system. The entry of text, the selection amongst alternatives, contextual information and multiple modalities are managed by the disambiguation module. The system may use inputs from the user, the context of the application, external sensors and context resources and disambiguation, and correction approaches to determine the user's intent as noted herein. Based on an understanding of the user's intent, the system maintains the context and state of the application, and manages the composition of inputs and synchronization across multiple input modalities. By interfacing with business logic, the system can produce multimodal output to be presented to the user. The interaction, the business logic and the context and state may be managed through an interaction script or more complex state machines (State Chart XML or SCXML) or languages which are used for the control of user interfaces such as XHTML+Voice Profile or SALT.

[00118] The user context database 626 may include any historical information relating to the user's prior character and/or word selection behavior, such as previous words utilized by the user, the frequency of words entered by the user, and common phrases employed by the user Other examples of user context information include: word pairs entered by a user, a user's unique vocabulary in a specific application (text messaging vs. email, for example), a user's level of 'sloppiness' (increasing the character region size) while entering text into the system, etc. Additionally, user context

information may reflect how frequently a user selects words from a particular language or what language the user primarily uses. For example, if the system utilizes both French and English language dictionaries for a bilingual user, the user context database 626 may track the relative frequency with which the user selects French words versus English words in order to determine the user's "primary language," and then words from that dictionary may be preferred or presented first over words from the other dictionary.

[00119] Alternatively or additionally, some user context information may be reflected in a user-specific dictionary and/or other data structures in the vocabulary module 624. Additionally or alternatively, the user context database 626 may also provide user-specific policies and parameters that may override default disambiguation parameters stored in the disambiguation parameters database 230.

[00120] The application context database 628 may permit the disambiguation module 613 to access historical information related to character or word selection within a particular application program. The application context database 628 may also provide application-specific dictionaries and/or application-specific policies and parameters that may override default disambiguation parameters stored in the disambiguation parameters database 630. Context can also come from text fields in which the information is supposed to be entered. As an example, in some implementations, the disambiguation module may be designed to integrate with specific types of application programs that define application-specific fields, tags or labels that may be associated with a particular word entry. As an example, the text-field of a form ("Name" or "Email") may be a label that could be utilized to provide context information. The application context database 628 may then correlate a user's historical word entries with application-specific field(s) to provide additional context information. The system may define, in the application context database, application-specific fields and rules (e.g., grammar rules, matching metrics and/or post-processing rules) that reflect how the field information and other context information may be utilized during word selection. These rules may even specify that word suggestions for a particular field can depend on what words a user has entered in other fields.

[00121] The system informs the disambiguation module of the intended textual information of the field (name, phone number, date, email address, password) and/or provides it with a grammar which describes the information. For instance a form which requires State, ZIP and City to be entered would use an approach that would be able to provide appropriate grammars based on the context and content of the other fields. If the State is "WA", the grammar for cities is constrained by actual cities in the State of Washington and ZIP codes are similarly constrained. When City and State are entered, the range of ZIP codes is again constrained. Complex interactions between fields and grammars can simplify the entry of data in such "forms". Alternatively, the system can learn the context for often used text fields.

[00122] To illustrate the use of this context information, consider the example of form filling, where the disambiguation module may remember what words users have entered in particular field(s). To illustrate, in an order form a user may enter his work email into an email field and then the disambiguation module would predict that the shipping address field would contain his work address. In contrast, if he enters his personal email address into an email field, the disambiguation module would predict his home address in the shipping address field.

[00123] Other contextual information includes environmental parameters, such as time of day, location, calendar entries, user settings, application settings and system settings.

[00124] While shown as separate databases, two or more of the databases described herein may be combined, and may be implemented in any data structure or logical construct.

[00125] The character selection submodule 618 and/or the word list selection submodule 620 may keep the user context database 626 and/or the application context database 228 current by providing notifications about a user's present behavior. For example, the word list selection submodule 620 may return information to these databases when a user selects a word from a word selection list.

[00126] Additionally, as described previously, the disambiguation module 613 may also receive additional dynamic context data from the operating system and/or an application program. Although not shown, the disambiguation module may additionally

comprise voice recognition software configured to disambiguate speech or audio inputs, as described herein.

Suitable Disambiguation Methods

[00127] The flow diagrams described herein do not show all functions or exchanges of data, but instead provide an understanding of commands and data exchanged under the system. Those skilled in the relevant art will recognize that some functions or exchange of commands and data may be repeated, varied, omitted, or supplemented, and other (less important) aspects not shown may be readily implemented. Further, although process steps, method steps, blocks, algorithms or the like may be described in a particular order, such processes, methods, blocks and algorithms may be configured to work in alternate orders. In other words, any sequence or order described herein does not necessarily indicate a requirement that the steps or blocks be performed in that order. The steps or blocks of processes and methods described herein may be performed in any order practical, and some steps may be performed simultaneously.

[00128] Figure 7A shows a process 700 for disambiguating a series of user input data that may correspond to multi-modal user input in order to permit the selection of a word from a word choice list. The process 700 is performed by the disambiguation module 613 and begins at block 710, when the disambiguation module 613 waits for and receives input data before proceeding to block 730. Typically, the disambiguation module 613 receives input data in the form of one or more user input notifications or input events from the operating system, but it may also receive input data from other processes, such as an application program. For example, at block 710 the disambiguation module may wait for and receive from the operating system a finger down notification, a finger move notification, and/or a finger up notification, each of which is accompanied by a set of (x,y,t) or (x,y,t,p) coordinates, where x is the x-position of a user's finger on the display, y is the y-position of the user's finger, t is the time or a clock reference for those inputs, and p is an optional pressure measurement (for a pressure sensitive screen). The disambiguation module 613 may also wait for other forms of input data, such as voice inputs, accelerometer input, external sensor data, location information. Although not shown, at block 710, the disambiguation

module 613 may receive additional dynamic context data, e.g., from the operating system and/or an application program. For example, it may receive information about the type of application program or the context in which the user is entering text (e.g., the type of field in which the user is typing, e.g., a date field versus a name field).

[00129] The period of time that the disambiguation module waits for and receives user input data may vary. For example, in one implementation, the disambiguation module may wait to receive an entire group of notifications corresponding to (1) a finger down notification, (2) the next finger up notification, and (3) all of the finger move notifications that occur in between these first two notifications, before proceeding to block 730. In some other implementations, at block 710, the disambiguation module 613 may continuously analyze incoming user input data to identify other types of logical groupings in the user input data and may proceed to block 730 only when a logical group is received in its entirety. For example, at block 710, the disambiguation module may continuously analyze received notifications as they arrive to determine if an input feature (e.g., a tap, a corner, a hover, etc.) or special function has occurred (using, e.g., the techniques described herein at block 802 and block 730, respectively) and when a logical group of input data that corresponds to a single input feature or special function is detected, processing of that logical group may then proceed at block 730.

[00130] At decision block 730, the disambiguation module determines whether the user has provided input that indicates that the disambiguation module should perform a special function, such as word selection, character deletion, or a function related to a special function key (e.g., shift, caps lock, keyboard selection key, etc.). As shown in Figure 7A, if a special function is indicated, processing proceeds to block 780, where the disambiguation module performs the special function in accordance with the process shown in Figure 7B (described herein), before the process proceeds to block 740. Otherwise, if input data does not indicate a special function, the process proceeds directly to block 740.

[00131] At block 740, the disambiguation module utilizes the character selection submodule 618 to identify what input features (e.g., taps, corners, segments, hovers, audio inputs, etc.), if any, are indicated by the received input data. Furthermore, at

block 740, the disambiguation module utilizes the character selection submodule to generate a feature object for each identified input feature. A feature object includes a character set, a set of feature types, and a proximity weight set. The character selection submodule may perform these tasks in accordance with the processes shown in Figure 8A-8B.

[00132] During block 740, the character selection submodule may also characterize each identified input feature using one or more feature types. For example, the character selection submodule may characterize each input feature as a tap, a corner, a segment, a hover, etc. Additionally, the character selection submodule may also determine whether an identified input feature is an "intentional input feature" (or "intentional feature"). An intentional input feature is an input feature that appears more likely to correspond to an intended keystroke by a user as compared to other types of input features. If a feature is not an intentional input feature, it is instead characterized as an "incidental input feature" (or "incidental feature"). When matching candidate words to input features, intentional input features may be treated differently (e.g. weighted higher) than incidental features, as described herein.

[00133] To illustrate, in some implementations, the disambiguation module treats all taps and all corners as intentional input features, since these features indicate a distinct and abrupt change in the user's input behavior. As another illustration, the disambiguation module may treat all taps, corners and hovers as "intentional" input features. The disambiguation module may further refine which input features are characterized as intentional or incidental by employing other factors described herein. Characterization of input features is described in greater detail herein with respect to Figure 8A. In some implementations, the disambiguation module may make no distinction and may treat all input features as intentional.

[00134] At block 750, the disambiguation module may increment an estimated input length variable (L) to reflect the number of new intentional input features, if any, that were identified at block 740. As described herein, the disambiguation module may later use the estimated input length L to pre-filter dictionaries or for other purposes when generating a word choice list at block 370. Similarly, at block 750 the disambiguation module may additionally update other variables that reflect the composition of the input

sequence (e.g., a variable that reflects the number of segment features present in the input sequence).

[00135] At block 760, the disambiguation module appends any newly generated feature objects to an input sequence. The input sequence reflects the ordered set of all input feature objects created since the user last selected a word. The various feature objects in the input sequence are ordered on the basis of time.

[00136] At block 770, the disambiguation module utilizes the word list selection submodule 618 to create a word choice list using the current input sequence and to output this list to the user (e.g., via the word choice list area on a touch screen display). In this way, the disambiguation module gives the user an opportunity to select his intended word. The creation of a word choice list is described in greater detail herein with respect to Figures 9A and 9B.

[00137] In one variant of the system, if the user selects a word in the word choice list, the system may respond by only showing words that start with the selected word. In addition to words, the selection list may also contain objects which are represented by the word. For instance the word love may have an icon in the shape of a heart associated with it. In addition, words which are retrieved from different vocabularies or providers, such as the contact dictionary, may offer additional options when selected. For instance, if a user has entered a name which matches a name in the contacts dictionary, the user may select to add the phone number, driving directions, e-mail address or any other related object, including an object which represents the contact in a machine readable format (vCard etc). Other words may be sent to 'recognizers' which may recognize keywords, phone numbers, potential calendar entries etc. When the user has typed: "Let's meet for Lunch at Joey's," the recognizers could add an action: add to calendar, call Joey's, make reservation, insert directions and more. When the user selects any action, the system may launch an activity which at completion returns the user to the activity of text entry. Such activities may be launched with any relevant contextual parameters that may help the activity to be better informed about the intent of the user, including user history, user preferences. In another example, the user may want to add a song to the email. By typing the name of the song, artist, album or even such keywords as mp3, song, the user may launch an activity that allows the

user to seamlessly attach the object. Optionally, the word(s) which were selected to cause the start of the activity may be automatically deleted.

[00138] Figure 7B shows a process 715 for performing a special function indicated by user input data. The process 715 begins at block 782, when the disambiguation module identifies what types of special functions were indicated by the user's input data. To do so, the disambiguation module may analyze the proximity of tactile user input to a special function key, a word choice list area, and/or other active area, such as a menu button; may perform speech recognition analysis of voice command inputs; may analyze other tactile gestures (e.g. to detect a swipe, a multi-touch action) or physical gestures (e.g., a shake of a device); and/or may perform a lookup in the disambiguation parameters database to map types of input to a special function.

[00139] At decision block 784, the disambiguation module determines if the input data indicates that the user has selected a word (e.g., from a word choice list). User selection of a word may occur, for example, via vocal selection (as described previously), if the user taps, traces or hovers near or over a special key (e.g., a space bar, tab key, enter key, etc.), or if the user taps, traces or hovers on or near a word in the word choice list area. Of course a user may select a word by any other suitable method, such as by shaking a device, pushing an input button, etc.

[00140] In one example, the disambiguation module 613 may provide "auto-spacing" functionality by analyzing the types of input features utilized by the user to determine whether the user's input indicates that she intent to end one discrete word and begin another. In some implementations, the disambiguation module 613 will interpret two consecutive traces in an input sequence (i.e., without another type of input feature like a trace or hover intervening) as an indication that the user intended to (1) select the default word determined for the last trace and the other previous features in the input sequence, and (2) begin a new word starting with the second trace. Thus, at decision block 784, the disambiguation module may determine whether the last two input features were traces. If they were, the system may (1) proceed to block 792 in order to process the user's selection of the last default word, and (2) restart process 700 with the components of the second trace (i.e., its corners and segments) as the first features in a new input sequence. Otherwise, the system may simply

continue the process 700. Of course, any other suitable feature combination could be utilized to test for auto-spacing at decision block 784. More generally, the disambiguation module 613 may perform auto-spacing upon the occurrence of a particular feature composition within the input sequence; the triggering compositions may be set using disambiguation parameters and preferences in the disambiguation parameters database 630.

[00141] Additionally, for certain languages (e.g., compounding languages) or contexts (e.g., URL entry), the auto-spacing feature may be disabled or implemented in a different fashion. For example, if two consecutive traces (or a different triggering condition) is detected, the system may (1) proceed to block 792 in order to process the user's selection of the last default word, and (2) restart process 700 with the components of the second trace (i.e., its corners and segments) as the first features in a new input sequence, and may set a flag that indicates that the last default word and the new word should be compounded when the new word is selected.

[00142] If the input data indicates the user has selected a word, processing proceeds to block 792 where the disambiguation module processes the selected word, otherwise processing proceeds directly to block 786. At block 792 the disambiguation module outputs the selected word to the desired output (e.g., to the output area of a window associated with a currently running application program). The nature of this output may be affected by context (e.g., sentence context), flags, parameters, or other factors. For example, if the immediately previous word in a sentence is a common left stem in a compounding language, and the currently selected word is a common right stem in the same compounding language, the disambiguation module may determine whether to insert a space before the currently selected word, or whether to compound the newly selected word to the immediately previous word. To make such a decision, the disambiguation module may utilize language information from the vocabulary module 624 and/or grammar module. As another example, if the disambiguation module may eliminate a spaces between words if it can infer from the context (e.g., the previous entry of "google.com") that a user is entering a URL.

[00143] Additionally, at block 792, the disambiguation module may update the vocabulary module to reflect the selection. For example, the disambiguation module

may update frequency and recency information related to the selected word and/or may add a user-created word to a user-specific dictionary or temporary dictionary until the user has entered the same word several times. This avoids the accidental addition of garbage words to the user database. The system may even take notice of later edits to the word to remove such accidental additions to the dictionary without further user intervention. In addition, the user may indicate that a user generated word should be added immediately to the user dictionary through a particular action, such as a long press on the word. In addition to the word, the system may also include information about the textual context of the word such as the preceding word/words to further improve future predictions (e.g. with word pairs, as noted herein).

[00144] As another example, the disambiguation module may update a dictionary that is both application- and user-dependent (e.g., if the system maintains different user dictionaries for email vs. text messaging). As yet another example, the disambiguation module may retrieve the previous word entered in order to update the user context database 626 with information that relates to word pairs utilized by a user. For example, if the user frequently used the word pair "school book", and in a current entry a previous word was "school", then the work "book" may receive a higher probability and be promoted within the word choice list. As another example, in some implementations, the disambiguation module may update the application context database 628, e.g., by associating the selected word with an applicable field label.

[00145] Additionally, at block 792, the disambiguation module may analyze current and/or historical received input data, current and/or historical input sequences and current and/or historical selected words in order to adjust its future behavior. For example, the disambiguation module may compare the location of the keys corresponding to a user's selected word to the location of detected features in an input sequence to determine if it can discern any trends in how the user inputs data to the user interface (can the system learn the user's patterns or habits based on a set of similar user inputs). If trends are discerned, the disambiguation module may update user-specific or other disambiguation parameters to reflect any observed trend. As examples, the disambiguation module may adjust its character selection parameters if a user always overshoots or undershoots a character at a corner (or does so in certain cases), if a user wiggles slightly during a tap in an effort to apparently provide extra

emphasis or indicate a repeated letter, if the user typically pauses mid-segment in order to indicate an intended keystroke, etc. As another specific example, the disambiguation module may adjust applicable distance function and/or proximity metric parameters (e.g., those used to generate a corner oval, as described herein) to reflect how a user is particularly precise or imprecise in their input entry. In many instances, the disambiguation module employs a feedback loop, wherein the module stores the series of user inputs associated with the same word the user selected from the word list, compare those inputs, and make adjustments to ordered list of words on subsequent word lists, disambiguation of weights to inputs, etc. Different adaptation models may exist when the system detects a single finger entry (such as the thumb when holding the device in one hand) versus the entry through multiple fingers when holding the keyboard with both hands. In addition, the models can take into consideration other contextual parameters such as speed of the user, the availability of environmental light, etc.

[00146] As another example, the disambiguation module may analyze the selected word to determine the primary or preferred language of the user by determining the frequency with which the user selects words from a particular language, so that the user need not explicitly set his preferred language.

[00147] Additionally, at block 792, the disambiguation module may also update the application context database to reflect the frequency or recency of the word or phrase in the context of a particular application program (e.g., a text message program) and/or a particular application field (e.g., a "name" field). If appropriate, selected fields such as password fields may be remembered, but can be protected from being retrieved until the user enters a secret passcode, gesture, shake, speech command which unlocks the secured memory, vault or location containing these sensitive words for a period of time which may depend on various context parameters. For instance, when a device has entered a 'sleep' mode or a 'screen saver' mode, the vault may auto lock. The behavior of the vault may be defined by the user, if necessary on a per case basis. Furthermore, the user may have defined various 'personas' or guises and based upon explicit or implicit activation, usernames, passwords and other sensitive data may change. For instance, during working hours, the persona would be 'work' while after hours or during the weekends the persona could be 'leisure' or 'home' or 'family', and differing

dictionaries, databases and preferences of the system would be used depending upon the persona.

[00148] Finally, at block 792, the disambiguation module may clear the input sequence and restart a new process 700 as shown in Figure 7A.

[00149] At block 786, the disambiguation module determines whether the input data indicates the deletion of characters. For example, the disambiguation module may determine whether a delete special function key was been depressed (or traced), or whether the user shook the device or otherwise performed a deletion gesture. If a deletion event is detected, processing proceeds to blocks 794 and 796 before block 788. Otherwise processing proceeds directly to block 788. At block 794, the disambiguation module removes one or more feature objects from the input list. Typically, for a single depression (e.g., tap) or trace of a delete key, the disambiguation module may remove the last intentional feature object and any subsequent incidental feature objects from the input sequence. However, the disambiguation module may remove a different subset of feature objects from the input sequence; the number, nature and order of the features removed at block 394 may depend on the precise nature of the input data received (e.g., whether a "delete all" key or gesture was utilized instead of a "delete one" key or gesture; whether a user's deletion gesture or input indicated that a particular feature should be deleted, etc.) At block 794, the disambiguation module may additionally decrement the estimated input length variable L to reflect the deletion of one or more intentional feature objects from the input sequence. At block 796, the disambiguation module creates a new word list using the updated input sequence and outputs this new list to the user (e.g., as described in Figure 9A).

[00150] At block 788, the disambiguation module determines whether the input data indicates a special function that is related to how the disambiguation module should select candidate characters and/or words when generating a word choice list. For example, the disambiguation module may determine whether the user has tapped or traced over a shift key, a caps lock key, a keyboard selection key, or a similar key that modifies how the disambiguation module should select characters and/or words. In another example, the keyboard may contain a 'Command' key which allows the user to

quickly enter system commands. For instance by tracing over a Command key the word "COPY", or tracing from the Command key to then trace the word COPY on the keyboard, the user can copy selected text. Similarly, a CTRL key could be used to map to commonly used functions: CTRL-A "Select All", CTRL-C/V to copy and paste, CTRL-E to center text etc. In addition, the user may be able to define commands and short cuts. As another example, the disambiguation module may determine whether the user has indicated a similar intent via other input means (e.g., by tracing off-keyboard (e.g. to indicate an undisplayed character is desired); by shaking, rubbing or other physical gesture; or by voice command). If a special function is indicated, the disambiguation module takes appropriate responsive action at block 798, for example, by adjusting a character determination flag (such as a capitalization flag, an area-key mapping selection flag, a key-character mapping selection flag, and/or a diacritical marker flag), or a word determination flag (such as a capitalization flag), by adjusting the contents of the input sequence, and/or by taking any other suitable action

[00151] At block 790, the disambiguation module determines whether the input data indicates another function. For example, the disambiguation module may determine that the user has tapped on a menu button. If another function is indicated, at block 799 the disambiguation module takes suitable steps needed to perform the other indicated function before the process 315 returns. Otherwise, the process 715 returns immediately.

[00152] Figure 8A illustrates a process 800 for identifying what input features, if any, are indicated by received input data and generating a feature object for each identified input feature. The process also characterizes each input feature, selects a character set to associate with the input feature, and determines a proximity weight set associated with that character set or corresponding weights for each character in the set.

[00153] The process 800 begins at block 802, where the character selection submodule processes the raw input data (e.g., a time series of finger down, finger move and finger up notifications or events associated with position measurements) to identify the types of input feature(s) present and the location of the identified input features. To identify each input feature, the character selection submodule may analyze a group of

input data corresponding to a single depression of a user's finger, i.e., a time series of input data that starts with a finger down event, any number of finger move events, and a finger up event. The character selection submodule may then analyze this group to determine movement and/or pressure metrics from the related time series of position/pressure data, X-Y = {x(t),y(t), and optionally, p(t)}. For example, the character selection submodule may calculate first-order values such as: the total time of the depression, the total distance traveled (e.g., by summing all of the line segments reflected in X-Y), the range of (x(t), y(t)) or some combination thereof, the net difference in pressure during the depression, etc. As another example, the character selection submodule may perform higher-order and/or time-dependent calculations, such as determining the velocity of the user's finger along a trace or performing well-known geometric analysis algorithms that may be used to identify corners, inflection points (e.g., using second derivatives), and/or other interest points.

[00154] At decision block 805, the character selection submodule determines whether the input data indicates a tap feature. To identify a tap feature, the character selection submodule may simple determine whether the total depression time falls under a threshold tap time value and/or the total range of movement during the time series also falls under a threshold tap distance value. If these conditions are satisfied, the character selection submodule may identify a suitable location (e.g. the initial, average, or final (x,y) coordinate seen during the depression window) to utilize as the location of the tap feature. However, the character selection submodule may apply any other suitable method to identify a tap, to distinguish a tap from other types of features and/or to determine the location of the tap. For example, the character selection submodule may ignore low-pressure taps.

[00155] If a tap is detected at decision block 805, processing next continues at block 850, where the character selection submodule generates a feature object for the tap by characterizing the tap, identifying a related character set associated with the tap, and calculating proximity weights for each character in the character set. Typically, a character selection submodule will characterize a tap feature as an intentional feature as described previously, but under certain circumstances dictated by disambiguation parameters (e.g., a low-pressure tap); the character selection submodule may instead characterize a tap as an incidental feature. Additionally, the character selection

submodule may characterize the tap feature as both a "finger-down" and "finger-up event." Suitable methods for identifying a related character set and calculating proximity weights for a detected tap feature are described in greater detail herein with respect to Figures 8B and 8C.

[00156] At block 810, the character selection submodule determines whether the input data contains a corner feature. The character selection submodule may detect a starting corner and an ending corner of a trace simply by utilizing the first and last members or data points of the X-Y set of a trace. To identify a mid-trace corner feature, the character selection submodule may utilize any suitable curvature analysis method to detect an abrupt change in the user's direction. As one example, the character selection submodule may repeatedly evaluate a series of coordinates (e.g. three consecutive points) on the trace to determine if the central point falls more than a threshold distance from the line connecting the other two points. If it does not, the evaluation repeats for the next set of points on the trace. If it does, the central point is identified as a corner location. This process is then iterated to find corners. As another example, to identify a mid-trace corner feature, the character selection submodule may evaluate the pressure, velocity and/or acceleration behavior along a trace. However, the character selection submodule may apply any other suitable method to identify a corner, to distinguish a corner from other types of features and/or to determine the location of the corner.

[00157] If a corner is detected at decision block 805, processing next continues at block 860, where the character selection submodule generates a feature object for the corner by characterizing the corner, identifying a related character set associated with the corner and calculating proximity weights for each character in the character set. Typically, a character selection submodule will characterize a corner feature as an intentional feature as described previously, but under certain circumstances dictated by disambiguation parameters (e.g., a low-pressure corner or a mid-trace corner with a lower curvature); the character selection submodule may instead characterize a corner as a incidental feature. Additionally, the character selection submodule may characterize a starting corner feature as a finger-down feature and characterize an ending corner feature as a finger-up feature. Suitable methods for identifying a related

character set and calculating proximity weights for a detected corner feature are described in greater detail herein with respect to Figures 8B and 8D.

[00158] At decision block 820, the character selection submodule determines whether a segment feature is detected in the input data. The character selection submodule may detect a segment and select the location data for a segment feature simply by selecting the X-Y trace data that falls between two adjoining corners (where, again, a "corner" can include an endpoint of the trace). The submodule may also determine whether where the trace is greater than an area of key on the virtual keyboard to indicate a potential segment between two features. However, the character selection submodule may apply any other suitable method to identify a segment, to distinguish a segment from other types of features and/or to determine the location of the segment.

[00159] If a segment is detected at decision block 820, processing next continues at block 870, where the character selection submodule generates a feature object for the segment by characterizing the segment, identifying a related character set associated with the segment and calculating proximity weights for each character in the character set. Typically, the character selection submodule will characterize a segment feature as an incidental feature unless otherwise dictated by disambiguation parameters. Suitable methods for identifying a related character set and calculating proximity weights for a detected segment feature are described in greater detail herein with respect to Figures 8B and 8E.

[00160] At decision block 830, the character selection submodule determines whether another type of feature is detected in the input data. For example, the character selection submodule may identify any hovering or anomalous localized pressure that occurred during an X-Y trace. Examples of other features that the character submodule may detect include: spoken commands (e.g., to select a letter), a second finger tapping the screen during a trace, a moderate change in curvature, and a constant change in curvature (e.g., suggesting a circling motion). If another type of feature is detected, processing continues at block 880, where the character selection submodule generates a feature object for the feature by characterizing the feature, identifying a related character set associated with the feature and calculating proximity

weights for each character in the character set. The character selection submodule may characterize the identified feature as an intentional feature if the feature is a clear manifestation of the user's intent to effectuate a particular keystroke. For example, a clearly spoken letter may be characterized an intentional feature.

[00161] During the process 800, the character selection submodule may adjust the location of an input feature to offset known peculiarities or trends in a user's input style by evaluating various user-specific disambiguation parameters. For example, the character selection submodule may adjust the position of a tap feature to the left of its actual detected location if the user has a tendency to tap to the right of keys.

[00162] Figure 8B shows a process 890 for identifying a character set and calculating related proximity weights for an input feature. The process 890 begins at block 803, where the character selection submodule utilizes disambiguation parameters to identify an applicable distance function and proximity metric that should be used for the particular feature type. A "distance function" provides a method of deriving a distance score, which reflects the separation between the location of a particular input feature and the location of a particular key in a virtual keyboard. A "proximity metric" provides a method of deriving a proximity weight. A "proximity weight" reflects the likelihood or probability that a user intended to indicate a particular keystroke by an input feature, based on the separation between the location of the input feature and the location of a particular corresponding key in a virtual keyboard. Figures 8C-8E, described below, illustrate various types of distance functions and proximity metrics that may be utilized. One having skill in the art will appreciate, however, that any suitable distance functions or proximity metrics may be employed.

[00163] At block 806, the character selection submodule loads an area-key mapping from the keyboard mapping database 622 that reflects the key layout (e.g., 12-key, 28-key, etc.) of the virtual keyboard being displayed to and utilized by the user.

[00164] Then, starting at block 809, the character selection submodule performs a loop for each key in the area-key mapping. The loop begins at block 812, where the character selection submodule determines the location of the key by using the area-key mapping, which typically is a language-independent mapping. Next, at block 815, the character selection submodule calculates the key's distance score by evaluating the

applicable distance function using the location of the key and the location of the input feature, as described in greater detail herein with respect to Figures 8C-8E. At decision block 818, the character selection submodule determines if the key is sufficiently close to the input feature to merit further analysis; to do so, the submodule may evaluate the distance score against a threshold value. If the key is not sufficiently close, the loop repeats starting at block 812. Otherwise, the process proceeds to block 824, where the character selection submodule calculate the key's proximity weight by evaluating the applicable proximity metric using the location of the key, the location of the input feature and/or the distance score as described in greater detail herein with respect to Figures 8C-8E.

[00165] At block 827, the character selection submodule uses one or more key-character mappings to identify all characters associated with the key, even characters that may not be displayed to the user on the virtual keyboard (e.g., an accented letter). The submodule may determine which key-character mappings to use at block 827 by evaluating various flags (e.g., a keyboard selection flag), dynamic context information (e.g., a user's language settings received from the operating system), user preferences, and/or disambiguation parameters. For example, the submodule may receive an indication that the user interface has a full QWERTY keyboard with a French character layout, and may use this information to select a suitable key-character mapping. The character selection submodule may utilize more than one key-character mapping at this block (e.g., to accommodate a multi-lingual user who may wish to continuously enter text without switching between different on-screen character layouts).

[00166] At block 833, the character selection submodule adds each character identified at block 827 to the feature object's character set and associates each identified character with the calculated key proximity weight. At block 836, the character selection submodule determines if there are more keys in the area-key mapping to process. If so, the loop repeats starting at block 812, otherwise the process 890 returns.

[00167] Figure 8C conceptually illustrates suitable distance functions and/or proximity metrics that may be suitably employed with tap features. Figure 8C indicates a tap feature 882 located at a point (shown with an "X") on the "E" key of a virtual,

displayed QWERTY keyboard. In some implementations, both the distance function and the proximity metric are piece-wise step functions. In one example, the distance score for a key is zero if any part of the key (or alternatively, all of the key) falls within a circle 881 of radius R, where R may be determined at least in part using disambiguation parameters (including, for example, parameters that may be adjusted to reflect a user's input style and parameters related to a keyboard layout such as the average key size and/or average key separation). In this example, the distance function has a maximum value for all other keys falling outside the radius. In this example, for the tap 882 shown, the A, W, S, E, D, R (and possibly T) keys would have a 0 distance value (or other minimum value), and all other keys would have a maximum distance value. In another example, the distance score for a key is zero (or minimum) if the tap point 882 falls directly on the key, is an intermediate value if some (or alternatively, all) of the key falls within a circle 881 of radius R, and is a maximum value for all other keys outside the circle 4881. In this example, for the tap 882 shown in Figure 8C, the E key would have zero distance score, the A, W, S, D, R (and possibly T) keys would have an intermediate value, and all other keys would have a maximum value. In yet another example, the distance function for a key is the Cartesian distance from the tap feature 882 to a point on or in the key (e.g., its centroid, the closest point on its perimeter, etc.). In these examples, a proximity metric for a key may be defined as the maximum value of the distance function (or another maximum value) minus the distance score of the key. However, one having skill in the art will appreciate that any other suitable higher-order distance functions and/or proximity metrics may be employed and that the proximity metric need not directly employ a key's distance score. The techniques described for tap features may also be suitably employed for other finger-on and/or finger-off features (e.g., corner features that either start or end a trace).

[00168] Figure 8D conceptually illustrates suitable distance functions and/or proximity metrics that may be suitably employed with corner features, and may be particularly well-suited to non-terminal corner features. During a trace, as a user approaches a corner 883, there may be a tendency for the user to either overshoot and/or overshoot his intended corner key. Whether a user overshoots or undershoots during a given trace may be a function of the handedness of the user, the shape and/or layout of the keyboard, the direction of the trace, the velocity or acceleration as the user

approaches the corner, the shape of the user's hand, the user's ability to visually discern the keyboard layout as he approaches the corner key (it may be obstructed by his hand), the degree of curvature of the trace at the corner, and other factors. These factors may also affect precisely how the user overshoots or undershoots (e.g., whether they overshoot in the x-direction, the y-direction, how far they overshoot, etc.).

[00169] Figure 8D conceptually illustrates how distance functions and/or proximity metrics may compensate for a user overshooting or undershooting an intended key. Figure 8D shows how an ellipse 884 or oval area (or similar asymmetric shape) at an internal corner feature 883 may be utilized to implement piece-wise distance functions analogous to the piece-wise distance functions described previously with respect to Figure 8C. The precise shape and orientation of the area may be chosen to correct for overshoot or undershoot that is caused by the factors just described. For example, in one implementation, the major axis 888 of an ellipse 884 may be chosen to parallel the velocity vector of the user's finger just before it reaches the corner 883, when it reaches the corner or shortly after it turns the corner. Additionally, the length of the major axis 888 may be chosen to increase in proportion to the magnitude of the velocity vector at one of these points and/or to otherwise reflect the factors described previously (e.g., the sloppiness of the user). Similarly, the length of the minor axis 889 may be chosen to reflect the factors described previously.

[00170] As shown in Figure 8F, a different type of asymmetric shape may also be utilized, such as an ovoid shape, which comprises two half-ovals, each having its own major axis and minor axis. The directions, and absolute and/or relative lengths of the two major axes may be a function of the velocity of the user's fingers (both magnitude and direction), the handedness of the user, the sloppiness of the user, and/or the other factors described previously. In one implementation, the major axis of a half-ellipse may be chosen to parallel the velocity vector of the user's finger just before it reaches the corner, when it reaches the corner or shortly after it turns the corner. The axes may be chosen in part to correct for an obscured view that is dependent on the handedness of the user and their direction of movement. For example, a right-handed user moving to the right has less visibility of keys to the right of his finger (e.g., than a left-handed user moving in the same direction), which causes increased uncertainty in judging his intent to strike a key on the right side of a corner. In the example shown in Figure 8F,

the ovoid is longer on the right side of the keyboard to compensate for a right handed user's more obstructed view of some keys as he approaches from the bottom left. The minor axes of the two half-ovals in the ovoid may also be chosen to reflect the factors described previously; the two half-ovals may have minor axes of different lengths, with the longer axis being located to the right in the example above.

[00171] Similar to the methods described previously with respect to Figure 8C, keys that fall (either fully or partially) within the asymmetric shape (e.g. ellipse 884 or the ovoid of Figure 8F) may be assigned a lower distance score (and/or higher proximity weight) than shapes outside the asymmetric shape. As another example, if a corner point 883 falls on a key, that key may be assigned a minimum distance score, keys within the asymmetric shape may be assigned an intermediate distance score, and keys outside the asymmetric shape may be assigned a maximum distance score. In yet another example, the distance function for a key is the Cartesian distance from the corner feature 483 to a point on or in the key (e.g., its centroid, the closest point on its perimeter, etc.). Also, the proximity weight for a key may be chosen by subtracting the key's distance score from the maximum possible distance score.

[00172] Figure 8D has primarily described piecewise distance functions and proximity metrics for corner features. However, any other suitable higher-order distance functions and/or proximity metrics may be employed (including higher-order distance functions and/or proximity metrics that correct for overshoot or undershoot factors) and that the proximity metric need not directly employ a key's distance score.

[00173] Figure 8E conceptually illustrates distance functions and/or proximity metrics that may be suitably employed with segment features. Here, a piece-wise distance function and/or proximity metric may be defined using an irregular area 885 defined by all points falling within a particular perpendicular distance from the trace line of the segment feature 886. The maximum distance utilized to define the area may be determined at least in part using disambiguation parameters (including, for example, parameters that may be adjusted to reflect a user's input style and habits). In a first example, all keys that fall partially (or alternatively, wholly) within the irregular area 885 may receive a minimum distance score (and/or maximum proximity weight) and all other keys may receive a maximum distance score (and/or minimum proximity weight).

In a second example, keys that are directly intersected by the segment feature 886 may receive a minimum distance score (and/or maximum proximity score), other keys that fall partially (or alternatively, wholly) within the area may receive an intermediate distance score (and/or maximum proximity score), and all other keys may receive a maximum distance score (and/or minimum proximity score). One having skill in the art will appreciate that any other suitable higher-order distance functions and/or proximity metrics may be employed, including higher-order functions and metrics that utilize the perpendicular distance of a key to the trace line.

[00174] Figure 9A shows a process 900 for creating a word choice list using an input sequence of feature objects. The process 900 begins at block 905, where the word list selection submodule loads or receives applicable disambiguation parameters; context data, including semi-static context data retrieved from the user context database and application context database and dynamic context data received from an operating system and/or application program; and language data, including, e.g., frequency data from a vocabulary module, user context database, and/or application context database. At block 510, the word list selection submodule ("word submodule" for short) loads applicable dictionaries from the vocabulary submodule using the context data, disambiguation parameters, and/or any flags (e.g., language selection flags). For example, the dictionaries used may be selected on the basis of the type of application program that will receive the output of the disambiguation module. As another example, the dictionary used may be generated by analyzing the user's speech using voice recognition software or by analyzing another mode of user input. For example, the dictionary may be an N-best list generated by voice recognition software, handwriting recognition software, etc.

[00175] At block 915, the word submodule may pre-filter the dictionaries using some portion of the input sequence, the estimated input length L and/or the context to generate a subgroup of words. As a first example, the word submodule may pre-filter the dictionary on the basis of whether a word matches the first "finger-up" feature and/or the last "finger-down" feature (described previously), since these features provide possibly the strongest indication of the user's intent to effectuate a particular keystroke. As a second example, the word submodule may pre-filter the dictionary on the basis of estimated input length L. For example, the word submodule may filter out

any words that are shorter than L minus X, where X is determined using disambiguation parameters. As a third example, the word submodule may pre-filter the dictionary to a list of words generated by voice recognition software. As a fourth example, if the dynamic context indicates that the user is typing in a name field, it may filter the dictionary to only include proper nouns. Of course, the word submodule may use a combination of these filtering techniques.

[00176] At block 920, the word submodule selects the next word in the subgroup on the basis of language data, context, word length, and/or any other suitable factors. For example, the word submodule may sort the subgroup on the basis of frequency of use and present these words in that order.

[00177] At block 925, the word submodule determines the matching score for the selected word by evaluating a match metric using input sequence, context, word length, and language data. A suitable method for determining a matching score using a match metric is shown in Figure 9B.

[00178] At decision block 930, the word submodule may determine if the word has a matching score that exceeds a minimum threshold value that is determined using disambiguation parameters. If it does, the word is added to the word choice list at block 935 before the process proceeds to block 940. Otherwise processing proceeds directly to block 940. The word submodule may eliminate poorly matching words and provide a word list of fixed or minimum size. Alternatively block 930 may be eliminated from the word submodule.

[00179] At block 940, the word submodule determines if there are more words to process in the subgroup. If there are, the processing returns to block 920 so that another word may be evaluated.

[00180] Otherwise, the process proceeds to block 945, where the word choice list is post-processed. For example, the word submodule may sort the list by matching score and/or by selecting one or more default words that have the highest matching score. As another example, after sorting, the word submodule may group or adjust the ordering of words in a logical fashion to facilitate improved user browsing behavior. For example, the word submodule may rearrange the list to group together words that have the same root (e.g., "interest," "interesting," and "interestingly") to permit a user to scan

the word choice list more rapidly. As yet another example, dynamic or static context data may be utilized at block 950 to adjust the list, e.g., to promote or demote particular words in the list and/or to otherwise adjust the order of the list. For example, if a user has utilized a particular word in the same application program before, that word may be promoted. As another example, the word submodule may promote words that end with a punctuation mark over words that have embedded punctuation marks. As yet another example, if more than one language dictionary was utilized to generate a word list or the disambiguation module is otherwise providing bilingual integration (e.g., to accommodate a bilingual user), the post-processing may promote words in the primary language of the user and/or demote words in a secondary language of the user. The "primary language" of the user may be determined by language parameters or flags and/or by user context data from the user context database 626.

[00181] As still another example of post-processing, the disambiguation module may promote or demote particular words based on application-specific field information and/or rules or grammar retrieved from the application context database.

[00182] In another example of post-processing, the disambiguation module may determine whether the user is attempting to utilize a word that may not be listed or found in a standard dictionary, such as neologism like "podcast," or an uncommon proper noun. If it determines, based on typical character sequences in a language that the user may be attempting to enter an "unlisted" word that does not appear in the dictionary, it will make the unlisted word the default word, and provide the word choice list as an alternative suggestion. Otherwise, it may utilize a high-scoring word selected from the dictionary as the default word.

[00183] To illustrate, if the user crisply taps out the letters "podcast," the disambiguation module may keep "podcast" as default word, despite the fact that it may not be in a standard English dictionary, since the character sequences (the combinations of "po," "ca," and "st," etc.) are frequently seen in the English language. On the other hand, if the user crisply taps out the letters "Pfsx," the disambiguation module may assume that the user has made a misspelling (or typed sloppily) and will not select "pfsx" as the default word, since the combinations of "pf" "fs" and "sx" are all

infrequently seen in the English language. Instead the disambiguation module will select a dictionary word with a high matching score found during blocks 905-940.

[00184] To make this determination, the disambiguation module may first generate a "stroke sequence" by selecting, for each intentional feature (e.g., tap) in the input sequence, the associated character that has the best proximity score. Next, the disambiguation module may evaluate the composition of the stroke sequence by using a table or database within the vocabulary module 624 that provides the probabilities or frequencies of various character sequences (character bigrams, 3-grams, 4-grams, ... n-grams, etc.) in a given language (or other logical group of words) to derive a composition score. The composition score may be the product of various probabilities/frequencies of bigrams/etc., or another higher-order function of the various probabilities/frequencies. If the composition score exceeds a threshold value, the disambiguation module may use the stroke sequence as the default word. In some implementations, the stroke sequence may be defined using a different subset of the input sequence (e.g., tap features only, not corners).

[00185] At block 950 the word choice list is output to the user, e.g., via a word choice list area on a display or otherwise. Alternatively, the word choice list and/or a default word may be provided to another process (e.g., an application program) that does not need user intervention to select a word.

[00186] Figure 9B shows one suitable process 990 for calculating a matching score for a word using a matching metric. Any matching metric or algorithm may be utilized to generate a matching score, and that the disclosed technology is not limited to those particular examples described below.

[00187] The process 990 begins at block 972 when the word submodule sets a word's matching score to a default score, which may be a unity value of 1. A loop for each character in the word then begins, as shown at block 974. At block 975, the word submodule retrieves the character set and related proximity weight set that corresponds to the next intentional input feature in the input sequence, or if this is the first iteration of the character loop, the first intentional input feature in the input sequence. For example, the word submodule retrieves the character set and proximity weights associated with the next tap or corner feature in the input sequence.

[00188] At block 976, the word submodule identifies the proximity weight for the character. To do so, the submodule determines whether the character appears in the retrieved character set, and if it does, it uses the retrieved proximity weight associated with the character. Otherwise, if the character does not appear in the retrieved character set, the submodule may use a default proximity weight (e.g., a low weight) specified by a disambiguation module, terminate the loop 974, or end the process 990 by returning a default matching score (e.g., a score of zero or other default matching score).

[00189] At block 978, the word submodule adjusts the matching score to reflect the identified proximity weight for the character. In one example, the submodule adjusts the matching score by multiplying it by the retrieved proximity weight. However, the matching score may be adjusted in any manner to reflect the retrieved matching score. For example, the previous matching score and the retrieved proximity weight may combined by any suitable function including simple addition, a weighted summation, multiplication, division, and higher order functions etc.

[00190] At decision block 979, the word submodule tests whether there are any more characters to process in the word and whether there are more intentional features in the input sequence. If both conditions are satisfied, the character loop repeats starting at block 975. Otherwise the process proceeds to block 980.

[00191] At block 980, the word submodule adjusts the matching score to reflect context data and/or language data (e.g., frequency of use). In one implementation, the word submodule scales the matching score by the frequency of use. As another example, the word submodule may increase a matching score based on context data, for example, the matching score may be increased if the user has utilized the same word in the same type of data field and/or the same application. As yet another example, if the surrounding sentence context (e.g., previous words entered by the user) suggests that the word is more or less likely, the matching score may be adjusted upward or downward. These examples are not intended to be exhaustive. The previous matching score may be adjusted in any suitable manner (e.g., via higher order functions) that reflects how the context and/or frequency of use increases or decreases the likelihood that the word was the intended entry of the user.

[00192] At block 982, by utilizing known edit distance techniques, the word submodule determines the type of edits needed to match a character sequence reflected in the intentional features of the input sequence. For example, the word submodule may determine what characters would need to be added to the word, or what characters would need to be removed from the word so that it would match a sequence of characters reflected in the sequence of intentional features.

[00193] When determining the types of edit(s) needed, the word submodule may only attempt to match a first portion of the word against the intentional features in the input sequence. For example, the word submodule may ignore any mismatches that occur after the Lth character in the word, where L is the estimated input length. The cutoff point could alternatively be chosen as L-1, L+2, L+3, etc. In this way, the word submodule improves the chances that a longer word having a good initial match to the user's initial input will be returned.

[00194] At block 984, for each edit needed, the word submodule determines an edit penalty based on the estimated input length and the input sequence, including the feature types reflected in the input sequence and the proximity weights. As utilized herein, a "low penalty" is one that is lower than a standard or default penalty assessed by a standard edit cost function for a similar edit.

[00195] As a first example, the word submodule may assign a zero or low penalty for character changes needed after a first portion of the word. For example, there may be no penalty or a low penalty assessed for character changes needed after the Lth position in the word. This technique similarly improves the chances that a longer word that has a good initial match to the user's initial input will be returned.

[00196] As a second example, the word submodule may assign a zero or low penalty for character additions or deletions involving characters that are reflected by the full input sequence, including both intentional and incidental features. For example, if the only difference between the word and the input sequence of intentional features is a missing "E" between the third and fourth intentional features, the word submodule may assign a zero or low penalty if an "E" character appears in a character set associated with an incidental feature (e.g., a segment) that falls between the third and fourth intentional features in the input sequence. In some implementations, the penalty

assessed may be a function of the proximity weight associated with the missing character. To illustrate, returning to the previous example, if the segment feature that provides the missing "E" cuts directly through the center of the E key (i.e., the proximity weight for the E character is near its maximum possible value), the penalty assessed may be lower than if the segment runs further away from the E key. By reducing or eliminating edit penalties in these circumstances, the word submodule permits a user to indicate her selection of a letter simply by tracing through the letter.

[00197] As a third example, the word submodule may assign a zero or low penalty for character additions or deletions caused by repeating characters or repeating keystrokes. Stated another way, there is a no penalty or lower penalty assessed if the word would match the input sequence if only one or more input features were repeated (one or more times) within the sequence. By reducing or eliminating edit penalties in these circumstances, the word submodule permits a user to indicate her selection of a word that has repeating characters or repeating keystrokes with a reduced number of input features. If a low penalty is assessed, it may be a function of the type of input features that would need to be repeated (e.g., intentional vs. incidental), the number of times each feature would need to be repeated, and/or the proximity metrics associated with the repeated input features. To illustrate, if the word is "WEED" and only difference between the word and the input sequence of intentional features is that the second "E" is missing between the second and third intentional features, the word submodule may assign a zero or low penalty.

[00198] As a fourth example, the word list selection submodule may assign a zero or low penalty for character changes that reflect the addition or deletion of punctuation marks and/or similar symbols.

[00199] At block 986, the word submodule adjusts the matching cost to reflect any calculated penalties. In some cases, the penalty is subtracted from the matching score. However, in other implementations, higher-order adjustments may be utilized. Then the process 990 returns.

IV. APPLICATION TO SECURITY SYSTEMS

[00200] In accordance with another aspect of the disclosed technology, a password or other text entry system and method are provided that allow a user to leverage the familiarity with QWERTY keyboard (or other common keyboard layouts).

[00201] This password or other text input is achieved by providing the user with preferably nine, or other appropriate number of defined zones, each anchored by a distinct key that acts as a zone output key. When the user selects one key from a particular zone, the zone output key of the selected zone is considered as having been selected. Thus, while a user is able to enter a password on a standard keyboard in a standard manner, depending on the zone definitions, a sequence of zone output keys will be output representative of the input password. If a receiving device is aware of the zone definition used when generating the sequence of output keys corresponding to the input password, the receiving device is able to decipher the sequence of output keys to determine whether the proper password has been entered.

[00202] A plurality of zone definitions may be available. Thus, by transmitting a zone definition identifier and sequence of zone output keys, a receiving device, that is aware of the plurality of zone definitions and identifiers associated therewith, can properly interpret the transmission while maintaining the security of the password.

[00203] Additionally, the zone definition need not necessarily include keys that are contiguous with each other. By defining non-contiguous zones, the user must be more accurate in key entry, but the difficulty for a hacker or other thief in breaking the code may be greatly increased, and the number of possible available zone definitions is similarly greatly increased.

[00204] Additionally, rather than using only a standard keyboard for text entry of the password characters, characters may be input using directional input on a joystick, 4 or 8 directional keypad (such as the ones found in TV remote control, telephones and mobile phones), various combinations of numeric keys on such a remote control or other available numeric keypad, or pointing functionality of such a remote control or other device, such as a Nintendo ® Wii® remote or other wand like input device, body movement entry solutions, or the like. When using such a non-traditional input device,

the user may move the joystick or other device in the direction of a desired key to be input. When performing this movement, rather than moving between keys, the selector moves between adjacent zones of keys, all keys contained in the zone moved to will be selected, and a zone output key associated with that zone may be further delineated. Thus, when a key is desired to be selected, a joystick or the like may be used to move to a zone that contains the desired key. By selection of such a zone, the associated zone output key may be presented as part of the output sequence of characters. By way of example, if the user wishes to select the letter "R" as part of a password, movement to a zone containing the letters R, T, Y, U, and I, and using Y as a zone output key, selection of such a zone causes the letter "Y" to be output as part of the output stream. In addition to providing a coded password transmission, a user need only select between the number of zones, and not be as precise as selecting each individual key in that selection of any key in a particular zone will result in the same zone output key being output as part of the password data stream.

[00205] The disclosed technology is also applicable to any keyboard configuration, and language, and any other symbol grouping. Furthermore, the zones assigned to an input device need not be visible to a user, rather only working to encrypt the data to be transmitted in the background.

[00206] Referring first to Figure 10, a first embodiment in accordance with the disclosed technology is shown. In Figure 10, a keyboard, designated generally at 1000, is provided with a plurality of keys 1110. In this depicted embodiment, a 26 letter QWERTY keyboard is shown. It should be understood by one of ordinary skill in the art that other keyboard configurations are available, including but not limited to other arrangements of the 26 English letter alphabet, arrangements of any other character set for use in other languages, any combination of numbers and/or letters, or any other desired combination of symbols of any kind. A predetermined number of these keys 1110 are also designated as zone output keys 1120. In the depicted embodiment, there are nine such zone output keys, although any desired number may be employed. Each zone output key 1120 is associated with a zone comprising one or more letter keys associated therewith. As is further shown in Figure 10 by way of example, the "E" key, designated as 120a represents the zone output key for a zone comprising the "E" key, and the other letter keys "Q", "W", "R", and "T", collectively designated at 1110a.

Thus, any time a user is interested in selecting any one of the five keys in this zone (1110a or 1120a), the zone output key "E" will be the selected output key to comprise part of the output data stream representing the selected password or other text. While it is anticipated that each zone output key may be associated with a predefined, unique set of keys 1110, it would be possible to have the zones overlapping, and indeed include one or more keys 1110 in one or more zones.

[00207] Furthermore, while it is contemplated that all of the available symbol keys, in this case letters, be included within at least one zone, this need not be the case. Indeed, any particular key or keys may be left alone, requiring direct user selection. Such a configuration may be desirable for rarely-used keys, or keys with special significance.

[00208] As can be understood from this description referring to Figure 10, a user experience is eased as a user need not be as accurate when choosing a key entry, and indeed only has, in this particular depicted embodiment, nine zones to choose from, rather than a more traditional 26 letters. In the particular embodiment as depicted in Figure 10, a user interface might utilize a joystick with eight directional movement, and a center home position, each available position corresponding to a zone output. Alternatively, a remote control or other device with a nine number keypad may be employed, each number corresponding to one of the zone output keys. Of course other configurations, including a joystick with less directional movement or a track ball with more, the same, or fewer degrees of freedom may be employed thus allowing a user to directionally move between zones. While requiring less hardware and learning, such a configuration may require two or more jumps when moving from one zone to another situated remotely on the input keyboard as movement may be limited to jumping between adjacent zones. Alternatively, it may be possible to provide a scenario where a cursor or other pointer returns to a "home" or other designated zone or location after each letter entry. This feature has its benefits and drawbacks, providing a known start point for each text entry, but requiring multiple movements for double letters, etc.

[00209] When employing the eight direction joystick as noted above, the user can move between the zones through movement of the joystick. Two or more schemes are possible. In a first, a valid movement of the controller may be Up, Down, Left, Right,

Up-Right, Up-Left, Down-Right, and Down-Left. These eight distinct movements allow the user to quickly move between the zone output keys on the keyboard, moving from zone to zone. A similar scheme may be employed with a less versatile four direction joystick. Without diagonal movements available, however, more jumps may be necessary for moving from one zone to another. In a second scheme, each of the eight directional keys and a central "neutral" position may each correspond to the zones, allowing a user to directly access each of the zones without having to navigate from one to the other. Alternatively, when, for example, a nine key number pad is provided, each number may correspond to a particular zone.

[00210] While a most common option would be for these keys to be assigned to various zones based upon corresponding locations, in an alternative embodiment of the disclosed technology, it is possible to configure the zones in any contiguous or non-contiguous manner as the zone location will likely not affect the user experience, if the user is actually entering the password keys, rather than simply selecting one of a number of zones, but the available multiple zone configurations will assist in protecting the security of the input password. In either of these entry situations, it is not necessary that the zones be visible to a user. Rather, a user may be prompted to enter a password as normal on a keyboard. Background processing may assign a zone definition (as will be described below) and prepare a data output stream to transmission.

[00211] Referring next to Figure 11, steps used in accordance with an embodiment of the disclosed technology will be described. First in step 1210, a zone definition must be determined. Thus, the keys of the keyboard are assigned to a predetermined number of zones. These zones may be contiguous or non-contiguous. Examples of different possible zone configurations can be seen in Figures 15 (see zones 1610a-d) and 16, in addition to Figure 10. It should be noted that the use of, for example four zones as shown in Figure 15 will result in an easier input experience for the user as they will need only to select between four zones. The system, however, may require a longer password to be utilized in such a situation so that different passwords may be more likely to generate different sequences of zone output keys. Of course, other configurations may be employed. In accordance with the disclosed technology, a

plurality of such zone configurations may be defined, and thus the apparatus at step 1210 may select from one of the predefined zone layout definitions.

[00212] Once the zone definition has been selected, a user may start to enter characters that comprise the password. Such an input character is received at step 1215. At step 1220, the zone output key associated with the zone comprising the key selected by the user is defined as the output character associated with the input character. This output character is then provided as a first character to the eventual output data stream to be transmitted. Then processing passes to step 1225 where it is inquired whether all input characters have been received. If this inquiry is answered in the negative, and it is therefore determined that not all of the desired input characters have been received, control returns to step 1215 and a next input character is received.

[00213] If, however, the inquiry at step 1225 is answered in the affirmative, and it is therefore determined that all desired input characters have been received, then control passes to step 1230, where the utilized zone definition and generated output data stream representing the input password is transmitted to a receiving device. Processing then ends at step 1235. While the embodiment has described transmitting the zone layout definition along with the output data stream, such zone layout definition may be transmitted separately. It is contemplated that such zone layout definition preferably not comprise a complete listing of zones, but rather a zone definition indicator, thus allowing a receiving device to select from one of a plurality of predefined zone layout definitions. In such a manner, only such an otherwise meaningless indicator is transmitted, thus not giving away the zone layout and increasing the security of the system. Further, it is possible that no zone definition is transmitted, and that the transmitting and receiving devices are synchronized and simply cycle through a predetermined number of zone layout definitions in a predetermined manner. Further, it may be possible to use any other indicator or the like to enter into an equation, algorithm, or the like to select from the plurality of zone layout definitions, as long as both the transmitting and receiving devices are able to process the same algorithm to them utilize the same zone layout definition for both generation and interpretation of the password.

[00214] Referring next to Figure 12, a receiving device first receives the transmitted zone layout definition (or uses one of the methods noted above to determine the correct zone layout definition to employ). Processing then passes to step 1315 where the receiving device receives the first character of the transmitted data stream, including the output data stream representing the input password. This received character is then compared to a zone output key of a zone containing an expected password character. At step 1325, if it is determined that these characters do not match, then processing ends at step 1340. If it is determined that these characters match, then processing passes to step 1330 where it is determined whether all password characters have been received. If all of the password characters have not been received, processing passes back to step 1315 to receive a next password character.

[00215] If it is determined at step 1330 that all of the password characters have been received, then processing passes to step 1335 where the system recognizes that a valid password has been entered, and the user is so notified. Processing then ends at step 1340. Therefore, in accordance with the charts displayed in Figures 11 and 12, a system of a transmitting device and a receiving device can confirm a user password from one to the other without actually transmitting each actual password character, thus maintaining the security of that password.

[00216] In an alternative embodiment of the disclosed technology, it may be possible to provide two consecutive zone definitions that divide the keyboard in a manner so that upon entry of a password twice by a user, the system transmits zone indications for the two different zone definitions allowing for particular notification of the selected keys at the receiving end, even if the keys themselves. For example, if the letter "A" is first associated with zone 1, and then in a second zone definition is the only letter previously in zone 1 that is now associated with zone 4, a sequence of Z1, Z4 for the first letter in two consecutive password entries would result in a guaranteed determination of the letter "A", even though this letter was never transmitted. Thus, through the user of multiple iterations of this password scheme, further precision can be achieved.

[00217] An embodiment of the disclosed technology employing a traditional nine key keypad is shown in Figure 13. As is shown in Figure 13, zone output keys 1120,

1120a are shown, as well as keys associated therewith 110a, similarly to the display depicted in Figure 10. Additionally, a key configuration 1410 is shown, such as that may be included on a traditional remote control, telephone, or the like, indicating a mapping each key 1415 thereof to one of the zone output keys 1120, 1120a. Such mapping may be indicated by a connecting lead line 1420, color, shape, or any other desired indicator of relationship. Thus, if a number of zones are defined, a user may be able to enter the password using such a keypad by selecting number keys associated with the zone including each of the desired characters in the password.

[00218] In an additional embodiment of the disclosed technology, rather than making an indication on a remote device as described above to indicate zone selection, it may be possible to employ a pointing device, such as a remote control utilized with, for example, a NINTENDO® Wii® controller, body movement sensing to determine a user input, or the like. Thus, as a user points such a controller at a displayed virtual keyboard, or otherwise indicates zone selection, a zone pointed at by the controller is highlighted or otherwise indicated as being designated. A user can select such a zone by pressing an indicator on the remote, or by other method as is known to one of ordinary skill in the art. The use of zones in accordance with the disclosed technology is particularly useful in such a situation in that the ability to select each individual key may be difficult in such a configuration. Accuracy may be difficult. However, in accordance with the present disclosed technology, a user need only select between, for example, one of nine zones, thus making this ability to select much easier for a user. Thus, a user will likely be able to move through character selection in a much faster and easier manner.

[00219] As is shown in Figures 14A and 14B, utilizing such a pointer device allows for easy selection of a desired zone. Figure 14A depicts selection of a zone 1510, such as that selected in Figure 10. In Figure 14B a zone 1520, two zones to the right of the previously selected zone, is designated and selected. The user is able to make such a designation and selection simply by redirecting the pointing device. Preferably, an indicator 530 remains on the display to aid in locating the current position of the pointing device.

[00220] In addition to providing a visual indication of the remote pointing device moving from one displayed zone to another, in an alternative embodiment of the disclosed technology, a haptic or other tactile response is also provided to a user to provide an additional, non-visual indication of movement and selection. Thus, as a user moves the pointing device to designate a second zone, a vibration or other non-verbal indicator may be provided to the user. Thus, if as in the movement between Figures 14A and 14B a user moves the pointer two zones, such a haptic response may be provided to a user twice, once each time the border between zones is crossed. Such haptic response may also be modified, thus providing a different response for different zones. Thus, each zone may have a different haptic signature, or a zone determined by a parsing algorithm to be the most likely selected zone in the next selection may be provided a haptic indicator different from the other zones. The zones may be differentiated in any other manner including such a haptic indicator.

[00221] Referring once again to Figure 10, when a character in a particular zone is selected on the user interface, a predetermined number of adjacent keys to the left and the right and/or above and below are highlighted along with the selected key, thus comprising a zone associated with the zone output key. This highlight lets the user know the zone that has been selected. Preferably, the zone output key associated with the designated zone is further delineated as the key that will become part of the output data stream. As is also noted above, if the zones are not to be displayed to a user, then selection of a particular key will result in no change in display, even if in the background the zone output keys are being output based upon an input zone, as described above.

[00222] As noted above, the displayed virtual keyboard represents a full QWERTY keyboard, but may comprise any other desired configuration. The zone output keys may be preferably highlighted in a different color on the keyboard, or designated using some other distinguishing characteristic. When the input device is used to go to a zone corresponding to a particular zone output key, the other characters in the zone are preferably highlighted as well to provide to the user visual feedback on the set of letters that are grouped with the selection of a particular zone.

[00223] While the disclosed technology has been described related to the transmission of a password, the features of the disclosed technology may be applied to a more lengthy encrypted data transmission.

Conclusion

[00224] Unless the context clearly requires otherwise, throughout the description and the claims, the words “comprise,” “comprising,” and the like are to be construed in an inclusive sense, as opposed to an exclusive or exhaustive sense; that is to say, in the sense of “including, but not limited to.” As used herein, the terms "connected," "coupled," or any variant thereof means any connection or coupling, either direct or indirect, between two or more elements; the coupling or connection between the elements can be physical, logical, or a combination thereof. Additionally, the words “herein,” “above,” "below," and words of similar import, when used in this application, refer to this application as a whole and not to any particular portions of this application. Where the context permits, words in the above Detailed Description using the singular or plural number may also include the plural or singular number respectively. The word "or," in reference to a list of two or more items, covers all of the following interpretations of the word: any of the items in the list, all of the items in the list, and any combination of the items in the list.

[00225] The above Detailed Description of examples of the disclosed technology is not intended to be exhaustive or to limit the disclosed technology to the precise form disclosed above. While specific examples for the disclosed technology are described above for illustrative purposes, various equivalent modifications are possible within the scope of the disclosed technology, as those skilled in the relevant art will recognize. For example, while processes or blocks are presented in a given order, alternative implementations may perform routines having steps, or employ systems having blocks, in a different order, and some processes or blocks may be deleted, moved, added, subdivided, combined, and/or modified to provide alternative or subcombinations. Each of these processes or blocks may be implemented in a variety of different ways. Also, while processes or blocks are at times shown as being performed in series, these processes or blocks may instead be performed or implemented in parallel, or may be

performed at different times. Further any specific numbers noted herein are only examples: alternative implementations may employ differing values or ranges.

[00226] The teachings of the disclosed technology provided herein can be applied to other systems, not necessarily the system described above. The elements and acts of the various examples described above can be combined to provide further implementations of the disclosed technology. Some alternative implementations of the disclosed technology may include not only additional elements to those implementations noted above, but also may include fewer elements.

[00227] Any patents and applications and other references noted above, including any that may be listed in accompanying filing papers, are incorporated herein by reference. Aspects of the disclosed technology can be modified, if necessary, to employ the systems, functions, and concepts of the various references described above to provide yet further implementations of the disclosed technology.

[00228] These and other changes can be made to the disclosed technology in light of the above Detailed Description. While the above description describes certain examples of the disclosed technology, and describes the best mode contemplated, no matter how detailed the above appears in text, the disclosed technology can be practiced in many ways. Details of the system may vary considerably in its specific implementation, while still being encompassed by the disclosed technology disclosed herein. As noted above, particular terminology used when describing certain features or aspects of the disclosed technology should not be taken to imply that the terminology is being redefined herein to be restricted to any specific characteristics, features, or aspects of the disclosed technology with which that terminology is associated. In general, the terms used in the following claims should not be construed to limit the disclosed technology to the specific examples disclosed in the specification, unless the above Detailed Description section explicitly defines such terms.

CLAIMS

I/We claim:

1. A method for data input, comprising the steps of:

receiving a first user input comprising a microgesture of a user indicating at least a first input selection and a second input selection that represent less than an entire word;

determining one or more possible word suggestions based upon the first user input; and

providing the possible word suggestions to the user.

2. The method of claim 1, further comprising the step of determining whether there is a bend in a gesture from the first input selection to the second input selection.

3. The method of claim 2, further comprising the step of determining a middle input selection is intended by the user if it is determined that a bend is in the gesture.

4. The method of claim 1, further comprising the step of determining a direction of movement of the user input from the first input selection.

5. The method of claim 4, further comprising the step of determining a middle input selection is intended by the user based at least in part upon the determined direction of user movement.

6. The method of claim 1, wherein the first user input is received on a touch screen keyboard of a mobile device.

7. The method of claim 1, wherein the first user input is received on a touch screen keyboard of a computing device.

8. The method of claim 1, wherein the first user input is received at a set top box of a television, and wherein the first user input is made employing a remote control pointer.

9. A method for data input, comprising the steps of:

receiving a first user input comprising a microgesture of a user indicating at least a first input selection and a second input selection that represent less than an entire word;

determining one or more possible word suggestions based upon the first user input;

providing the possible word suggestions to the user;

receiving a second user input comprising a microgesture of a user indicating at least a third input selection and a fourth input selection;

determining one or more possible word suggestions based upon the first user input and the second user input; and

providing the possible word suggestions to the user.

10. A computer system, comprising:

a memory for storing programmed instructions;

processor electronics configured to execute the instructions to perform a method for data input by:

receiving a first user input comprising a microgesture of a user indicating at least a first input selection and a second input selection that represent less than an entire word;

determining one or more possible word suggestions based upon the first user input; and

providing the possible word suggestions to the user.

11. A method for data input at a remotely located computing device, comprising the steps of:

dividing an input selection device of the remotely located computing device into a plurality of zones, each zone comprising one or more keys;

receiving a sequence of user indications of sequentially selected zones;

considering all of the one or more keys associated with each of the selected zones to have been selected;

transmitting a sequence of the sequentially selected one or more keys to a remote database storage location;

entering the sequence of the sequentially selected one or more keys into an algorithm for determining an intended user word or words input in accordance with a sequence of selected keys;

transmitting the determined intended user word or words to the remotely located computing device; and

receiving user indication of selection of one of the determined intended user word or words.

12. The method of claim 11, further comprising the step of considering one or more characteristics of the remotely located computing device in accordance with the algorithm for determining an intended user word or words.

13. The method of claim 12, wherein the one or more characteristics comprises the identity of a user employing the remotely located computing device.

14 The method of claim 12, wherein the one or more characteristics comprises an indication of text entry selections in the past in accordance with a user of the remotely located computing device.

15. The method of claim 14, wherein text entry selections made in the more recent past are weighted more heavily that text entry selections made in the more distant past in accordance with the algorithm.

16. The method of claim 12, wherein the one or more characteristics comprises a group to which a user of the remotely located computing device is associated.

17. The method of claim 16, wherein the one or more characteristics further comprises an indication of text entry selections in the past in accordance with the group.

18. The method of claim 14, wherein text entry selections made in the more recent past and more frequently are weighted more heavily that text entry selections made in the more distant past and less frequently in accordance with the algorithm.

19. A computer system comprising:

a memory configured to store programmed instructions;

processor electronics configured to execute the programmed instructions to perform a method for data input at a remotely located computing device, by:

dividing an input selection device of the remotely located computing device into a plurality of zones, each zone comprising one or more keys;

receiving a sequence of user indications of sequentially selected zones;

considering all of the one or more keys associated with each of the selected zones to have been selected;

transmitting a sequence of the sequentially selected one or more keys to a remote database storage location;

entering the sequence of the sequentially selected one or more keys into an algorithm for determining an intended user word or words input in accordance with a sequence of selected keys;

transmitting the determined intended user word or words to the remotely located computing device; and

receiving user indication of selection of one of the determined intended user word or words.

20. A method for data transmission, comprising the steps of:

dividing an input selection device into a plurality of zones, each zone including two or more input keys which correspond to at least one zone output key;

receiving a plurality of inputs, each input being associated with the selection of a key in one of the plurality of zones; and

outputting a plurality of zone output keys that correspond to each of the plurality of inputs received.

21. The method of claim 20, wherein the plurality of input characters comprise a password.

22. The method of claim 20, wherein the configuration of the plurality of zones comprises a zone definition.

23. The method of claim 20, wherein the zone definition is output along with the zone output keys.

24. A method for data transmission, comprising the steps of:

defining a plurality of zone layout definitions, each zone layout definition being identified by a zone definition identifier, each zone definition dividing an input selection device into a plurality of zones, each zone including one output key associated therewith;

selecting one of the zone layout definitions;

receiving a plurality of input characters, each input character being associated with at least one of the plurality of zones defined by the selected zone layout definition; and

outputting a sequence of zone output keys including a zone output key included in each of the zones associated with each of the plurality of input characters as defined in accordance with the selected zone layout definition.

25. The method of claim 24, further comprising the step of outputting the zone definition identifier for the selected zone layout definition.

26. The method of claim 25, further comprising the step of transmitting the zone definition identifier and sequence of zone output keys to a receiving device.

27. The method of claim 26, further comprising the steps of:

receiving at the receiving device the transmitted zone definition identifier and sequence of zone output keys;

applying a predefined sequence of characters against a predetermined one of a plurality of zone layout definitions associated with the transmitted zone definition identifier to determine an expected sequence of zone output keys associated with the transmitted sequence of zone output keys; and

comparing the transmitted sequence of zone output keys with the expected sequence of zone output keys to determine a match therebetween.

28. The method of claim 27, wherein a password is accepted if the transmitted sequence of zone output keys matches with the expected sequence of zone output keys.

29. A method for data transmission, comprising the steps of:

defining a plurality of zone layout definitions, each zone layout definition dividing an input selection device into a plurality of zones, each zone including one output key associated therewith;

selecting one of the zone layout definitions in accordance with a predetermined selection method;

receiving a plurality of input characters, each input character being associated with at least one of the plurality of zones defined by the selected zone layout definition;

outputting to a receiving device a sequence of zone output keys including a zone output key included in each of the zones associated with each of the plurality of input characters as defined in accordance with the selected zone layout definition;

receiving at a receiving device the output sequence of zone output keys;

selecting the one of the zone layout definitions in accordance with the predetermined selection method;

applying a predefined sequence of characters against the selected zone layout definition to determine an expected sequence of zone output keys associated with the output sequence of zone output keys; and

comparing the output sequence of zone output keys with the expected sequence of zone output keys to determine a match therebetween.

30. The method of claim 29, wherein the zone layout definition is selected by sequencing through a predetermined number of zone definitions.

31. The method of claim 29, wherein the zone layout definition is selected by application of a predetermined algorithm to one or more predefined coefficients.

32. The method of claim 29, wherein each zone in a zone layout definition includes contiguous groups of keys.

33. The method of claim 29, wherein at least one zone in a zone layout definition includes non-contiguous keys.

34 The method of claim 29, wherein all of the keys associated with a zone are indicated as having been selected upon selection of one key in the zone.

35. The method of claim 29, wherein the zone output key associated with a zone that includes a particular selected input key is indicated differently than the other keys in the zone.

36. The method of claim 29, wherein the zones are defined from a QWERTY keyboard layout.

37. The method of claim 29, wherein at least one key is associated with a plurality of zones.

38. The method of claim 29, wherein a password is accepted if the output sequence of zone output keys matches with the expected sequence of zone output keys.

39. The method of claim 29, wherein a user is notified of the acceptance of the password.

40. A computer system comprising:

a memory configured to store a sequence of program instructions;

processor electronics configured to execute the program instructions to perform a method for data transmission by:

dividing an input selection device into a plurality of zones, each zone including two or more input keys which correspond to at least one zone output key;

receiving a plurality of inputs, each input being associated with the selection of a key in one of the plurality of zones; and

outputting a plurality of zone output keys that correspond to each of the plurality of inputs received.

41. A computer system, comprising:

a memory configured to store programmed instructions;

processor electronics configured to execute the programmed instructions to perform a method of receiving text inputs from a user by:

receiving inputs from a user in two or more different modalities, wherein the inputs are indicative of text to be entered;

analyzing the inputs in each of the two or more modalities to determine one or more word choices corresponding to the text to be entered;

using the word choices determined from each of the two or more modalities to select a word that corresponds to the text to be entered.

42. The computer system of claim 41, wherein the instructions are executable by the processor electronics to present the word choices determined from each of the

two or more modalities to the user to select a word corresponding to the text to be entered.

43. The computer system of claim 41, wherein the computer includes a keyboard and a microphone and wherein the instructions are executable by the processor to receive inputs from the user via entries on the keyboard and via audio input received by the microphone.

44. The computer system of claim 41, wherein the computer includes a tactile input and a microphone and wherein the instructions are executable by the processor to receive inputs from the user via entries on the tactile input and via audio input received by the microphone.

45. The computer system of claim 41, wherein the memory stores a mapping of entries on a keyboard to text.

46. The computer system of claim 41, wherein the memory stores a database of words that are likely to correspond to text entered by the user, wherein the database records how frequently the words in the database are selected by the user.

47. The computer system of claim 41, wherein the memory stores a database of words that are likely to correspond to text entered by the user, wherein the database records how recently the words in the database were selected by the user.

48. The computer system of claim 41, wherein the instructions cause the processor to determine recent actions taken by the user and select word choices corresponding to the recent actions taken by the user.

49. The computer system of claim 48, whrein the recent actions taken by the user include one or more of: programs used, documents viewed; internet sites visited; and audio/video content experienced.

50 The computer system of claim 41, wherein the instructions cause the processor to determine a location of the user and select word choices corresponding to the location of the user.

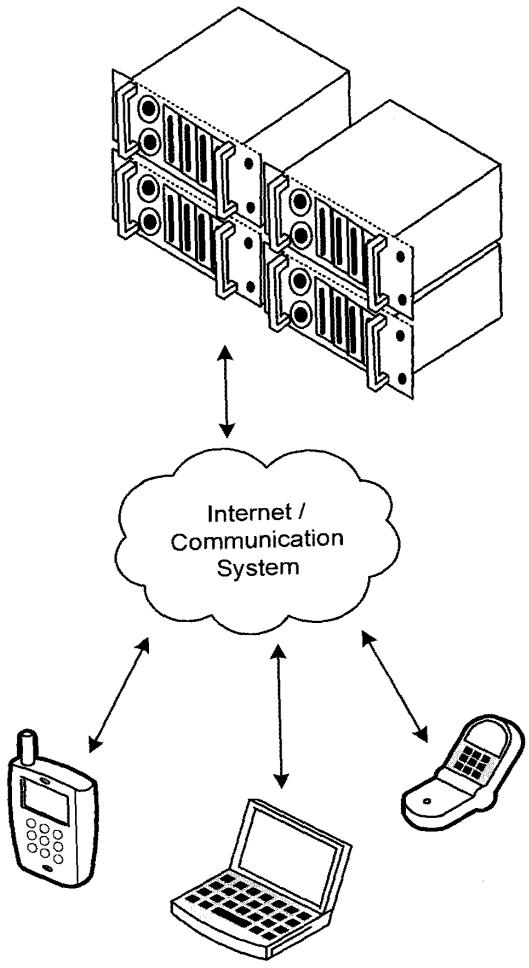


FIG. 1

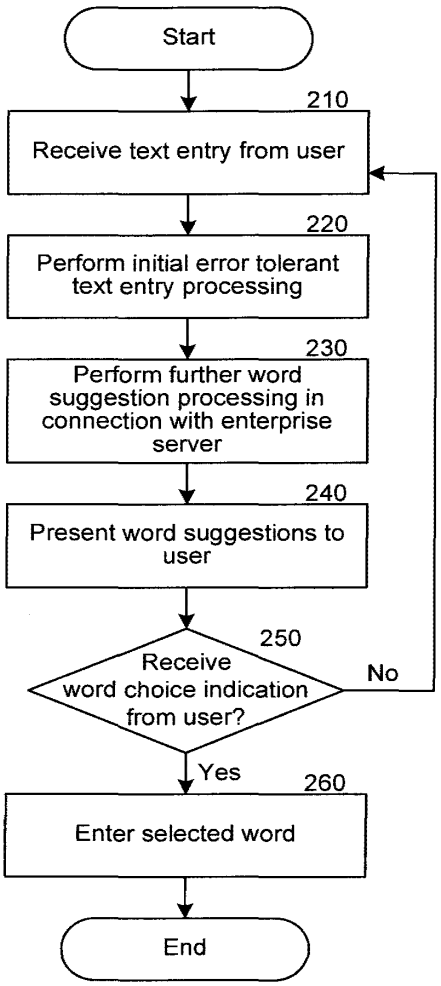

Start
210
Receive text entry from user
220
Perform initial error tolerant text entry processing
230
Perform further word suggestion processing in connection with enterprise server
240
Present word suggestions to user
250
Receive word choice indication from user?
No
Yes
260
Enter selected word
End

FIG. 2

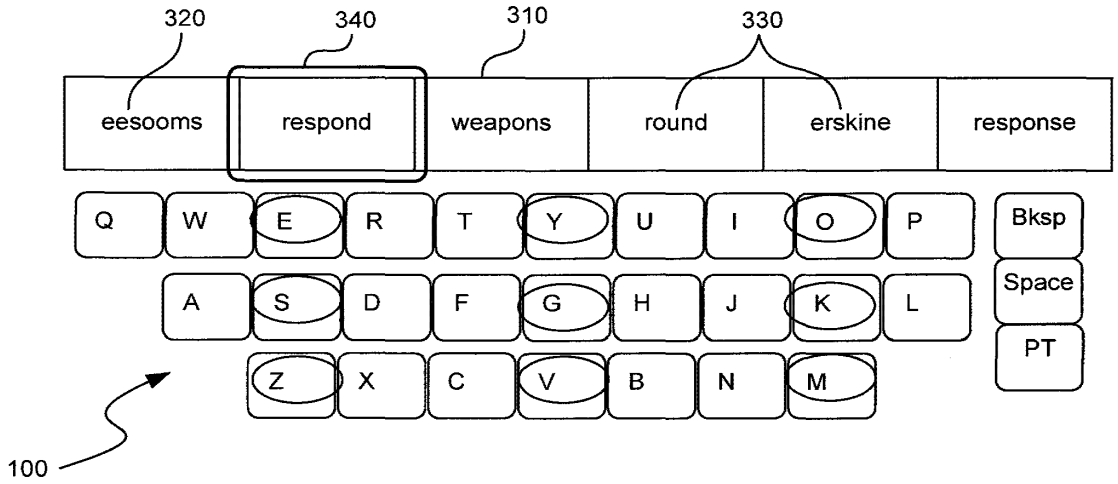

320
340
310
330
eesooms
respond
weapons
round
erskine
response
Q
W
E
R
T
Y
U
I
O
P
Bksp
A
S
D
F
G
H
J
K
L
Space
PT
Z
X
C
V
B
N
M
100

FIG. 3

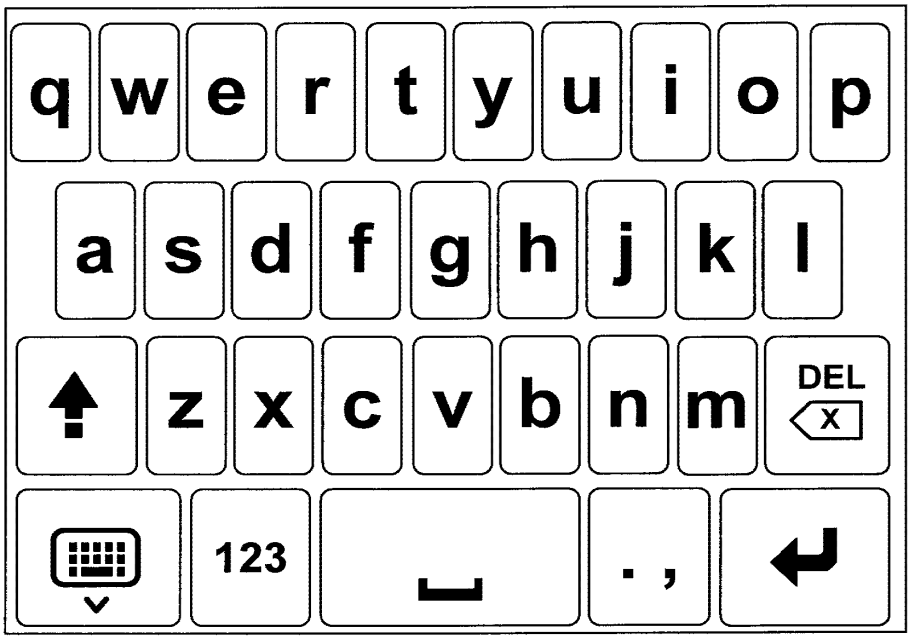


FIG. 4

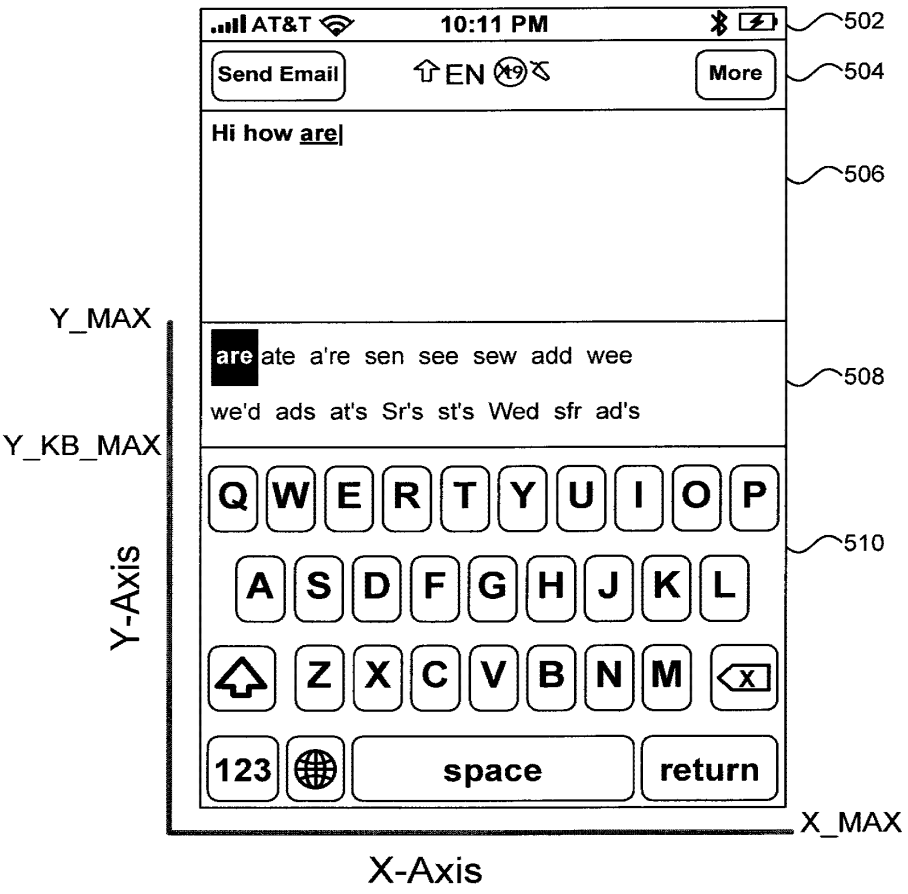

AT&T
10:11 PM
502
Send Email
EN
More
504
Hi how are|
506
Y_MAX
are ate a're sen see sew add wee
we'd ads at's Sr's st's Wed sfr ad's
508
Y_KB_MAX
Q W E R T Y U I O P
510
A S D F G H J K L
Z X C V B N M
123
space
return
Y-Axis
X_MAX
X-Axis

FIG. 5A

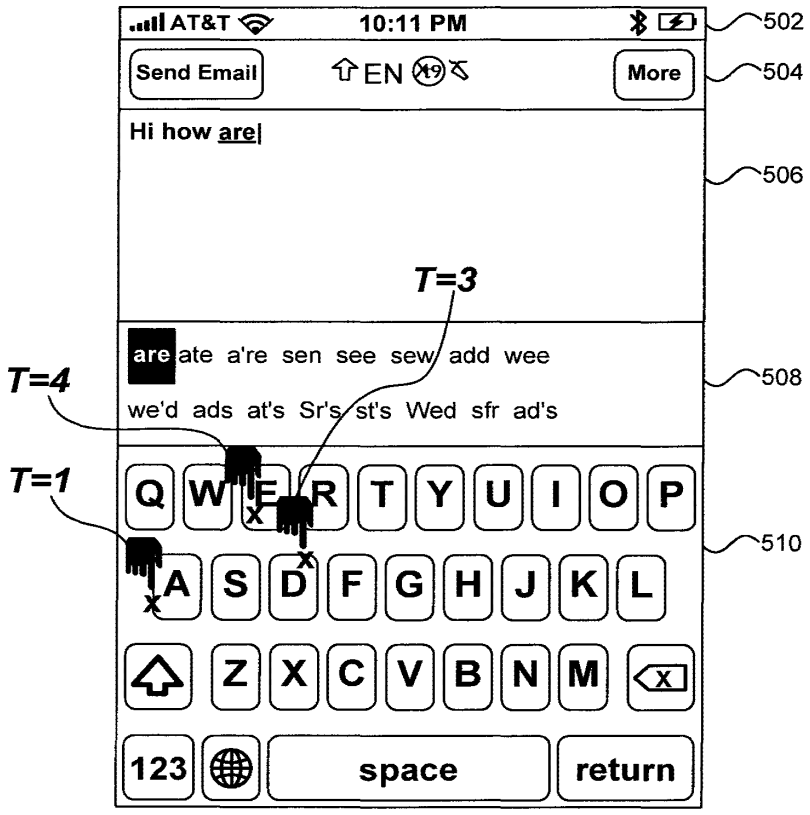

AT&T
10:11 PM
502
Send Email
EN
More
504
Hi how are|
506
T=3
are ate a're sen see sew add wee
we'd ads at's Sr's st's Wed sfr ad's
508
T=4
T=1
Q W E R T Y U I O P
A S D F G H J K L
Z X C V B N M
510
123
space
return

FIG. 5B

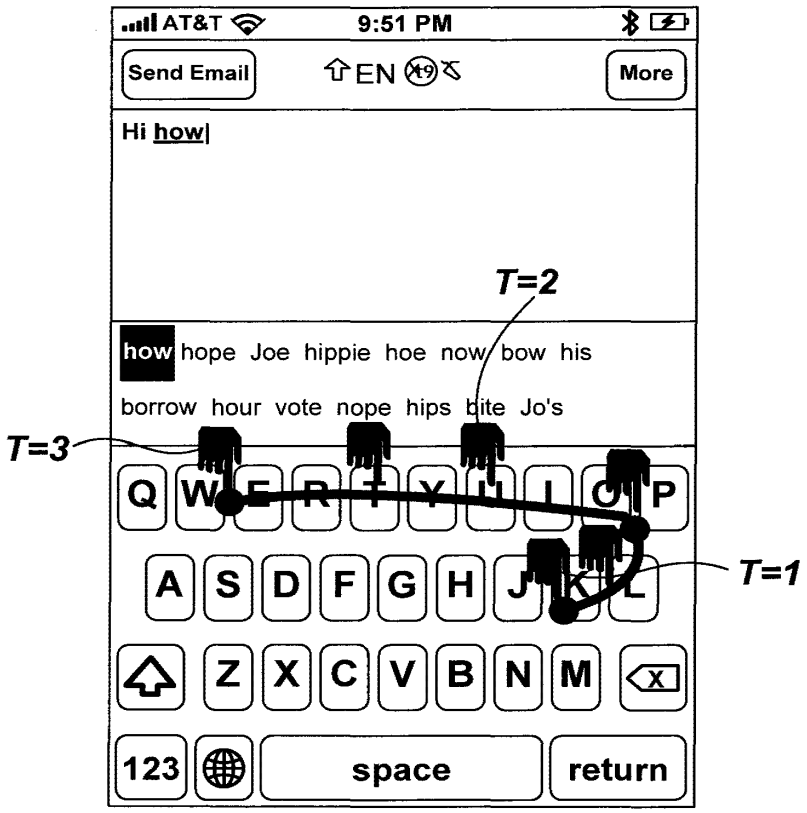

AT&T
9:51 PM
Send Email
EN
More
Hi how
how hope Joe hippie hoe now bow his
borrow hour vote nope hips bite Jo's
T=1
T=2
T=3
Q W E R T Y U I O P
A S D F G H J K L
Z X C V B N M
123
space
return

FIG. 5C

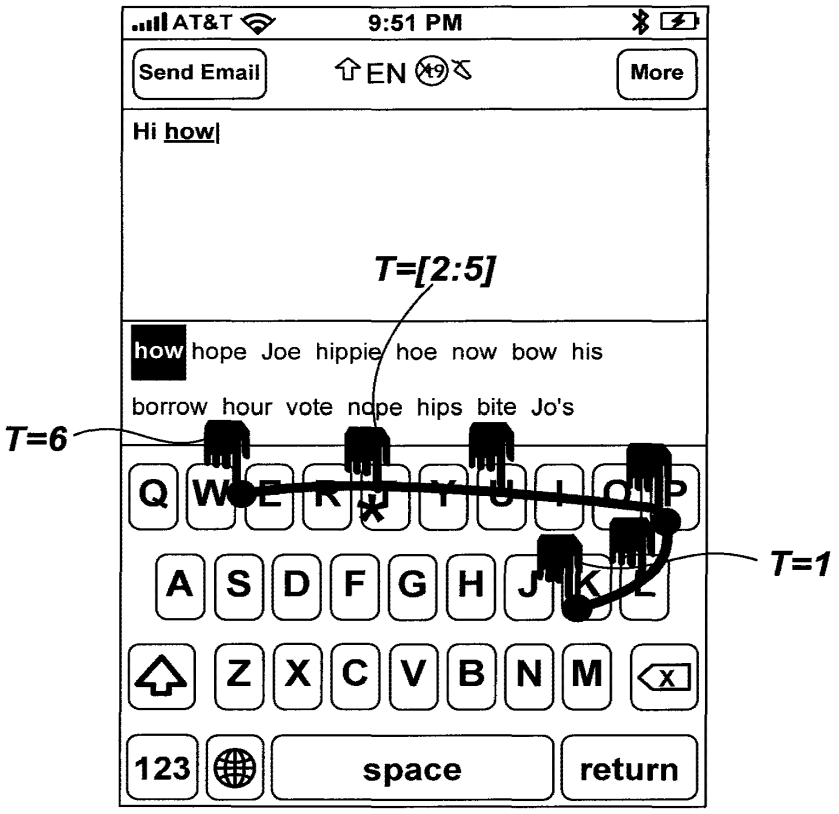

AT&T
9:51 PM
Send Email
EN
More
Hi how|
T=[2:5]
how hope Joe hippie hoe now bow his
borrow hour vote nope hips bite Jo's
T=6
T=1
Q W E R T Y U I O P
A S D F G H J K L
Z X C V B N M
123
space
return

FIG. 5D

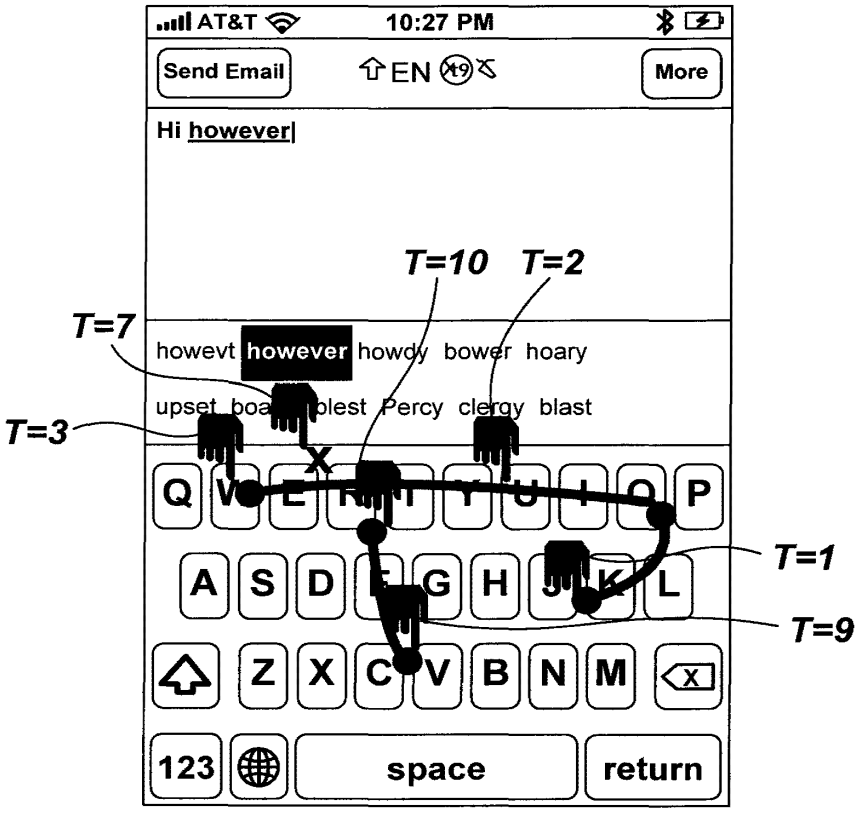
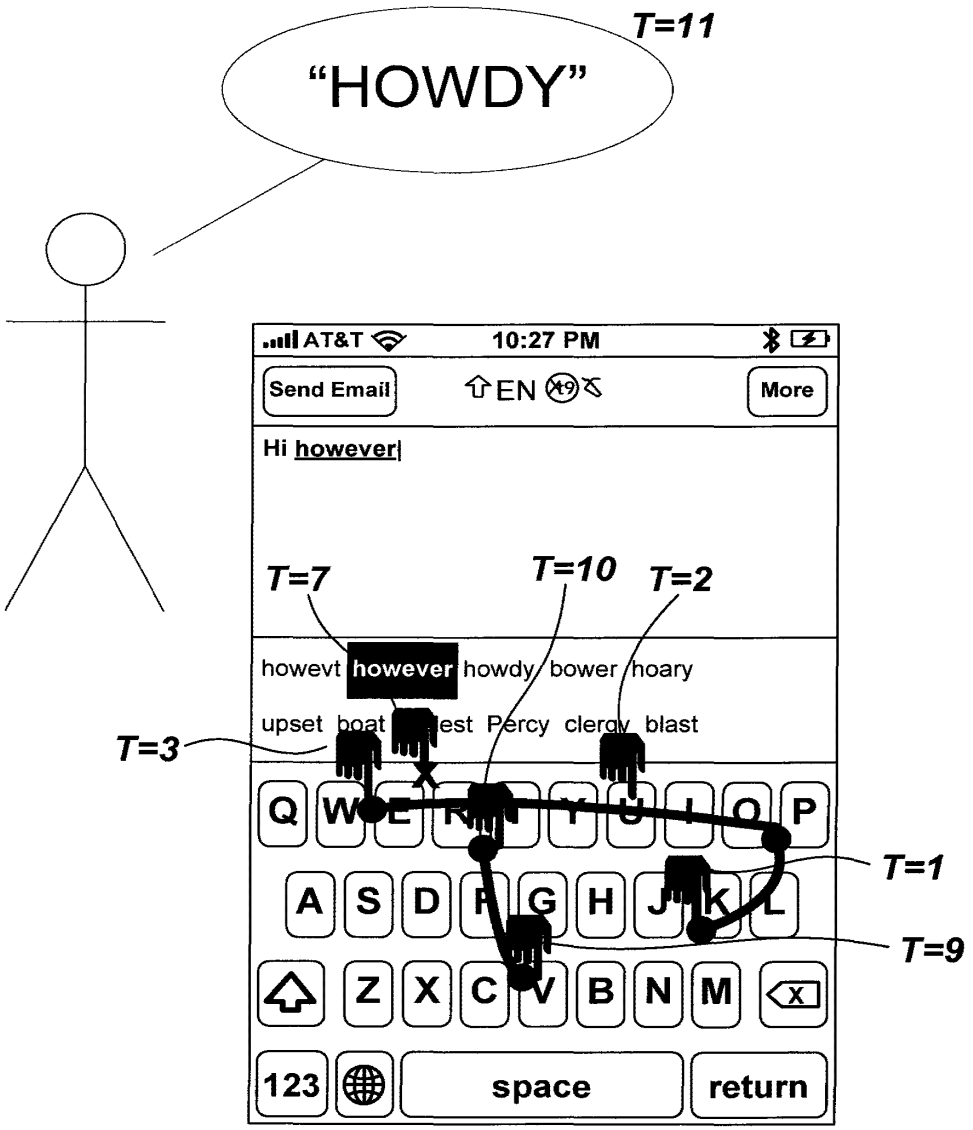

AT&T
10:27 PM
Send Email
EN
More
Hi however|
howevt however howdy bower hoary
upset boa plest Percy clergy blast
T=10
T=2
T=7
T=3
T=1
T=9
Q W E R T Y U I O P
A S D F G H J K L
Z X C V B N M
123
space
return

FIG. 5E



Multimodal 2: trace, lift, tap, trace select by voice

FIG. 5F

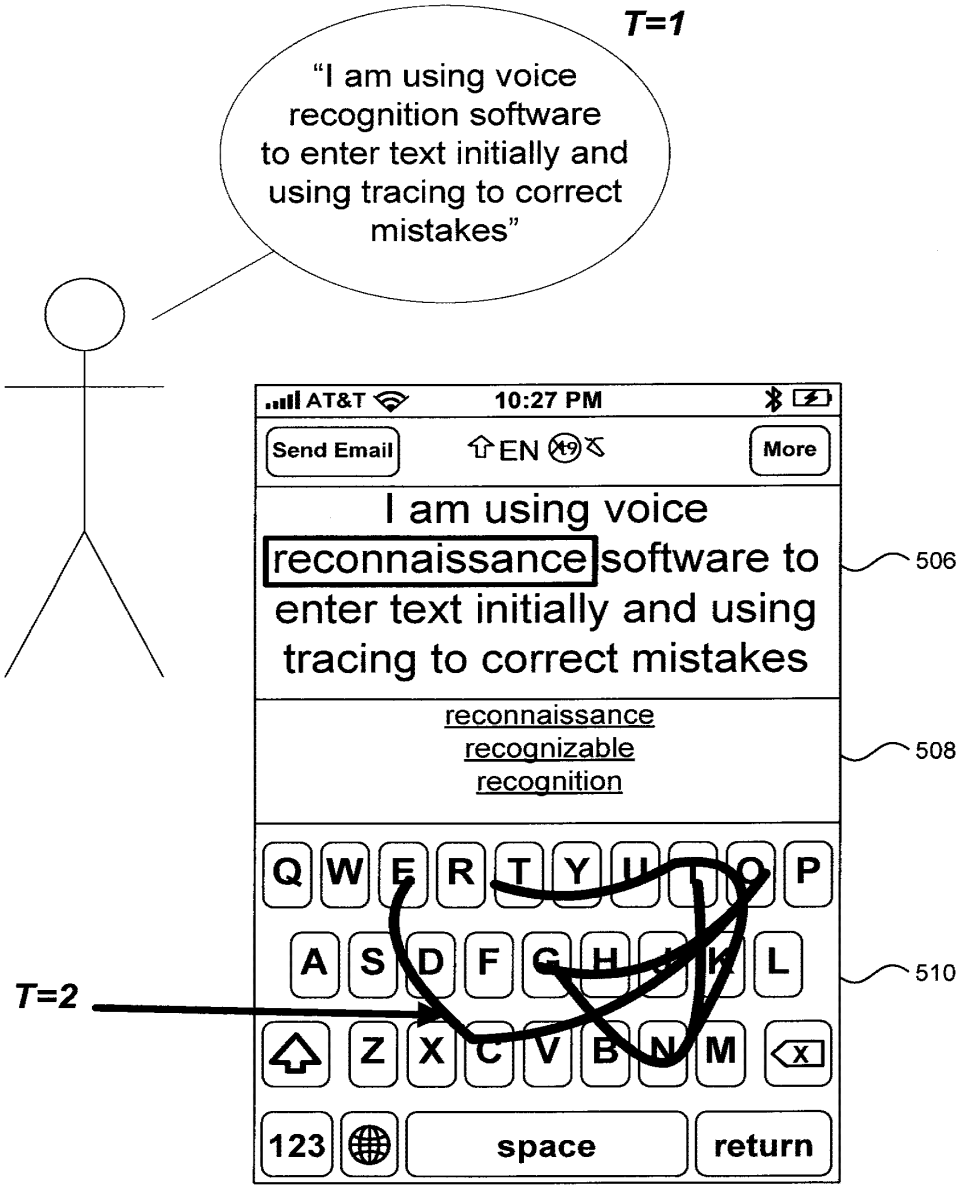

T=1
"I am using voice recognition software to enter text initially and using tracing to correct mistakes"
AT&T
10:27 PM
Send Email
EN
More
I am using voice reconnaissance software to enter text initially and using tracing to correct mistakes
506
reconnaissance
recognizable
recognition
508
Q W E R T Y U I O P
A S D F G H J K L
510
Z X C V B N M
123
space
return
T=2

FIG. 5G

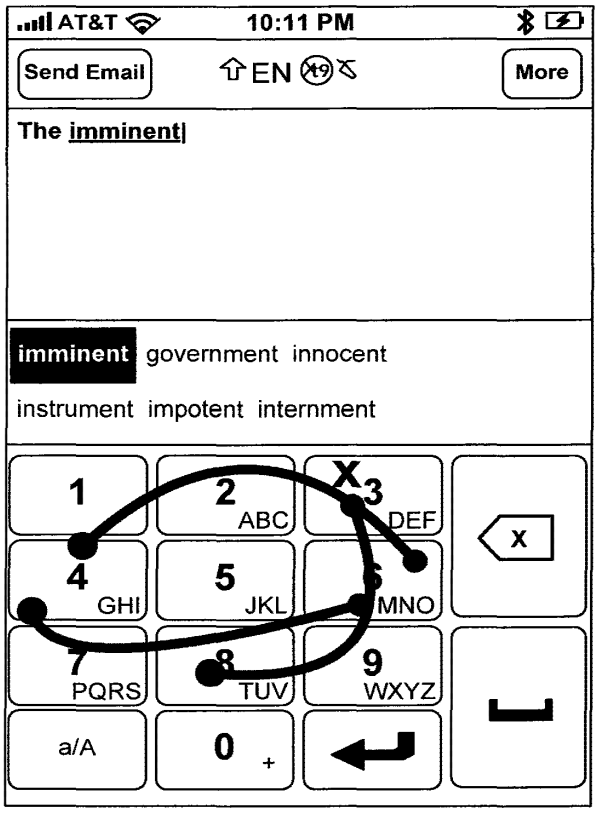

AT&T
10:11 PM
Send Email
EN
More
The imminent
imminent government innocent
instrument impotent internment
1
2 ABC
3 DEF
4 GHI
5 JKL
6 MNO
7 PQRS
8 TUV
9 WXYZ
a/A
0 +
X

FIG. 5H

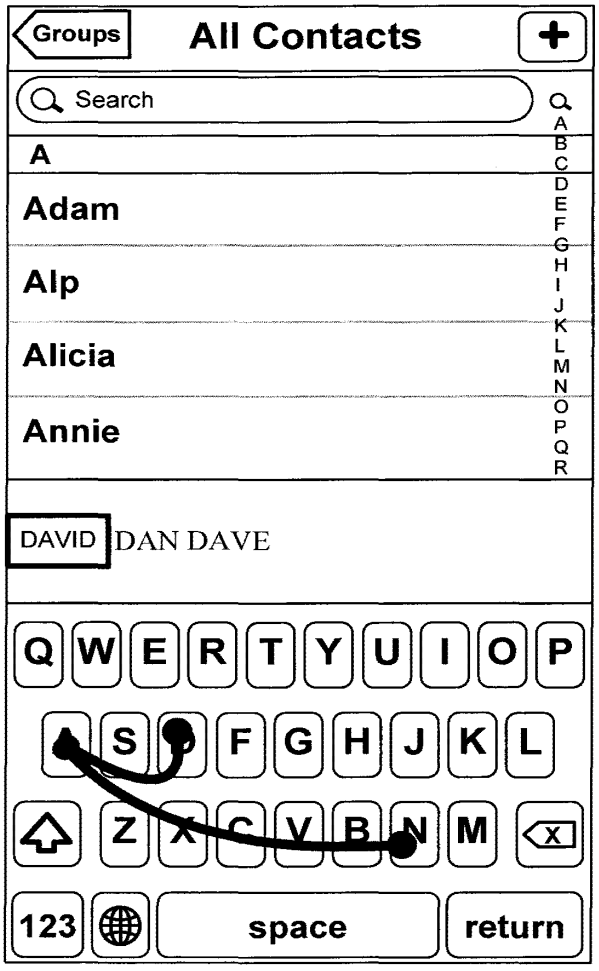

Groups
All Contacts
Search
A
Adam
Alp
Alicia
Annie
A B C D E F G H I J K L M N O P Q R
DAVID
DAN DAVE
Q W E R T Y U I O P
S F G H J K L
Z X C V B N M
123
space
return

FIG. 5I

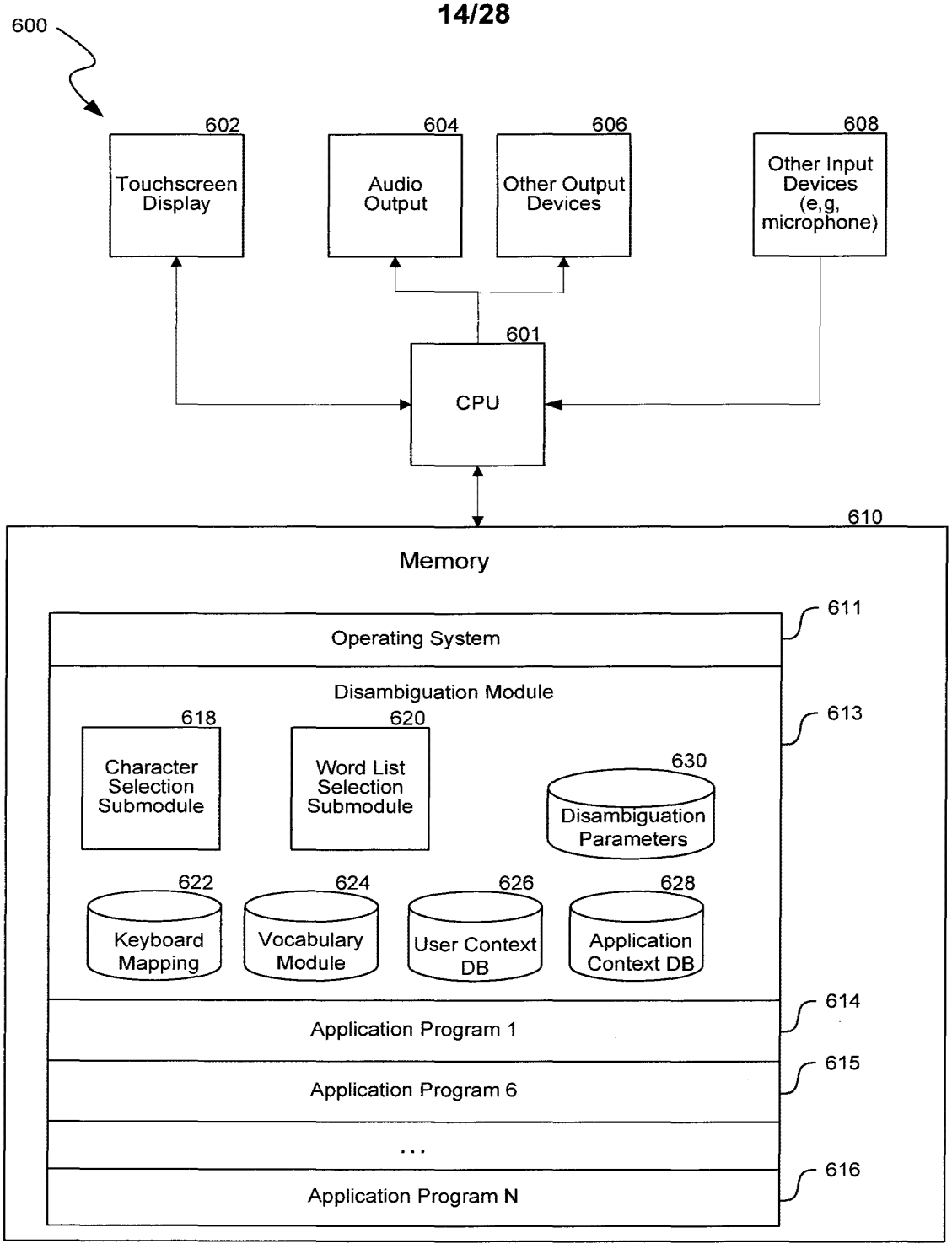

600
602
Touchscreen Display
604
Audio Output
606
Other Output Devices
608
Other Input Devices (e,g, microphone)
601
CPU
610
Memory
611
Operating System
Disambiguation Module
613
618
Character Selection Submodule
620
Word List Selection Submodule
630
Disambiguation Parameters
622
Keyboard Mapping
624
Vocabulary Module
626
User Context DB
628
Application Context DB
614
Application Program 1
615
Application Program 6
...
616
Application Program N

FIG. 6

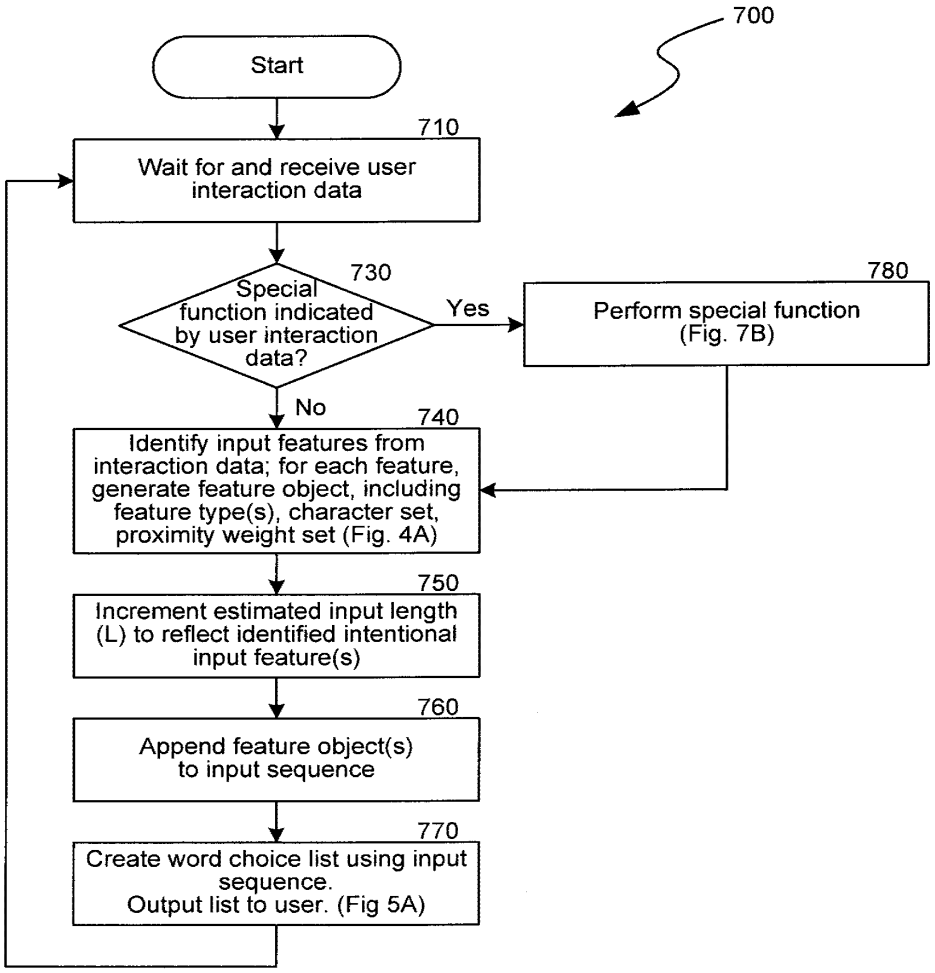

700
Start
710
Wait for and receive user interaction data
730
Special function indicated by user interaction data?
Yes
780
Perform special function (Fig. 7B)
No
740
Identify input features from interaction data; for each feature, generate feature object, including feature type(s), character set, proximity weight set (Fig. 4A)
750
Increment estimated input length (L) to reflect identified intentional input feature(s)
760
Append feature object(s) to input sequence
770
Create word choice list using input sequence.
Output list to user. (Fig 5A)

FIG. 7A

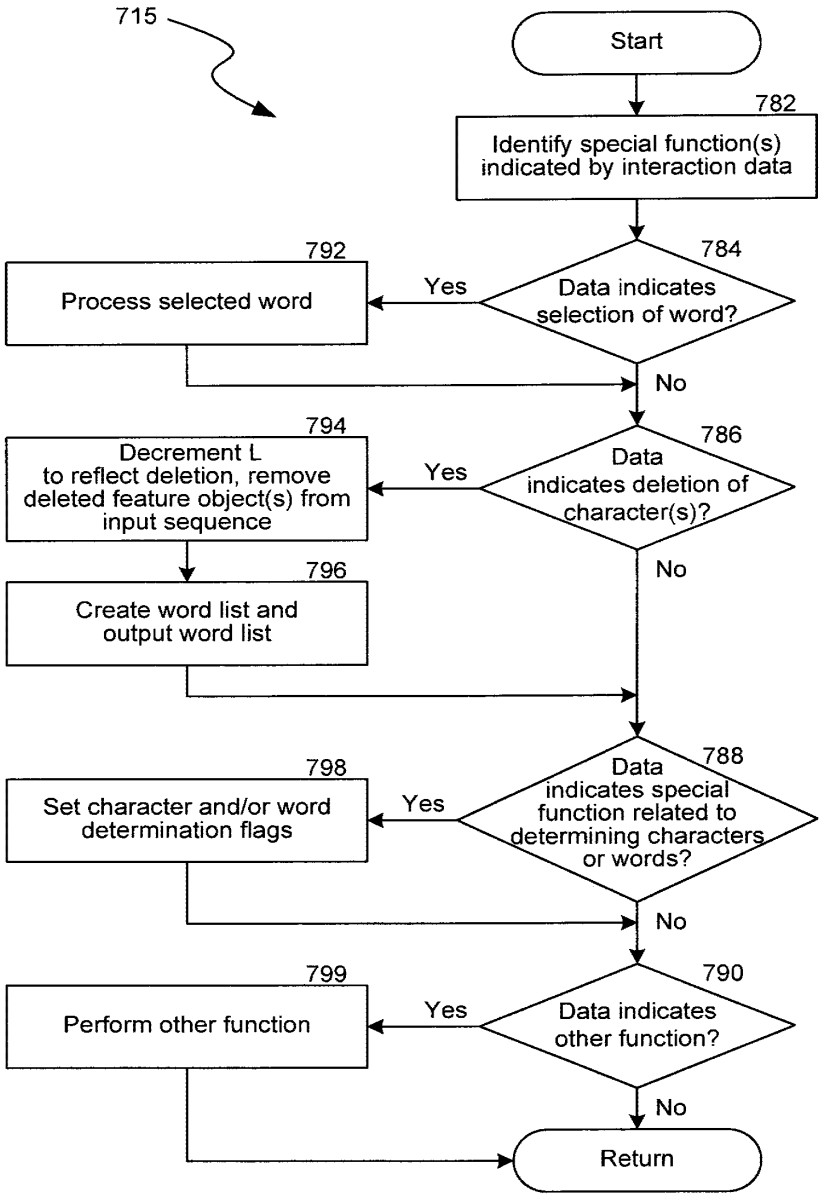

715
Start
782
Identify special function(s) indicated by interaction data
784
Data indicates selection of word?
Yes
792
Process selected word
No
786
Data indicates deletion of character(s)?
Yes
794
Decrement L to reflect deletion, remove deleted feature object(s) from input sequence
796
Create word list and output word list
No
788
Data indicates special function related to determining characters or words?
Yes
798
Set character and/or word determination flags
No
790
Data indicates other function?
Yes
799
Perform other function
No
Return

FIG. 7B

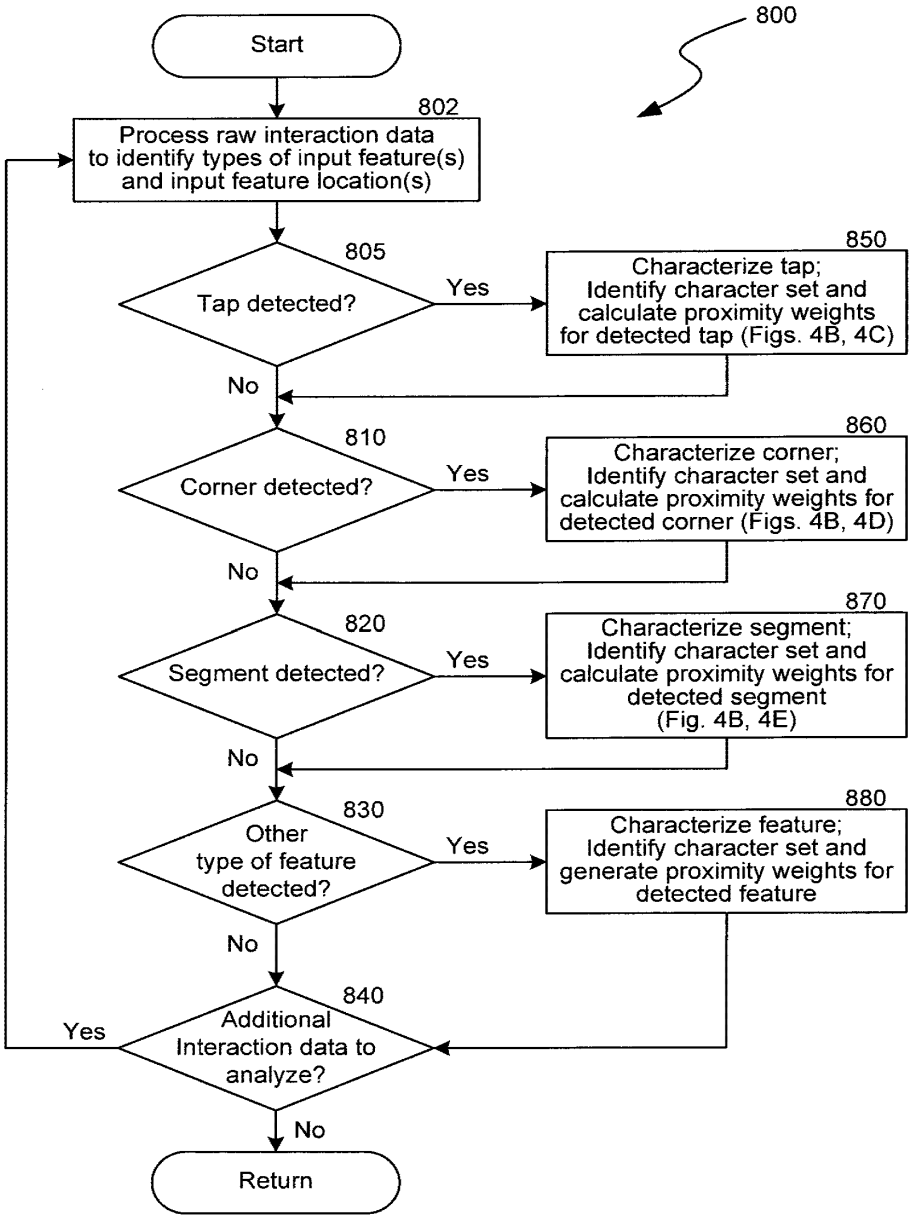

800
Start
802
Process raw interaction data to identify types of input feature(s) and input feature location(s)
805
Tap detected?
Yes
850
Characterize tap; Identify character set and calculate proximity weights for detected tap (Figs. 4B, 4C)
No
810
Corner detected?
Yes
860
Characterize corner; Identify character set and calculate proximity weights for detected corner (Figs. 4B, 4D)
No
820
Segment detected?
Yes
870
Characterize segment; Identify character set and calculate proximity weights for detected segment (Fig. 4B, 4E)
No
830
Other type of feature detected?
Yes
880
Characterize feature; Identify character set and generate proximity weights for detected feature
No
840
Additional Interaction data to analyze?
Yes
No
Return

FIG. 8A

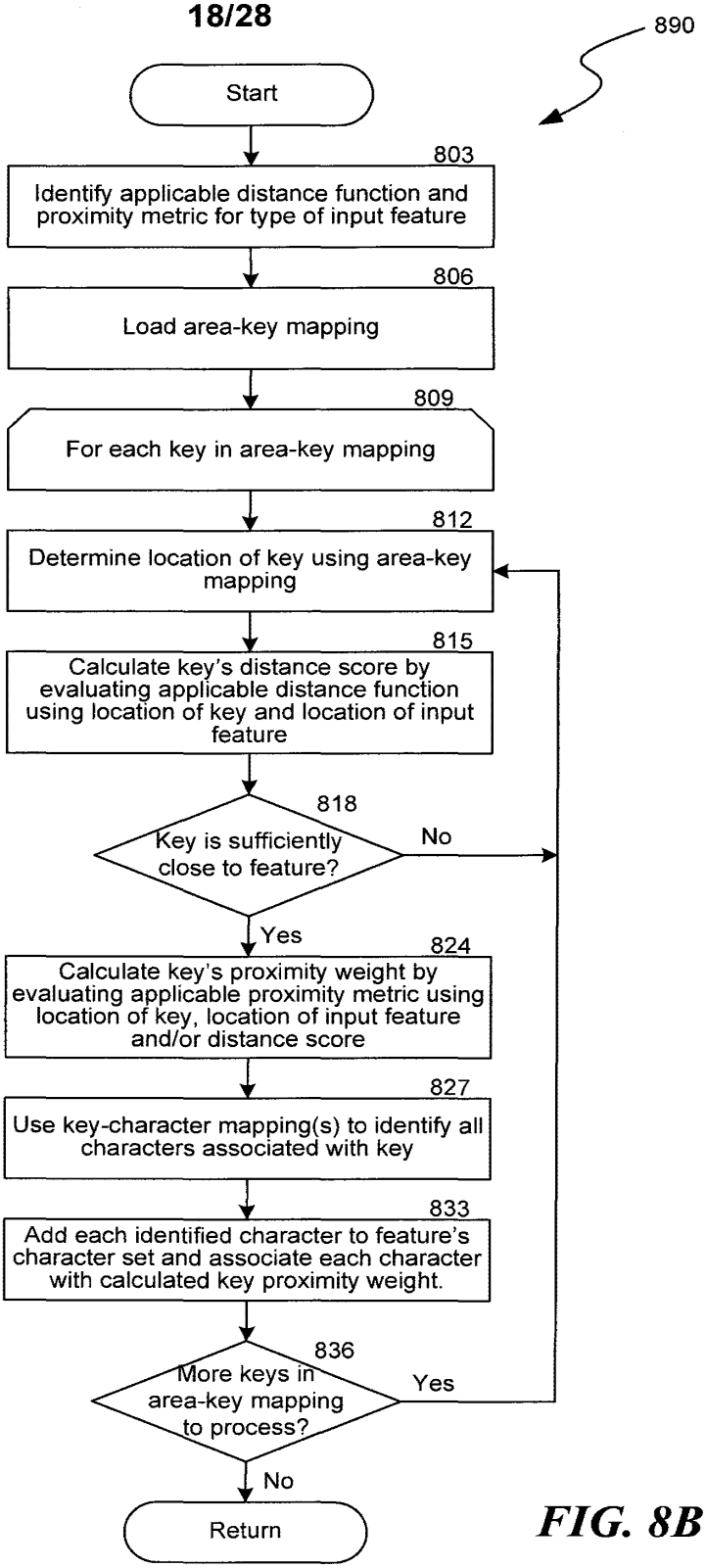

890
Start
803
Identify applicable distance function and proximity metric for type of input feature
806
Load area-key mapping
809
For each key in area-key mapping
812
Determine location of key using area-key mapping
815
Calculate key's distance score by evaluating applicable distance function using location of key and location of input feature
818
Key is sufficiently close to feature?
No
Yes
824
Calculate key's proximity weight by evaluating applicable proximity metric using location of key, location of input feature and/or distance score
827
Use key-character mapping(s) to identify all characters associated with key
833
Add each identified character to feature's character set and associate each character with calculated key proximity weight.
836
More keys in area-key mapping to process?
Yes
No
Return

FIG. 8B

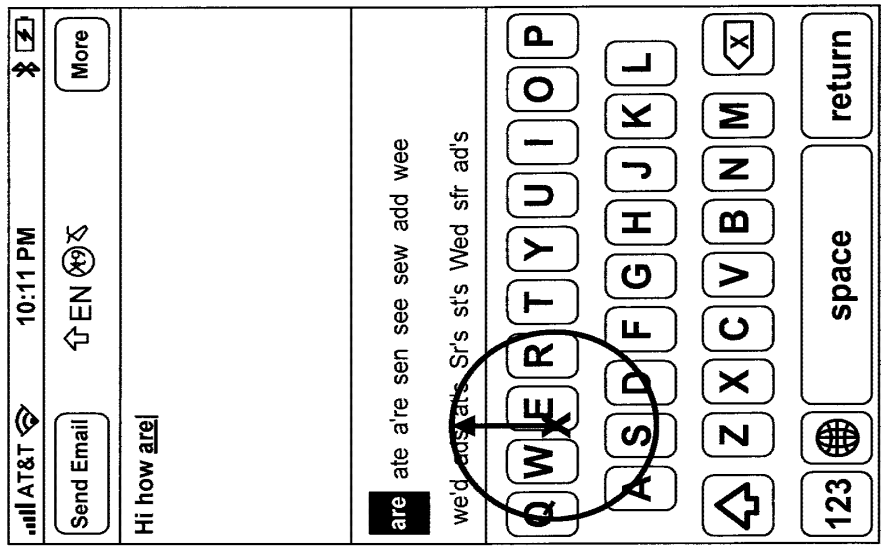

AT&T
10:11 PM
Send Email
EN
More
Hi how are
are ate a're sen see sew add wee
we'd ads at's Sr's st's Wed sfr ad's
Q W E R T Y U I O P
A S D F G H J K L
Z X C V B N M
123
space
return

FIG. 8C

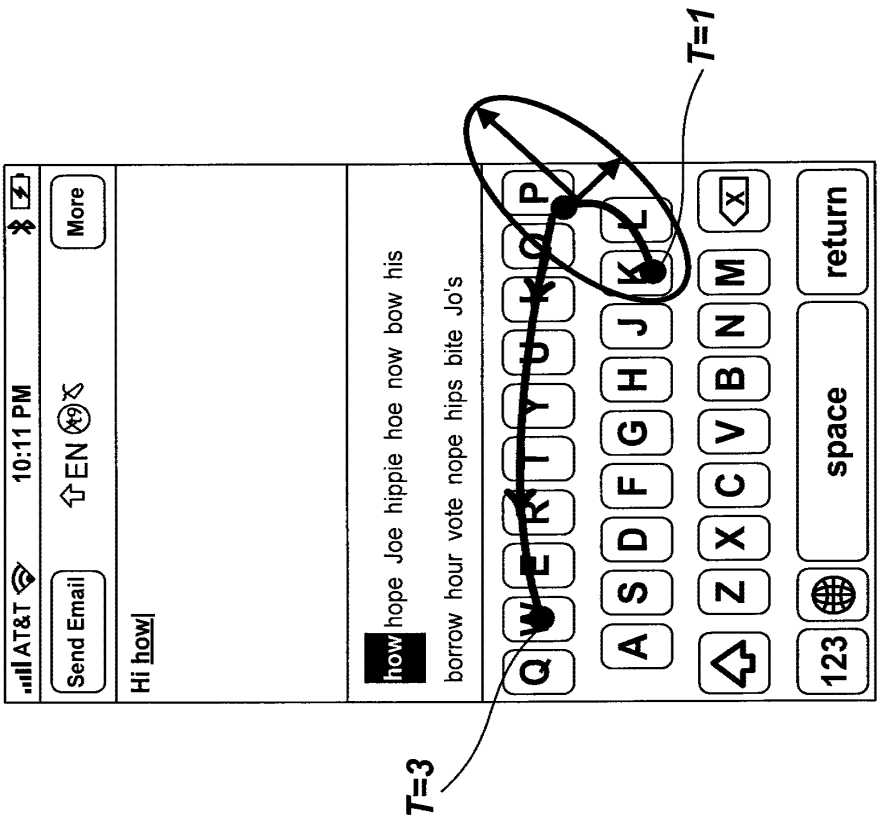

AT&T
10:11 PM
Send Email
EN
More
Hi how
how hope Joe hippie hoe now bow his
borrow hour vote nope hips bite Jo's
T=3
T=1
Q W E R T Y U I O P
A S D F G H J K L
Z X C V B N M
123
space
return

FIG. 8D

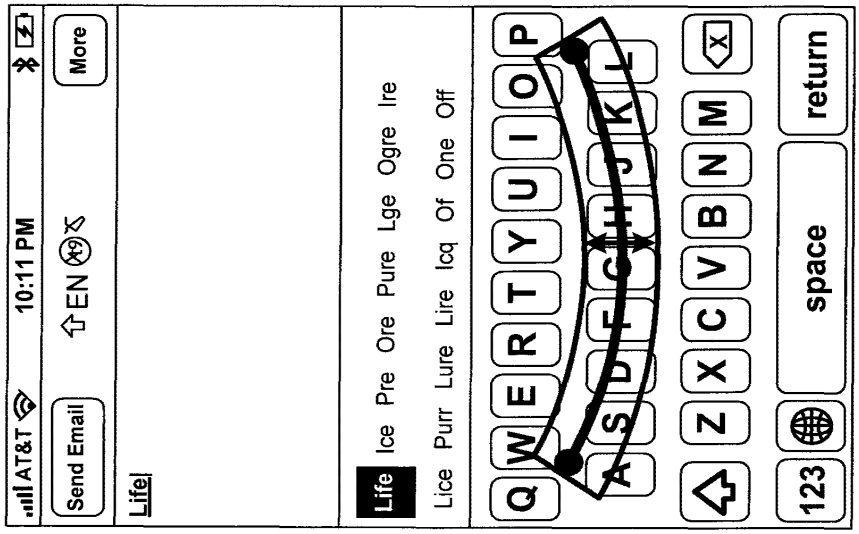


FIG. 8E

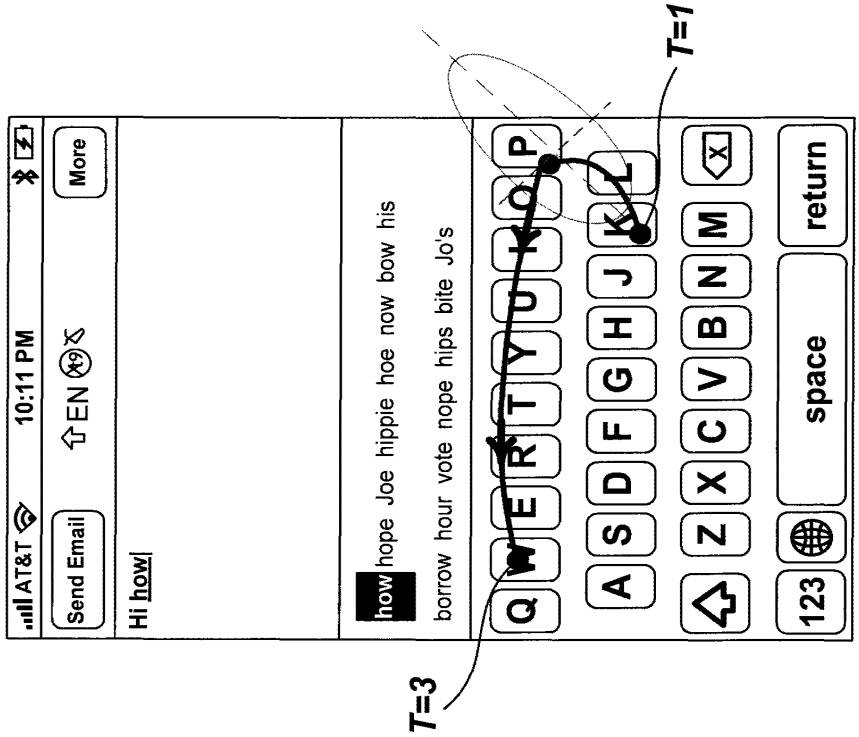


FIG. 8F

Exhibit 1004
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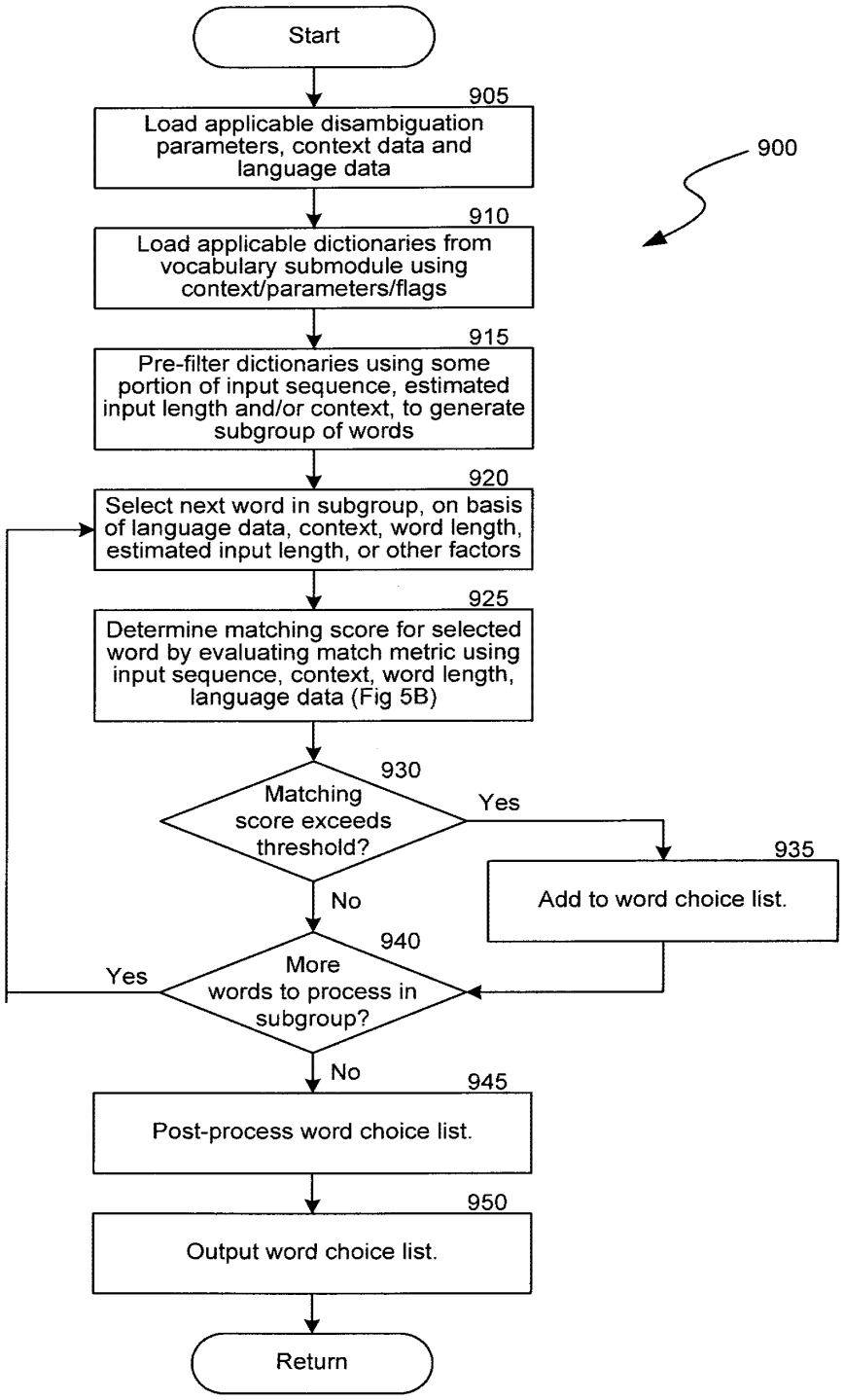

Start
905
Load applicable disambiguation parameters, context data and language data
900
910
Load applicable dictionaries from vocabulary submodule using context/parameters/flags
915
Pre-filter dictionaries using some portion of input sequence, estimated input length and/or context, to generate subgroup of words
920
Select next word in subgroup, on basis of language data, context, word length, estimated input length, or other factors
925
Determine matching score for selected word by evaluating match metric using input sequence, context, word length, language data (Fig 5B)
930
Matching score exceeds threshold?
Yes
935
Add to word choice list.
No
940
More words to process in subgroup?
Yes
No
945
Post-process word choice list.
950
Output word choice list.
Return

FIG. 9A

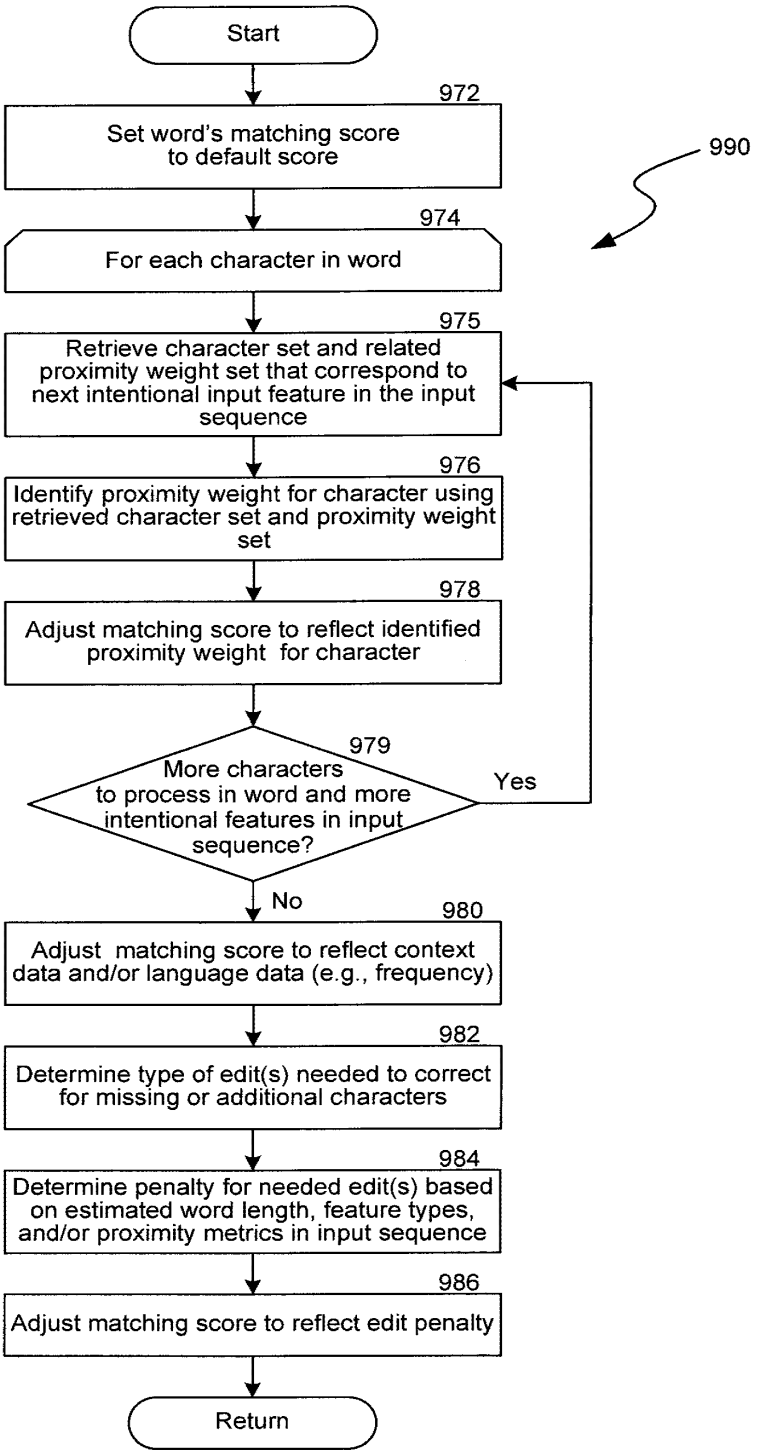

Start
972
Set word's matching score to default score
990
974
For each character in word
975
Retrieve character set and related proximity weight set that correspond to next intentional input feature in the input sequence
976
Identify proximity weight for character using retrieved character set and proximity weight set
978
Adjust matching score to reflect identified proximity weight for character
979
More characters to process in word and more intentional features in input sequence?
Yes
No
980
Adjust matching score to reflect context data and/or language data (e.g., frequency)
982
Determine type of edit(s) needed to correct for missing or additional characters
984
Determine penalty for needed edit(s) based on estimated word length, feature types, and/or proximity metrics in input sequence
986
Adjust matching score to reflect edit penalty
Return

FIG. 9B

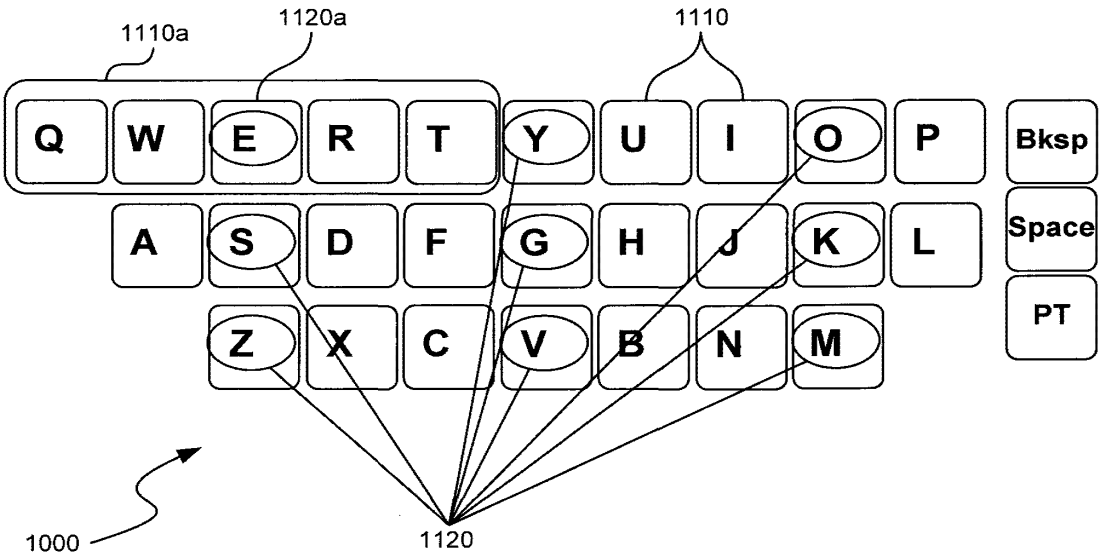

1110a
1120a
1110
Q W E R T Y U I O P Bksp
A S D F G H J K L Space
Z X C V B N M PT
1000
1120

FIG. 10

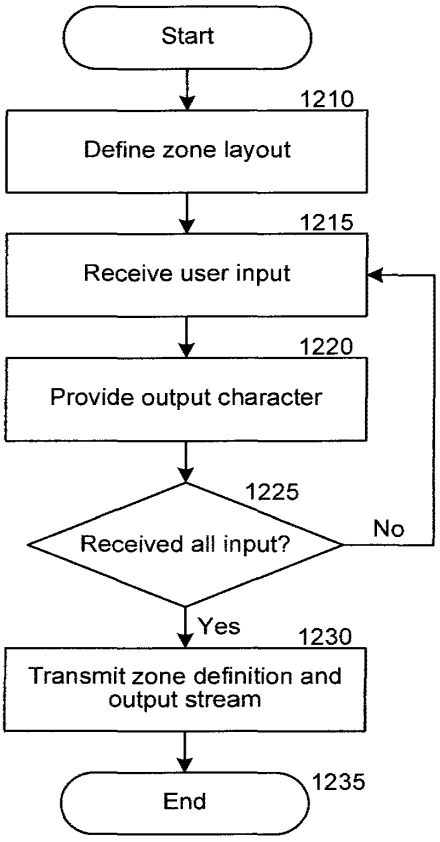

Start
1210
Define zone layout
1215
Receive user input
1220
Provide output character
1225
Received all input?
No
Yes
1230
Transmit zone definition and output stream
End
1235

FIG. 11

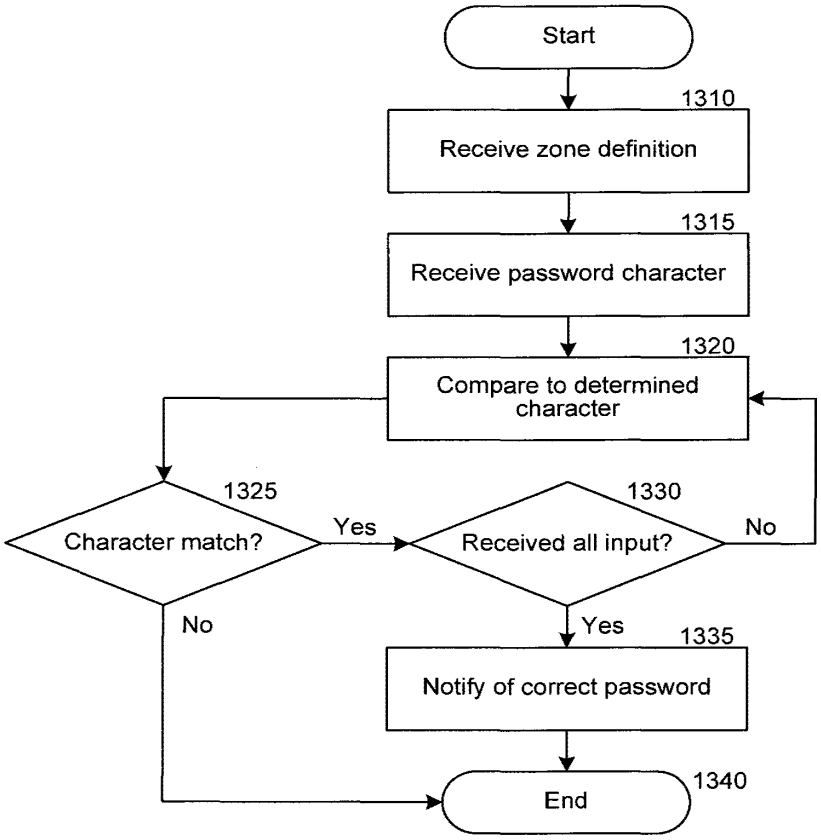

Start
1310
Receive zone definition
1315
Receive password character
1320
Compare to determined character
1325
Character match?
Yes
1330
Received all input?
No
No
Yes
1335
Notify of correct password
1340
End

FIG. 12

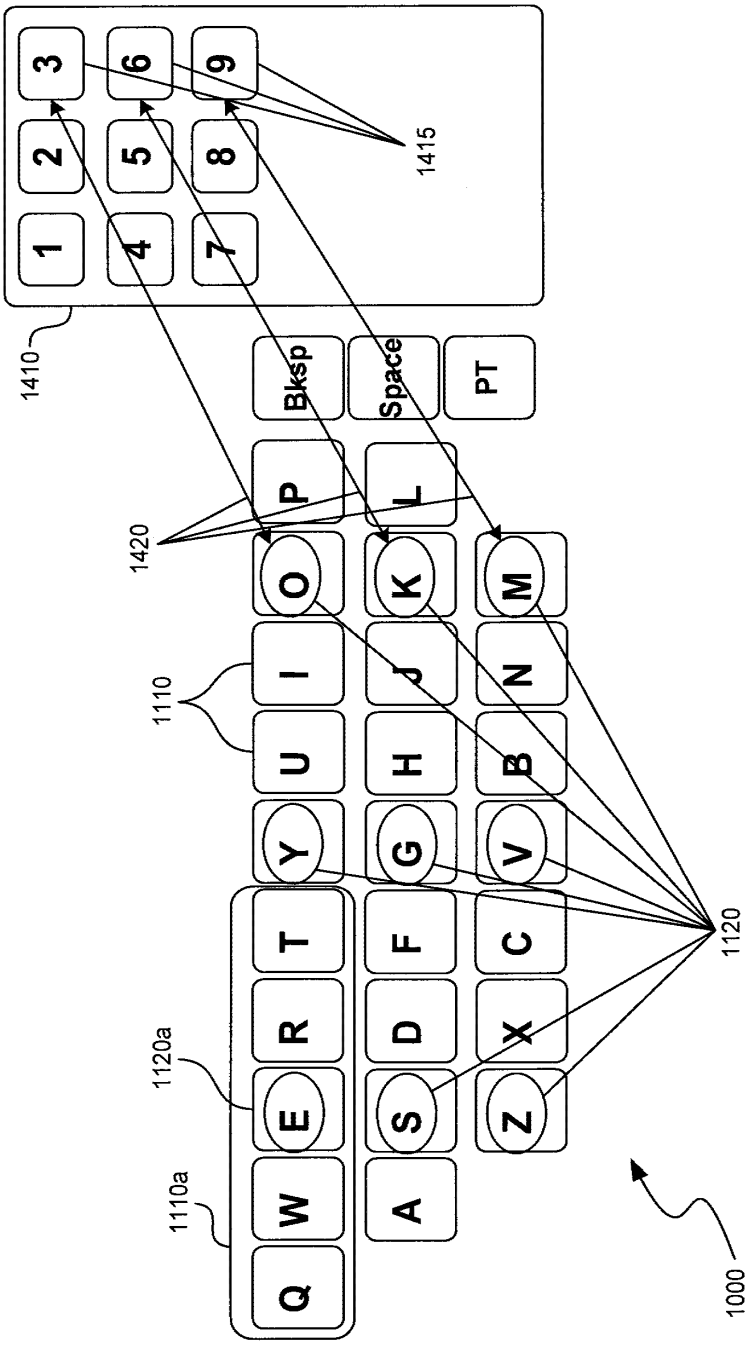

1410
1415
1420
1110
1120a
1110a
1120
1000
1 2 3 4 5 6 7 8 9
Bksp
Space
PT
P L O K M I J N U H B Y G V T F C R D X E S Z W A Q

FIG. 13

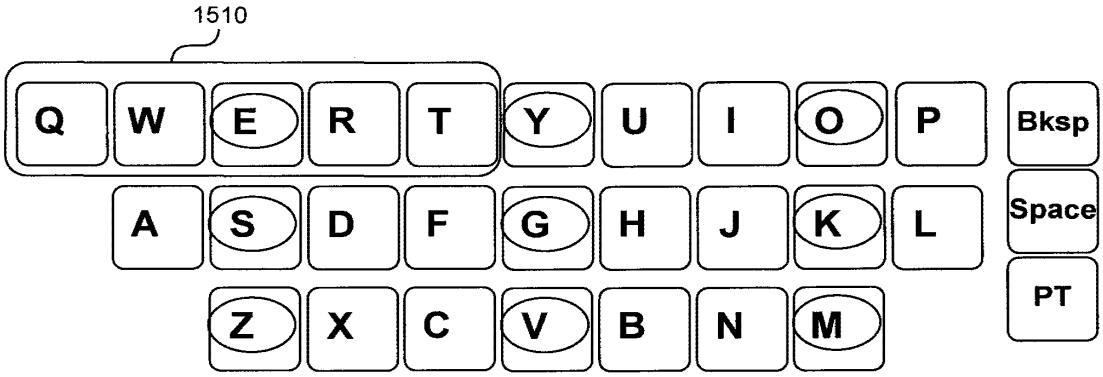


FIG. 14A

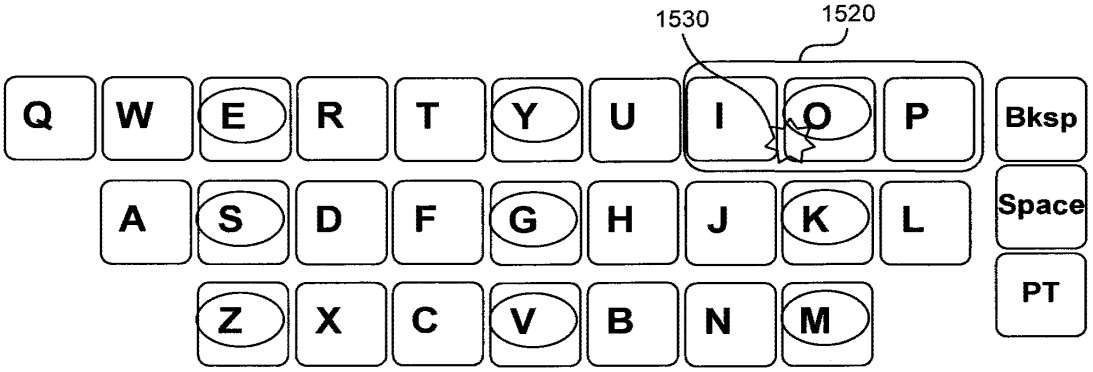


FIG. 14B

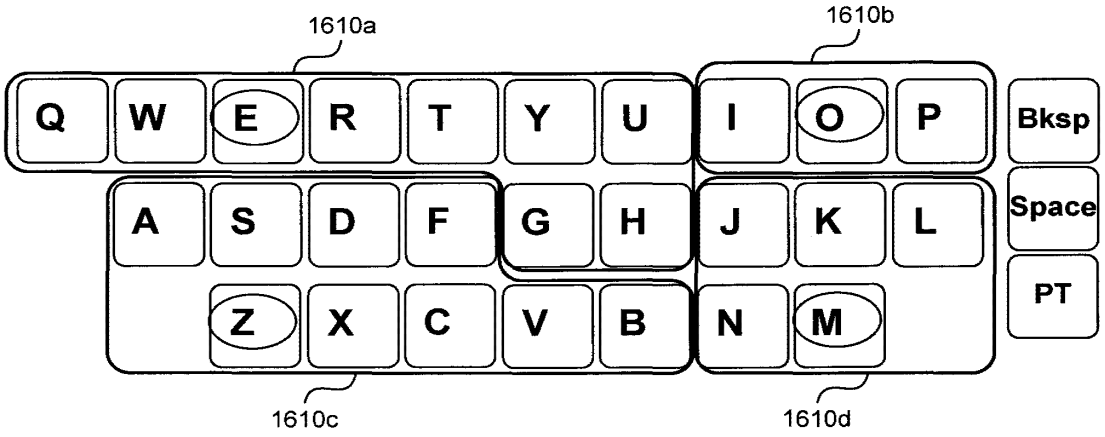

1610a
1610b
Q W E R T Y U I O P Bksp
A S D F G H J K L Space
Z X C V B N M PT
1610c
1610d

FIG. 15

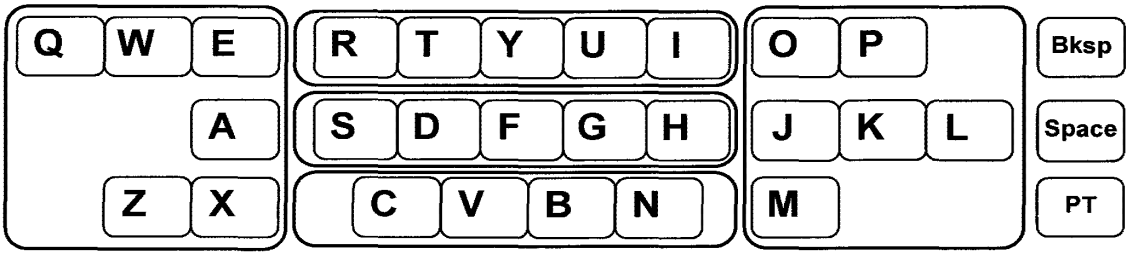

Q W E R T Y U I O P Bksp
A S D F G H J K L Space
Z X C V B N M PT

FIG. 16

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 11/28387

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - G06F 3/041 (2011.01)
USPC - 345/173
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC(8): G06F 3/041 (2011.01)
USPC: 345/173

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
IPC(8): G06F 3/041 (2011.01) (keyword limited; terms below)
USPC: 345/156, 173; 715/863 (keyword limited; terms below)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
pubWEST(USPT,PGPB,EPAB,JPAB,small quick short micro gesture path stroke touch finger screen panel intended candidate correction editing potential match database set-top remote control rank sequence password template character word definition zone group keys buttons clusters previous first suggested possible interpret middle scroll disambiguate

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 2007/0040813 A1 (Kushler et al.) 22 February 2007 (22.02.2007), entire document especially; para [0032]-[0076], [0147], [0191]-[0200], Fig. 2B, 4A to 4C	1-7, 9-12, 14-42, 45-49 --- 8, 13, 43, 44, 50
Y	US 2009/0239587 A1 (Negron et al.) 24 September 2009 (24.09.2009), para [0070]	8
Y	US 2007/0259717 A1 (Mattice et al.) 08 November 2007 (08.11.2007), para [0073], [0078], [0087], [0206]	13, 50
Y	US 2005/0283364 A1 (Longe et al.) 22 December 2005 (22.12.2005), para [0064], [0065], [0078], [0089]	43, 44
A	US 2009/0284471 A1 (Longe et al.) 19 November 2009 (19.11.2009), entire document	1 - 50

☐ Further documents are listed in the continuation of Box C. ☐

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
02 May 2011 (02.05.2011)	12 MAY 2011
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (July 2009)

Electronic Acknowledgement Receipt

EFS ID:	15685791
Application Number:	13652222
International Application Number:	
Confirmation Number:	4390
Title of Invention:	TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES
First Named Inventor/Applicant Name:	Jakob Sternby
Customer Number:	105412
Filer:	Christopher J. Daley-Watson/Cheryl Penner
Filer Authorized By:	Christopher J. Daley-Watson
Attorney Docket Number:	710078061US
Receipt Date:	03-MAY-2013
Filing Date:	15-OCT-2012
Time Stamp:	14:22:07
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		2013-05-03_IDS_710078061US.PDF	196263 5fe7b2dc542fb169db12d7e92a6f2a87d4fe3963	yes	4

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Transmittal Letter	1	2
	Information Disclosure Statement (IDS) Form (SB08)	3	4

Warnings:					
Information:					
2	Foreign Reference	WO20113057.PDF	4927934 8c8442ad7cf470dba0a365a5135160e7a5136c6b	no	113
Warnings:					
Information:					
3	Non Patent Literature	NPL_Stroke_WikipediaUSPTO.PDF	354208 ba2a28cf09c5cbd9e7b981ace27e4dedda9557d0	no	9
Warnings:					
Information:					
		Total Files Size (in bytes):	5478405		

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.

Docket No.: 710078061US
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Sternby et al.

Application No.: 13/652,222 | Confirmation No.: 4390

Filed: October 15, 2012 | Art Unit: 2658

For: TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES | Examiner: Not Yet Assigned

INFORMATION DISCLOSURE STATEMENT (IDS)

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

Madam:

Pursuant to 37 CFR 1.56, 1.97 and 1.98, the attention of the Patent and Trademark Office is hereby directed to the references listed on the attached PTO/SB/08. It is respectfully requested that the information be expressly considered during the prosecution of this application, and that the references be made of record therein and appear among the "References Cited" on any patent to issue therefrom.

This Information Disclosure Statement is filed before the mailing date of a first Office Action on the merits as far as is known to the undersigned (37 CFR § 1.97(b)(3)).

In accordance with 37 CFR § 1.98(a)(2)(ii), Applicant has not submitted copies of U.S. patents and U.S. patent applications. Applicant submits herewith copies of foreign patents and non-patent literature in accordance with 37 CFR § 1.98(a)(2).

This Information Disclosure Statement is not to be construed as a representation that: (i) a search has been made; (ii) additional information that may be material to the examination of this application does not exist; (iii) the information, protocols, results and the like reported by third parties are accurate or enabling; or (iv) the cited information is, or is considered to be, material to patentability. In addition, applicant does not admit that any enclosed item of information constitutes prior art to the subject invention and specifically reserves the right to demonstrate that any such reference is not prior art.

It is submitted that the Information Disclosure Statement is in compliance with 37 CFR 1.98 and the Examiner is respectfully requested to consider the listed references.

The Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Deposit Account No. 50-0665, under Order No. 710078061US.

Dated: 2 MAY 2013

Respectfully submitted,

By _____

Ryan M. Bello
Registration No.: 67,556
PERKINS COIE LLP
P.O. Box 1247
Seattle, Washington 98111-1247
(206) 359-8000
(206) 359-7198 (Fax)
Attorney for Applicant

Docket No.: 710078061US
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:

JAKOB STERNBY et al.

Application No.: 13/652,222

Filed: October 15, 2012

For: TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES

Confirmation No.: 4390

Art Unit: 2819

Examiner: Unassigned

REQUEST TO CORRECT INVENTORSHIP UNDER 37 CFR 1.48(a)

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

Dear Madam:

In regard to the "Response to Request for Corrected Filing Receipt," dated January 7, 2013, Applicants state the following:

1. Inventors in the present application are currently listed as Jakob Sternby, Jonas Morwing, Jonas Andersson, and Christer Friberg, as shown on the attached Application Data Sheet (Exhibit A), prepared by the attorney for Applicant and filed with the application on October 15, 2012.

2. On December 4, 2012, the Applicant, Nuance Communications, supplied executed declarations from the above inventors for filing with the Patent Office. Inventor Morwing's full correct name was listed as "Lars Jonas Morwing" as shown on the attached executed Declaration (Exhibit B). (emphasis added)

3. Inventor Morwing's name was incorrectly shown on the filed Applicant Data Sheet. This error occurred without deceptive intent. This is a correction of a typographical error on the ADS only and not a change in the inventorship of the application. A corrected Application Data Sheet is submitted herewith.

5. The fee of $130.00 is being submitted with this transmittal. The Director is authorized to deduct any other necessary fees and credit any overpayment to Deposit Account No. 50-0665.

Dated: October 11, 2013

Respectfully submitted,

/Ryan M. Bello/:
Ryan M. Bello
Registration No.: 67,556
PERKINS COIE LLP
P.O. Box 1247
Seattle, Washington 98111-1247
(206) 359-8000
(206) 359-7198 (Fax)
Attorney for Applicant

PTO/AIA/14 (08-12)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	710078061US
	Application Number	
Title of Invention	TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
Mr.	Jakob		Sternby	

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

City		State/Province		Country of Residence	

Mailing Address of Inventor:

Address 1			
Address 2			
City		State/Province	
Postal Code		Country	

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
Mr.	Jonas		Morwing	

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

City		State/Province		Country of Residence	

Mailing Address of Inventor:

Address 1			
Address 2			
City		State/Province	
Postal Code		Country	

Inventor 3 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
Mr.	Jonas		Andersson	

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

EXHIBIT A

PTO/AIA/14 (08-12)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	710078061US
	Application Number	
Title of Invention	TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES	

City		State/Province		Country of Residence	

Mailing Address of Inventor:

Address 1	
Address 2	

City		State/Province	
Postal Code		Country	

Inventor 4 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
Mr.	Christer		Friberg	

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

City		State/Province		Country of Residence	

Mailing Address of Inventor:

Address 1	
Address 2	

City		State/Province	
Postal Code		Country	

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

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	105412		
Email Address	patentprocurement@perkinscoie.com	Add Email	Remove Email

Application Information:

Title of the Invention	TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES		
Attorney Docket Number	710078061US	Small Entity Status Claimed	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Suggested Class (if any)		Sub Class (if any)	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)	12	Suggested Figure for Publication (if any)	

PTO/AIA/14 (08-12)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	710078061US
	Application Number	
Title of Invention	TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES	

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)
☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for thr Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	105412		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

Prior Application Status		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

Foreign Priority Information:

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(a).

		Remove	
Application Number	Country[1]	Filing Date (YYYY-MM-DD)	Priority Claimed
			○ Yes ○ No

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

PTO/AIA/14 (08-12)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	710078061US
	Application Number	
Title of Invention	TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES	

Authorization to Permit Access:

☐ Authorization to Permit Access to the Instant Application by the Participating Offices

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

◉ Assignee	○ Legal Representative under 35 U.S.C. 117
○ Person to whom the inventor is obligated to assign.	○ Person who shows sufficient proprietary interest

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

If the Assignee is an Organization check here. ☒

Organization Name	Nuance Communications, Inc.

PTO/AIA/14 (08-12)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	710078061US
	Application Number	
Title of Invention	TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES	

Mailing Address Information:			
Address 1	1 Wayside Road		
Address 2			
City	Burlington	State/Province	MA
Country	US	Postal Code	01803
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button.

Signature:

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

Signature	/Ryan M. Bello/			Date (YYYY-MM-DD)	2012-10-15
First Name	Ryan	Last Name	Bello	Registration Number	67556

Additional Signature may be generated within this form by selecting the Add button.

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

DECLARATION (37 C.F.R. § 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 C.F.R. § 1.76)

Title of Invention	TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES

As the below named inventor, I declare that:

This declaration is directed to:

☐ The attached application, or

☒ United States application or PCT international application number 13/652,222 filed on October 15th, 2012

☐ As amended on _____ (if applicable);

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

I believe the inventor(s) named below to be the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought.

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

I have reviewed and understand the contents of the above-identified application, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in 37 C.F.R. § 1.56.

All statements made herein of my own knowledge are true, and all statements made herein on information and belief are believed to be true.

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

LEGAL NAME OF SOLE OR FIRST INVENTOR

Inventor one: Jakob Sternby Date: _____

Signature: _____ Citizen of: Sweden

LEGAL NAME OF ADDITIONAL JOINT INVENTOR, if any

Inventor two: Lars Jonas Morwing Date: Nov-8-2012

Signature: _____ Citizen of: Sweden

LEGAL NAME OF ADDITIONAL JOINT INVENTOR, if any

Inventor three: Jonas Andersson Date: _____

Signature: _____ Citizen of: Sweden

LEGAL NAME OF ADDITIONAL JOINT INVENTOR, if any

Inventor four: Christer Friberg Date: _____

Signature: _____ Citizen of: Sweden

☐ Additional inventors are being named on _____ additional form(s) attached hereto.

EXHIBIT B

Corrected Application Data Sheet

Inventor Information

Inventor Number::	1
Name Prefix::	Mr.
Given Name::	Jakob
Family Name::	Sternby
City of Residence::	Lund
Country of Residence::	Sweden
Street of mailing address::	Korsbarsvagen 6
City of mailing address::	Lund
Country of mailing address::	Sweden
Postal or Zip Code of mailing address::	22355

Inventor Number::	2
Name Prefix::	Mr.
Given Name::	Lars
Middle Name::	Jonas
Family Name::	Morwing
City of Residence::	Malmo
Country of Residence::	Sweden
Street of mailing address::	Friisgatan 1
City of mailing address::	Malmo
Country of mailing address::	Sweden

Postal or Zip Code of mailing address::	21421
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Country of Residence::	Sweden
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City of mailing address::	Malmo
Country of mailing address::	Sweden
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City of mailing address::	Lund
Country of mailing address::	Sweden
Postal or Zip Code of mailing address::	22648

Corrected 13652222 10/15/2012 10/11/2013

Correspondence Information

Correspondence Customer Number::	105412
Name::	
City of mailing address::	
State or province of mailing address::	
Country of mailing address::	
Postal or Zip Code of mailing address::	
Phone number::	
Fax number::	

Application Information

Application Number::	13/652,222
Filing Date::	10/15/12
Application Type::	Regular
Subject Matter::	Utility
CD-ROM or CD-R?::	None
Sequence submission?::	None
Computer Readable Form (CRF)?::	No
Title::	TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES
Attorney Docket Number::	0710078061US

Request for Early Publication?::	No
Request for Non-Publication?::	No
Total Drawing Sheets::	12
Small Entity?::	No
Petition included?::	No
Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2::	No
Authorization to Permit Access to the Instant Application by the Participating Offices::	No
This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013::	No

Representative Information

Representative Customer Number::	105412

Domestic Priority Information

Foreign Priority Information

Applicant Information

Applicant Number::	1

Applicant Type::	Assignee
Organization Name::	Nuance Communications, Inc.
Street of mailing address::	One Wayside Road
City of mailing address::	Burlington
State or Province of mailing address::	MA
Postal or Zip Code of mailing address::	01803

Non-Applicant Assignee Information

Signature:

A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature.			
Signature	/Ryan M. Bello/	Date	October 11, 2013
Name (Print/Type)	Ryan M. Bello	Registration No. (Attorney/Agent)	67,556

Electronic Patent Application Fee Transmittal

Application Number:	13652222
Filing Date:	15-Oct-2012
Title of Invention:	TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES
First Named Inventor/Applicant Name:	Jakob Sternby
Filer:	Ryan M. Bello/Arlene Granlund
Attorney Docket Number:	710078061US

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:				
Processing Fee Correcting Inventorship	1816	1	130	130
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
			Total in USD ($)	**130**

Electronic Acknowledgement Receipt

EFS ID:	17112857
Application Number:	13652222
International Application Number:	
Confirmation Number:	4390
Title of Invention:	TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES
First Named Inventor/Applicant Name:	Jakob Sternby
Customer Number:	105412
Filer:	Ryan M. Bello/Arlene Granlund
Filer Authorized By:	Ryan M. Bello
Attorney Docket Number:	710078061US
Receipt Date:	11-OCT-2013
Filing Date:	15-OCT-2012
Time Stamp:	21:37:03
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$130
RAM confirmation Number	7340
Deposit Account	500665
Authorized User	LOVE, KONNIE L
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		2013-10-11_71007-8061US_REQ_CORR_INVENT.pdf	764708 ac58db8d44fb55437c574ff4347f00431b22e630	yes	14
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Request under Rule 48 correcting inventorship		1	8	
	Application Data Sheet		9	14	
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30387 c393a994863333085ab2868701832690f299ce1d	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	795095		

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.

Document code: WFEE

United States Patent and Trademark Office
Sales Receipt for Accounting Date: 10/18/2013

MTEKLEMI	SALE	#00000011	Mailroom Dt:	10/11/2013	500665	13652222	
		01	FC : 1830	130.00	OP		
		01	FC : 1830	10.00	DA		

Document code: WFEE

United States Patent and Trademark Office
Sales Receipt for Accounting Date: 10/18/2013

MTEKLEMI ADJ #00000006 Mailroom Dt: 10/11/2013
Seq No: 7340 Sales Acctg Dt: 10/15/2013 13652222
01 FC : 1816 -130.00 OP

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	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
13/652,222	10/15/2012	2658	1390	710078061US	20	3

CONFIRMATION NO. 4390

REPLACEMENT FILING RECEIPT

105412
Perkins Cole LLP- Nuance
P.O. Box 1247
Seattle, WA 98111-1247

OC000000064482921

Date Mailed: 10/24/2013

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Jakob Sternby, Lund, SWEDEN;
Lars Jonas Morwing, Malmo, SWEDEN;
Jonas Andersson, Malmo, SWEDEN;
Christer Friberg, Lund, SWEDEN;

Applicant(s)

NUANCE COMMUNICATIONS, INC., Burlington, MA

Assignment For Published Patent Application

Nuance Communications, Inc., Burlington, MA

Power of Attorney: The patent practitioners associated with Customer Number 105412

Domestic Applications for which benefit is claimed - None.
A proper domestic benefit claim must be provided in an Application Data Sheet in order to constitute a claim for domestic benefit. See 37 CFR 1.76 and 1.78.

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

If Required, Foreign Filing License Granted: 10/31/2012
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/652,222**
Projected Publication Date: 04/17/2014
Non-Publication Request: No

Early Publication Request: No
Title

TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES

Preliminary Class

704

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

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

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

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

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

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

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

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

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

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

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
13/652,222	10/15/2012	Jakob Sternby	710078061US

CONFIRMATION NO. 4390

105412
Perkins Cole LLP- Nuance
P.O. Box 1247
Seattle, WA 98111-1247

PUBLICATION NOTICE

OC000000067852887

Title:TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES

Publication No.US-2014-0108004-A1
Publication Date:04/17/2014

NOTICE OF PUBLICATION OF APPLICATION

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

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

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

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

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

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

REQUEST FOR PARTICIPATION IN THE PATENT COOPERATION TREATY – PATENT PROSECUTION HIGHWAY (PCT-PPH) PROGRAM BETWEEN THE KOREAN INTELLECTUAL PROPERTY OFFICE (KIPO) AND THE USPTO

Application No.:	13/652,222	First Named Inventor:	Jakob Sternby
Filing Date:	October 15, 2012	Attorney Docket No.:	0710078061US
Title of the Invention:	TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES		

THIS REQUEST FOR PARTICIPATION IN THE PCT-PPH PROGRAM ALONG WITH THE REQUIRED DOCUMENTS MUST BE SUBMITTED VIA EFS-WEB. INFORMATION REGARDING EFS-WEB IS AVAILABLE AT HTTP://WWW.USPTO.GOV/EBC/EFS_HELP.HTML.

APPLICANT HEREBY REQUESTS PARTICIPATION IN THE PCT-PPH PROGRAM AND PETITIONS TO MAKE THE ABOVE-IDENTIFIED APPLICATION SPECIAL UNDER THE PCT-PPH PROGRAM.

The above-identified application is (1) a national stage entry of the corresponding PCT application, or (2) a national stage entry of another PCT application which claims priority to the corresponding PCT application, or (3) a national application that claims domestic/ foreign priority to the corresponding PCT application, or (4) a national application which forms the basis for the priority claim in the corresponding PCT application, or (5) a continuing application of a U.S. application that satisfies one of (1) to (4) above, or (6) a U.S. application that claims domestic benefit to a U.S. provisional application which forms the basis for the priority claim in the corresponding PCT application.

The corresponding PCT application number(s) is/are: PCT/US2013/064717

The international date of the corresponding PCT application(s) is/are: October 11, 2013

I. List of Required Documents:

a. **A copy of the latest international work product (WO/ISA, WO/IPEA, or IPER) in the above-identified corresponding PCT application(s).**

[x] is attached.

[ ] is not attached because the document is already in the U.S. application.

b. **A copy of all claims which were indicated as having novelty, inventive step and industrial applicability in the above-identified corresponding PCT appliction(s).**

[x] is attached.

[ ] is not attached because the document is already in the U.S. application.

c. **English translations of the documents in a. and b. above are attached (if the documents are not in the English language). A statement that the English translation is accurate is attached for the document in b. above.**

d. **(1) An information disclosure statement listing the documents cited in the international work products (ISR, WO/ISA, WO/IPEA, IPER) of the corresponding PCT application.**

[x] is attached.

[ ] has already been filed in the above-identified U.S. application on _____

(2) Copies of all documents (except) for U.S. patents or U.S. patent application publications)

[x] are attached.

[ ] have already been filed in the above-identified U.S. application on _____

PTO/SB/20PCT-KR (07-12)
Approved for use through 01/31/2015. OMB 0651-0058
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

REQUEST FOR PARTICIPATION IN THE PCT-PPH PROGRAM BETWEEN THE KIPO AND THE USPTO
(continued)

Application No.:	13/652,222	First Named Inventor:	Jakob Sternby

II. Claims Correspondence Table:

Claims in US Application	Patentable Claims in the corresponding PCT application	Explanation regarding the correspondence
1-20	1-20	Pending claims are identical to the claims that were examined and deemed to have novelty, inventive step and industrial applicability in the PCT application.

III. All the claims in the US application sufficiently correspond to the patentable claims in the corresponding PCT application.

Signature	/Ryan M. Bello/	Date	August 11, 2014
Name (Print/Typed)	Ryan M. Bello	Registration Number	67,556

REVIEWED
By Tom Herrera at 3:41 pm, Jan 30, 2014

071007-8061.WO00
RMB/ACG

PCT/US2013/064717

PATENT COOPERATION TREATY

071007-8061.WO
RMB/ACG

From the INTERNATIONAL SEARCHING AUTHORITY

To:
BELLO, RYAN

PERKINS COIE LLP P.O. BOX 1247 SEATTLE, WA 98111
USA

Docketed
Amend Claims: 03/22/14
File Response: 08/15/14
References Cited

RECEIVED
PATENT DOCKETING
JAN 30 2014

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing *(day/month/year)* 22 January 2014 (22.01.2014)	
Applicant's or agent's file reference 710078061WO PERKINS COIE LLP	FOR FURTHER ACTION See paragraphs 1 and 4 below
International application No. **PCT/US2013/064717**	International filing date *(day/month/year)* **11 October 2013 (11.10.2013)**
Applicant **NUANCE COMMUNICATIONS, INC.**	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 - 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90bis.1 and 90bis.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the PCT Applicant's Guide, National Chapters.

Name and mailing address of the ISA/KR Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea	Authorized officer COMMISSIONER
Facsimile No. 82-42-472-7140	Telephone No. 82-42-481-8753

Form PCT/ISA/220 (July 2010)

* Attention

Copies of the documents cited in the international search report can be searched in the following Korean Intellectual Property Office English website for three months from the date of mailing of the international search report.

http://www.kipo.go.kr/en/ => PCT Services => PCT Services

ID : PCT international application number
PW : **8WV6DP64**

Inquiries related to PCT International Search Report or Written Opinion prepared by KIPO as an International Searching Authority can be answered not only by KIPO but also through IPKC (Intellectual Property Korea Center), located in Vienna, VA, which functions as a PCT Help Desk for PCT applicants.

Homepage: http://www.ipkcenter.com

Email: ipkc@ipkcenter.com

Notes to Form PCT/ISA/220 (July 2010)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 710078061WO	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. **PCT/US2013/064717**	International filing date *(day/month/year)* **11 October 2013 (11.10.2013)**	(Earliest) Priority Date *(day/month/year)* 15 October 2012 (15.10.2012)

Applicant

NUANCE COMMUNICATIONS, INC.

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

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

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

1. **Basis of the report**

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

☒ the international application in the language in which it was filed

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

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

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

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

3. ☐ **Unity of invention is lacking** (See Box No. III)

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

☒ the text is approved as submitted by the applicant.

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

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

☒ the text is approved as submitted by the applicant.

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

6. With regard to the drawings,

a. the figure of the **drawings** to be published with the abstract is Figure No. 2

☐ as suggested by the applicant.

☒ as selected by this Authority, because the applicant failed to suggest a figure.

☐ as selected by this Authority, because this figure better characterizes the invention.

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

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/064717

A. CLASSIFICATION OF SUBJECT MATTER

G06F 3/041(2006.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G06F 3/041; G06F 3/048; G06K 9/03; G06F 3/00; G06F 3/03; G06K 9/62

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & Keywords: handwrite, touchscreen, buffer, candidate, character

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2007-316981 A (MITSUBISHI ELECTRIC CORP.) 06 December 2007 See abstract, paragraphs [0009]-[0016], [0021]-[0024] and figures 1-2, 7.	1-20
A	JP 2012-048589 A (KYOCERA CORP.) 08 March 2012 See abstract, paragraphs [0051]-[0070], [0125]-[0127] and figures 5-7, 13.	1-20
A	JP 2000-123114 A (CASIO COMPUT CO., LTD.) 28 April 2000 See abstract, paragraphs [0017]-[0027] and figures 1-2.	1-20
A	JP 2012-145971 A (PANASONIC CORP.) 02 August 2012 See abstract, paragraphs [0018]-[0038] and figures 1-3.	1-20
A	JP 2000-200143 A (CASIO COMPUT CO., LTD.) 18 July 2000 See abstract, paragraphs [0006]-[0008] and figures 1-2.	1-20

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
22 January 2014 (22.01.2014)	**22 January 2014 (22.01.2014)**

Name and mailing address of the ISA/KR	Authorized officer
Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea Facsimile No. +82-42-472-7140	CHOI, Sang Won Telephone No. +82-42-481-8291

Form PCT/ISA/210 (second sheet) (July 2009)

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2007-316931 A	06/12/2007	None	
JP 2012-048589 A	08/03/2012	US 2013-0157727 A1	20/06/2013
		WO 2012-026590 A1	01/03/2012
JP 2000-123114 A	28/04/2000	None	
JP 2012-145971 A	02/08/2012	CN 103209322 A	11/09/2013
		JP 5305545 B2	02/10/2013
		TW 201234280 A	16/08/2012
		WO 2012-093657 A1	12/07/2012
JP 2000-200143 A	18/07/2000	None	

PATENT COOPERATION TREATY

07087-806I00
RM8/109

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BELLO, RYAN

PERKINS COIE LLP P.O. BOX 1247 SEATTLE, WA 98111
USA

RECEIVED
PATENT DOCKETING

JAN 30 2014

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**22 January 2014 (22.01.2014)**
Applicant's or agent's file reference PERKINS COIE LLP 710078061WO	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2013/064717	**11 October 2013 (11.10.2013)**	15 October 2012 (15.10.2012)

International Patent Classification (IPC) or both national classification and IPC
G06F 3/041(2006.01)i

Applicant
NUANCE COMMUNICATIONS, INC.

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

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

2. **FURTHER ACTION**

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

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

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea Facsimile No. +82-42-472-7140	22 January 2014 (22.01.2014)	CHOI, Sang Won Telephone No. +82-42-481-8291

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2013/064717

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

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

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:

   a. (*means*)

   ☐ on paper
   ☐ in electronic form

   b. (*time*)

   ☐ in the international application as filed.
   ☐ together with the international application in electronic form.
   ☐ subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2013/064717

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-20	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: JP 2007-316931 A (MITSUBISHI ELECTRIC CORP.) 06 December 2007
D2: JP 2012-048589 A (KYOCERA CORP.) 08 March 2012
D3: JP 2000-123114 A (CASIO COMPUT CO., LTD.) 28 April 2000
D4: JP 2012-145971 A (PANASONIC CORP.) 02 August 2012
D5: JP 2000-200143 A (CASIO COMPUT CO., LTD.) 18 July 2000

1. Novelty and Inventive Step
1.1. Claims 1-8
The subject matter of claim 1 differs from these prior art documents in the features of: allowing a user to edit a first candidate sequence; and removing a first sequence portion from a memory storage buffer, wherein the removing is performed in the absence of receiving user input - editing the first candidate sequence, representing a space character, or selecting a word. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 1 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claims 2-8 are dependent on claim 1 and therefore meet the requirements of PCT Article 33(2) and (3).

1.2. Claims 9-13
The subject matter of claim 9 differs from these prior art documents in the features of: automatically determining that at least a portion of a sequence matches a word or phrase in a database of acceptable words or phrases without a user inputting a space or selecting a word; and sending a first sequence to an application on a wireless device, wherein the sending is performed in the absence of user editing of the first sequence. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 9 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Continued on Supplemental Box

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of: Box No. V

Claims 10-13 are dependent on claim 9 and therefore meet the requirements of PCT Article 33(2) and (3).

1.3. Claims 14-20
The subject matter of claim 14 differs from these prior art documents in that a data processing apparatus is configured to: determine a final value for at least a likely first character based on likely first, likely second and likely third character data stored in a memory, wherein determining the final value is performed without the user inputting a space gesture or selecting a button to accept the likely first character, and wherein determining the final value is performed by comparing the likely first, second and third characters to a linguistic database; and remove the likely first data character from the memory after determining the final value for at least the first character. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 14 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claims 15-20 are dependent on claim 14 and therefore meet the requirements of PCT Article 33(2) and (3).

2. Industrial Applicability
Claims 1-20 are industrially applicable under PCT Article 33(4).

CLAIMS

I/We claim:

1. A method for data input on a touchscreen of a mobile device, the method comprising:

receiving a first user input,

wherein the first user input is handwritten input received on the touchscreen of the mobile device;

determining a first recognized sequence based on the first user input;

wherein the first recognized sequence is a best match of the first user input;

writing the first recognized sequence to a memory storage buffer of the mobile device;

generating a first candidate sequence,

wherein the first candidate sequence is a best match of one or more recognized sequences;

presenting the first candidate sequence to the user,

wherein the presenting includes displaying the first candidate sequence to the user and allowing the user to edit the first candidate sequence;

identifying at least a first sequence portion of the first candidate sequence

wherein the identifying is at least partially based on one or more rules or dictionaries of words accessible to the mobile device;

removing the first sequence portion from the memory storage buffer,

wherein the removing is performed in the absence of receiving user input–

(i) editing the first candidate sequence, or

(ii) representing a space character or,

(iii) selecting a word; and

sending the first sequence portion to an application running on the mobile device.

2. The method of claim 1, further comprising:

receiving at least a second user input;

determining a second recognized sequence based on the second user input; and

revising the first candidate sequence, wherein the revised first candidate sequence is based on the first recognized sequence and the second recognized sequence.

3. The method of claim 1, further comprising:

determining at least a second candidate sequence based on the first user input; and

presenting at least the second candidate sequence to the user.

4. The method of claim 1 wherein the identifying is based on linguistic properties of the first user input and the first candidate sequence, and a probability of future editing of the first sequence portion by the user.

5. The method of claim 4, wherein the removing is performed when the probability is less than a predetermined amount.

6. The method of claim 1, wherein the first sequence portion is removed from the memory storage buffer a predetermined time after second user input is received.

7. The method of claim 1, wherein thedictionaries of words include words in Chinese, Japanese, or Korean languages..

8. The method of claim 1, wherein the first user input includes at least one of a Chinese character, a Japanese character, or a Korean character.

9. At least one computer-readable storage medium storing instructions for data input, wherein the data input is performed at a wireless device having a processor and a memory, comprising:

receiving a first user input and at least a second user input;

wherein the first and second user input are handwritten input received on a handwriting input area of the wireless device;

determining a first sequence based on a best match of the first and second user inputs,

wherein the first sequence includes at least the first input;

storing the first sequence to a memory of the mobile device;

automatically determining that at least a portion of the sequence matches a word or phrase in a database of acceptable words and/or phrases without the user inputting a space or selecting a word; and

sending the first sequence to an application or service running on, or accessible by, the wireless device,

wherein the sending comprises removing the first sequence from the memory storage buffer, and

wherein the sending is performed in the absence of user editing of the first sequence.

10. The computer readable medium of claim 9, further comprising:

determining at least a second sequence based on the first user input and the second user input;

presenting the second sequence to the user;

11. The computer readable medium of claim 9, wherein the first sequence is sent to the application or service a predetermined time after the first user input is received in the absence of user editing of the first sequence.

12. The computer readable medium of claim 9, further comprising:

presenting the first sequence to the user,

wherein the presenting includes displaying the first sequence to the user and allowing the user to edit the first sequence

13. The computer readable medium of claim 9, wherein the first user input and the second user input include at least one of a Chinese character, a Japanese character, or a Korean character.

14. A data processing apparatus, comprising:

at least one processor;

at least one memory coupled to the processor;

data input and data output components coupled to the processor,

wherein the data output component includes a visual display device; and

wherein the data input component includes at least an area for receiving hand written character input;

wherein the data processing apparatus is configured to –

receive first character data representing a first handwritten character input to the data input component;

determine a likely first displayable character associated with the first character data;

store the likely first character data in the memory;

receive second character data representing a second handwritten character input to the data input component;

determine a likely second displayable character associated with the second character data;

store the likely second character data in the memory;

receive third character data representing a third handwritten character input to the data input component;

determine a likely third displayable character associated with the third character data;

store the likely third character data in the memory;

determine a final value for at least the likely first character based on the likely first, likely second and likely third character data stored in the memory,

wherein determining the final value is performed without the user inputting a space gesture or selecting a button to accept the likely first character, and

wherein determining the final value is performed by comparing the likely first, second and third characters to a linguistic database; and,

remove the likely first data character from the memory after determining the final value for at least the first character.

15. The apparatus of claim 14, wherein the input and output components are a touch-sensitive display,

wherein the first character data is received on a select area of the touch-sensitive display, and

wherein the second and third character data are sequentially received on the same area of the touch-sensitive display.

16. The apparatus of claim 14, wherein the likely first, second and third characters are Asian characters, and wherein the likely first character can be edited until it is removed from the memory.

17. The apparatus of claim 14, wherein the likely first and second characters are displayed on the display component before receiving the third character data, and wherein the determining comprises determining whether the received third character data represents punctuation.

18. The apparatus of claim 14, wherein the memory stores first and second words for comparison with the linguistic database, and wherein a determined final first

word is removed from the memory when the first and second words acceptably match a phrase in the linguistic database.

19. The apparatus of claim 14, further comprising a recognition engine, wherein the recognition engine and the linguistic database are stored in the memory, and wherein the recognition engine is a software module configured to perform at least the determining of a likely displayable character based on a received handwritten character.

20 The apparatus of claim 14, further comprising:

a portable power source;

a wireless transceiver; and

a touch-sensitive display.

Docket No.: 0710078061US
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Sternby et al.

Application No.: 13/652,222 | Confirmation No.: 4390

Filed: October 15, 2012 | Art Unit: 2657

For: TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES | Examiner: L. M. Spooner

TRANSMITTAL OF SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT (IDS)

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

Madam:

Pursuant to 37 CFR 1.56, 1.97 and 1.98, the attention of the Patent and Trademark Office is hereby directed to the references listed on the attached PTO/SB/08. It is respectfully requested that the information be expressly considered during the prosecution of this application, and that the references be made of record therein and appear among the "References Cited" on any patent to issue therefrom.

This Information Disclosure Statement is filed before the mailing date of a first Office Action on the merits as far as is known to the undersigned (37 C.F.R. § 1.97(b)(3)).

In accordance with 37 C.F.R. § 1.98(a)(2)(ii), Applicant has not submitted copies of U.S. patents and U.S. patent applications. Applicant submits herewith copies of foreign patents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

This Information Disclosure Statement is not to be construed as a representation that: (i) a search has been made; (ii) additional information that may be material to the examination of this application does not exist; (iii) the information, protocols, results and the like reported by third parties are accurate or enabling; or (iv) the cited information is, or is considered to be, material to patentability. In addition, applicant does not admit that any enclosed item of information constitutes prior art to the subject invention and specifically reserves the right to demonstrate that any such reference is not prior art.

It is submitted that the Information Disclosure Statement is in compliance with 37 CFR 1.98 and the Examiner is respectfully requested to consider the listed references.

The Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Deposit Account No. 50-0665, under Order No. 0710078061US.

Dated: August 11, 2014

Respectfully submitted,

By /Ryan M. Bello/

Ryan M. Bello
Registration No.: 67,556
PERKINS COIE LLP
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(206) 359-7198 (Fax)
Agent for Applicant

PTO/SB/08a (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 2

Complete if Known	
Application Number	13/652,222-Conf. #4390
Filing Date	October 15, 2012
First Named Inventor	Jakob Sternby
Art Unit	2657
Examiner Name	L. M. Spooner
Attorney Docket Number	0710078061US

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]
	BA	JP-2000123114-A	04-28-2000	Casio Computer Co Ltd		
	BB	JP-2000200143-A	07-18-2000	Casio Computer Co Ltd		
	BC	JP-2007316931-A	12-06-2007	Mitsubishi Electric Corp		
	BD	JP-2012048589-A	03-08-2012	Kyocera, Corp		
	BE	JP-2012145971-A	08-02-2012	Panasonic, Corp		

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

PTO/SB/08b (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet	2	of	2

Complete if Known	
Application Number	13/652,222-Conf. #4390
Filing Date	October 15, 2012
First Named Inventor	Jakob Sternby
Art Unit	2657
Examiner Name	L. M. Spooner
Attorney Docket Number	0710078061US

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
	CA	International Search Report and Written Opinion for International Application No. PCT/US2013/064717, mailing date 1/22/2014, 9 pages.	

Examiner Signature		Date Considered	

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

[1]Applicant's unique citation designation number (optional). [2]Applicant is to place a check mark here if English language Translation is attached.

REVIEWED
By Tom Herrera at 3:41 pm, Jan 30, 2014

071007-8061.WO00
RMB/ACG

PCT/US2013/064717

PATENT COOPERATION TREATY

071007-8061.WO
RMB/ACG

From the INTERNATIONAL SEARCHING AUTHORITY

To:
BELLO, RYAN

PERKINS COIE LLP P.O. BOX 1247 SEATTLE, WA 98111
USA

Docketed
Amend Claims: 03/22/14
File Response: 08/15/14
References Cited

RECEIVED
PATENT DOCKETING
JAN 30 2014

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing *(day/month/year)* 22 January 2014 (22.01.2014)	
Applicant's or agent's file reference 710078061WO PERKINS COIE LLP	FOR FURTHER ACTION See paragraphs 1 and 4 below
International application No. **PCT/US2013/064717**	International filing date *(day/month/year)* **11 October 2013 (11.10.2013)**
Applicant **NUANCE COMMUNICATIONS, INC.**	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 - 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90bis.1 and 90bis.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the PCT Applicant's Guide, National Chapters.

Name and mailing address of the ISA/KR Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea	Authorized officer COMMISSIONER
Facsimile No. 82-42-472-7140	Telephone No. 82-42-481-8753

Form PCT/ISA/220 (July 2010)

* Attention

Copies of the documents cited in the international search report can be searched in the following Korean Intellectual Property Office English website for three months from the date of mailing of the international search report.

http://www.kipo.go.kr/en/ => PCT Services => PCT Services

ID : PCT international application number
PW : **8WV6DP64**

Inquiries related to PCT International Search Report or Written Opinion prepared by KIPO as an International Searching Authority can be answered not only by KIPO but also through IPKC (Intellectual Property Korea Center), located in Vienna, VA, which functions as a PCT Help Desk for PCT applicants.

Homepage: http://www.ipkcenter.com

Email: ipkc@ipkcenter.com

Notes to Form PCT/ISA/220 (July 2010)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 710078061WO	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. **PCT/US2013/064717**	International filing date *(day/month/year)* **11 October 2013 (11.10.2013)**	(Earliest) Priority Date *(day/month/year)* 15 October 2012 (15.10.2012)

Applicant

NUANCE COMMUNICATIONS, INC.

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

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

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

1. **Basis of the report**

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

☒ the international application in the language in which it was filed

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

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

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

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

3. ☐ **Unity of invention is lacking** (See Box No. III)

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

☒ the text is approved as submitted by the applicant.

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

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

☒ the text is approved as submitted by the applicant.

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

6. With regard to the drawings,

a. the figure of the **drawings** to be published with the abstract is Figure No. 2

☐ as suggested by the applicant.

☒ as selected by this Authority, because the applicant failed to suggest a figure.

☐ as selected by this Authority, because this figure better characterizes the invention.

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

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/064717

A. CLASSIFICATION OF SUBJECT MATTER

G06F 3/041(2006.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G06F 3/041; G06F 3/048; G06K 9/03; G06F 3/00; G06F 3/03; G06K 9/62

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & Keywords: handwrite, touchscreen, buffer, candidate, character

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2007-316981 A (MITSUBISHI ELECTRIC CORP.) 06 December 2007 See abstract, paragraphs [0009]-[0016], [0021]-[0024] and figures 1-2, 7.	1-20
A	JP 2012-048589 A (KYOCERA CORP.) 08 March 2012 See abstract, paragraphs [0051]-[0070], [0125]-[0127] and figures 5-7, 13.	1-20
A	JP 2000-123114 A (CASIO COMPUT CO., LTD.) 28 April 2000 See abstract, paragraphs [0017]-[0027] and figures 1-2.	1-20
A	JP 2012-145971 A (PANASONIC CORP.) 02 August 2012 See abstract, paragraphs [0018]-[0038] and figures 1-3.	1-20
A	JP 2000-200143 A (CASIO COMPUT CO., LTD.) 18 July 2000 See abstract, paragraphs [0006]-[0008] and figures 1-2.	1-20

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
22 January 2014 (22.01.2014)	**22 January 2014 (22.01.2014)**

Name and mailing address of the ISA/KR	Authorized officer
Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea Facsimile No. +82-42-472-7140	CHOI, Sang Won Telephone No. +82-42-481-8291

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2013/064717

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2007-316931 A	06/12/2007	None	
JP 2012-048589 A	08/03/2012	US 2013-0157727 A1	20/06/2013
		WO 2012-026590 A1	01/03/2012
JP 2000-123114 A	28/04/2000	None	
JP 2012-145971 A	02/08/2012	CN 103209322 A	11/09/2013
		JP 5305545 B2	02/10/2013
		TW 201234280 A	16/08/2012
		WO 2012-093657 A1	12/07/2012
JP 2000-200143 A	18/07/2000	None	

Form PCT/ISA/210 (patent family annex) (July 2009)

PATENT COOPERATION TREATY

07 1087-806/.00
RM8/109

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BELLO, RYAN

PERKINS COIE LLP P.O. BOX 1247 SEATTLE, WA 98111
USA

RECEIVED
PATENT DOCKETING

JAN 3 0 2014

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**22 January 2014 (22.01.2014)**
Applicant's or agent's file reference PERKINS COIE LLP 710078061WO	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2013/064717	**11 October 2013 (11.10.2013)**	15 October 2012 (15.10.2012)

International Patent Classification (IPC) or both national classification and IPC
G06F 3/041(2006.01)i

Applicant
NUANCE COMMUNICATIONS, INC.

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

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

2. **FURTHER ACTION**

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

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

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea Facsimile No. +82-42-472-7140	22 January 2014 (22.01.2014)	CHOI, Sang Won Telephone No. +82-42-481-8291

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2013/064717

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

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

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:

   a. (*means*)

   ☐ on paper
   ☐ in electronic form

   b. (*time*)

   ☐ in the international application as filed.
   ☐ together with the international application in electronic form.
   ☐ subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2013/064717

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-20	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: JP 2007-316931 A (MITSUBISHI ELECTRIC CORP.) 06 December 2007
D2: JP 2012-048589 A (KYOCERA CORP.) 08 March 2012
D3: JP 2000-123114 A (CASIO COMPUT CO., LTD.) 28 April 2000
D4: JP 2012-145971 A (PANASONIC CORP.) 02 August 2012
D5: JP 2000-200143 A (CASIO COMPUT CO., LTD.) 18 July 2000

1. Novelty and Inventive Step
1.1. Claims 1-8
The subject matter of claim 1 differs from these prior art documents in the features of: allowing a user to edit a first candidate sequence; and removing a first sequence portion from a memory storage buffer, wherein the removing is performed in the absence of receiving user input - editing the first candidate sequence, representing a space character, or selecting a word. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 1 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claims 2-8 are dependent on claim 1 and therefore meet the requirements of PCT Article 33(2) and (3).

1.2. Claims 9-13
The subject matter of claim 9 differs from these prior art documents in the features of: automatically determining that at least a portion of a sequence matches a word or phrase in a database of acceptable words or phrases without a user inputting a space or selecting a word; and sending a first sequence to an application on a wireless device, wherein the sending is performed in the absence of user editing of the first sequence. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 9 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Continued on Supplemental Box

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of: Box No. V

Claims 10-13 are dependent on claim 9 and therefore meet the requirements of PCT Article 33(2) and (3).

1.3. Claims 14-20
The subject matter of claim 14 differs from these prior art documents in that a data processing apparatus is configured to: determine a final value for at least a likely first character based on likely first, likely second and likely third character data stored in a memory, wherein determining the final value is performed without the user inputting a space gesture or selecting a button to accept the likely first character, and wherein determining the final value is performed by comparing the likely first, second and third characters to a linguistic database; and remove the likely first data character from the memory after determining the final value for at least the first character. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 14 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claims 15-20 are dependent on claim 14 and therefore meet the requirements of PCT Article 33(2) and (3).

2. Industrial Applicability
Claims 1-20 are industrially applicable under PCT Article 33(4).

Espacenet

Bibliographic data: JP2000200143 (A) — 2000-07-18

HANDWRITTEN CHARACTER INPUT DEVICE AND PROGRAM RECORDING MEDIUM THEREFOR

Inventor(s): TODO NORIAKI; YAMAMOTO JUNJI ± (TODO NORIAKI, ; YAMAMOTO JUNJI)

Applicant(s): CASIO COMPUTER CO LTD ± (CASIO COMPUT CO LTD)

Classification: **- international:** ***G06F3/03; G06F3/041; G06F3/048; G06K9/62; G06K9/68;*** (IPC1-7): G06F3/03; G06K9/62; G06K9/68

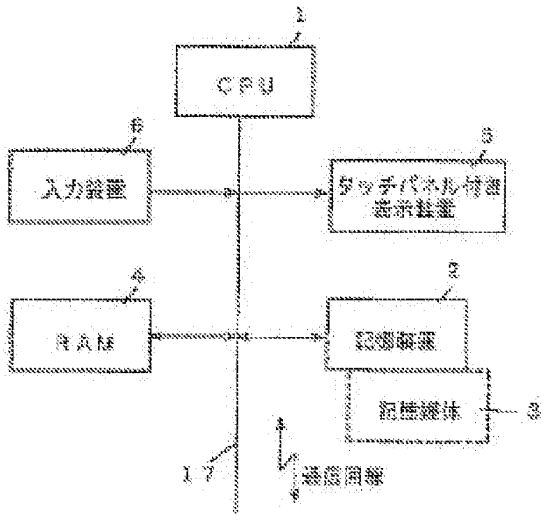
- cooperative:

Application number: JP19980376959 19981228

Priority number (s): JP19980376959 19981228

Abstract of JP2000200143 (A)

PROBLEM TO BE SOLVED: To recognize a handwritten character as a desired character kind without specifying a recognition character kind by a special key operation or the like. SOLUTION: Plural handwritten input areas are allocated to the input field of a display device 5 with a touch panel and the recognition character kinds are made to correspond to the respective handwritten input areas. A CPU 1 discriminates which handwritten input area is the write start position of the handwritten character and character-recognizes the handwritten inputted character as the character kind corresponding to the discriminated input area.



(19)日本国特許庁（ＪＰ）　(12) **公開特許公報**（Ａ）　(11)特許出願公開番号
特開2000－200143
（P2000－200143A）
(43)公開日　平成12年７月18日(2000.7.18)

(51)Int.Cl.[7]		識別記号	FI			テーマコード（参考）
Ｇ０６Ｆ	3/03	３８０	Ｃ０６Ｆ	3/03	３８０Ｒ	５Ｂ０６４
Ｇ０６Ｋ	9/62		Ｃ０６Ｋ	9/62	Ｃ	５Ｂ０６８
	9/68			9/68	Ｂ	

審査請求　未請求　請求項の数８　ＦＤ　（全 ９ 頁）

(21)出願番号　特願平10－376959

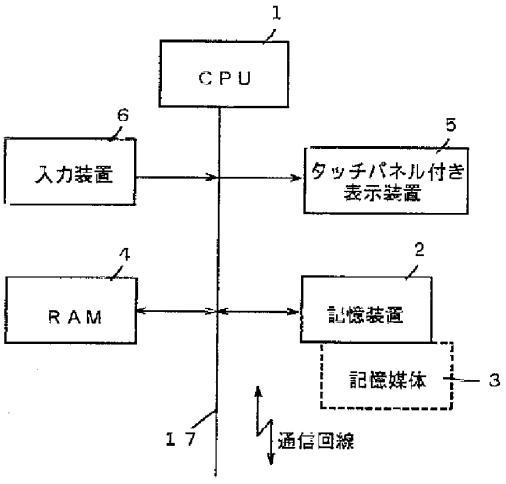
(22)出願日　平成10年12月28日(1998.12.28)

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弁理士　杉村　次郎

Ｆターム(参考)　5B064 AB04 BA05 DA16 EA27
5B068 AA05 BD17 CC02 CC19

(54)【発明の名称】　手書き文字入力装置およびそのプログラム記録媒体

(57)【要約】
【課題】　特別なキー操作等によって認識文字種を指定しなくても、手書き文字を所望の文字種として認識する。
【解決手段】　タッチパネル付き表示装置５の入力フィールドには複数の手書き入力領域が割り当てられており、この各手書き入力領域は認識文字種が対応付けられている。ＣＰＵ１は手書き文字の書き始め位置がどの手書き入力領域かを判別し、判別された入力領域に対応する文字種として手書き入力された文字を文字認識する。



【特許請求の範囲】
【請求項１】手書き文字を入力する入力フィールドに筆記された手書き文字を文字認識して認識候補を得る手書き文字入力装置であって、
前記入力フィールド上に認識文字種別に複数の文字種指示領域を割り当てる割当手段と、
手書き文字の書き始め位置がどの文字種指示領域かを判別する判別手段と、
この判別手段によって判別された文字種指示領域の文字種として手書き文字を認識する文字認識手段とを具備したことを特徴とする手書き文字入力装置。
【請求項２】前記入力フィールドに複数の手書き入力領域が割り当てられている場合に、手書き入力領域と認識文字種との対応関係を定義する定義情報記憶手段を設け、
この定義情報記憶手段に定義されている対応関係に基づいて前記割当手段は、前記複数の手書き入力領域を前記認識文字種別の文字種指示領域として入力フィールド上に割り当てるようにしたことを特徴とする請求項１記載の手書き文字入力装置。
【請求項３】前記定義情報記憶手段に定義されている手書き入力領域と認識文字種との対応関係を任意に変更する変更手段を設けたことを特徴とする請求項２記載の手書き文字入力装置。
【請求項４】前記入力フィールド上に割り当てられている複数の文字種指示領域毎に、それに対応する認識文字種を表示する表示手段を設けたことを特徴とする請求項１記載の手書き文字入力装置。
【請求項５】前記判別手段によって判別された書き始め位置の文字種指示領域の文字種を今回指定された認識文字種として記憶保持する指定文字種記憶手段を設け、
前記文字認識手段は前記指定文字種記憶手段に記憶保持された認識文字種が変更されるまでの間、前記入力フィールド上に筆記された手書き文字を前記指定文字種に該当する種類の文字として認識するようにしたことを特徴とする請求項１記載の手書き文字入力装置。
【請求項６】前記指定文字種記憶手段は、手書き文字の認識候補が確定されるまでの間、今回指定された認識文字種を記憶保持するようにしたことを特徴とする請求項５記載の手書き文字入力装置。
【請求項７】前記指定文字種記憶手段は、手書き文字を書き始めてから一定時間が経過するまでの間、今回指定された認識文字種を記憶保持するようにしたことを特徴とする請求項５記載の手書き文字入力装置。
【請求項８】コンピュータによって読み取られるプログラムコードを有する記録媒体であって、
手書き文字を入力する入力フィールド上に認識文字種別に複数の文字種指示領域を割り当てる機能と、
手書き文字の書き始め位置がどの文字種指示領域かを判別する機能と、
判別された文字種指示領域の文字種として手書き文字を認識する機能を実現するためのプログラムコードを有する記録媒体。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】この発明は、手書き入力された文字を文字認識する手書き文字入力装置およびそのプログラム記録媒体に関する。
【０００２】
【従来の技術】近年、携帯型情報機器としてのモバイルＰ／Ｃ、ＰＤＡにおいては、キーボードが装備されていないキーボードレスタイプの製品が多数存在している。この種のものは、手書き入力画面上に筆記された筆記情報を切り出して文字認識を行い、文字コードに変換するようにしている。このような手書き入力方式は、キーボードの操作が不慣れな人でも文字入力することが可能となる。ところで、手書き文字を認識する際には、ひらがな、カタカナ、漢字、英字、記号といった文字種の全てを文字認識辞書から検索し、その中から手書き入力されたイメージに最も近い字形の文字を選別して認識候補とするために、全体の認識率が下がってしまう。そこで、従来においては認識させたい文字種を指定して認識率を向上させる方法が知られている。
【０００３】
【発明が解決しようとする課題】しかしながら、認識文字種を指定するものにおいては、文字種別のアイコンを設け、文字種を変更する都度、それに対応するアイコンを入力指定する必要があるため、途中で何回も文字種の変更を指定するという煩わしさがあり、入力効率の妨げとなっていた。この発明の課題は、特別なキー操作等によって認識文字種を指定しなくても、手書き文字を所望の文字種として認識できるようにすることである。
【０００４】
【課題を解決するための手段】この発明の手段は次の通りである。請求項１記載の発明は、手書き文字を入力する入力フィールドに筆記された手書き文字を文字認識して認識候補を得る手書き文字入力装置であって、前記入力フィールド上に認識文字種別に複数の文字種指示領域を割り当てる割当手段と、手書き文字の書き始め位置がどの文字種指示領域かを判別する判別手段と、この判別手段によって判別された文字種指示領域の文字種として手書き文字を認識する文字認識手段とを具備するものである。なお、この発明は以下のものであってもよい。
（１）、前記入力フィールドに複数の手書き入力領域が割り当てられている場合に、手書き入力領域と認識文字種との対応関係を定義する定義情報記憶手段を設け、この定義情報記憶手段に定義されている対応関係に基づいて前記割当手段は、前記複数の手書き入力領域を前記認識文字種別の文字種指示領域として入力フィールド上に割り当てる。この場合、前記定義情報記憶手段に定義さ

れている手書き入力領域と認識文字種との対応関係を任意に変更する変更手段を設けてもよい。

（２）、前記入力フィールド上に割り当てられている複数の文字種指示領域毎に、それに対応する認識文字種を表示する表示手段を設ける。

（３）、前記判別手段によって判別された書き始め位置の文字種指示領域の文字種を今回指定された認識文字種として記憶保持する指定文字種記憶手段を設け、前記文字認識手段は前記指定文字種記憶手段に記憶保持された認識文字種が変更されるまでの間、前記入力フィールド上に筆記された手書き文字を前記指定文字種に該当する種類の文字として認識する。この場合、前記指定文字種記憶手段は、手書き文字を書き始めてから一定時間が経過するまでの間、今回指定された認識文字種を記憶保持するようにしてもよい。また、前記指定文字種記憶手段は、手書き文字を書き始めてから一定時間が経過するまでの間、今回指定された認識文字種を記憶保持するようにしてもよい。

【０００５】請求項１記載の発明においては、手書き文字を入力する入力フィールド上に認識文字種別に複数の文字種指示領域を割り当てておき、、手書き文字の書き始め位置がどの文字種指示領域かを判別し、この判別された文字種指示領域の文字種種として手書き文字を認識する。したがって、特別なキー操作等によって認識文字種を指定しなくても、手書き文字を所望の文字種として認識することができる。

【０００６】

【発明の実施の形態】以下、図１～図１３を参照してこの発明の一実施形態を説明する。図１は手書き文字入力装置の全体構成を示したブロック図である。ＣＰＵ１は各種プログラムにしたがってこの手書き文字入力装置の全体動作を制御する中央演算処理装置である。記憶装置２はオペレーティングシステムや各種アプリケーションプログラム、データベース、文字フォントデータ等が予め格納されている記憶媒体３やその駆動系を有している。この記憶媒体３は固定的に設けたもの、もしくは着脱自在に装着可能なものであり、フロッピーディスク、ハードディスク、光ディスク、ＲＡＭカード等の磁気的・光学的記憶媒体、半導体メモリによって構成されている。また、記憶媒体３内のプログラムやデータは、必要に応じてＣＰＵ１の制御により、ＲＡＭ４にロードされる。更に、ＣＰＵ１は通信回線等を介して他の機器側から送信されて来たプログラム、データを受信して記憶媒体３に格納したり、他の機器側に設けられている記憶媒体に格納されているプログラム、データを通信回線等を介して使用することもできる。また、ＣＰＵ１にはその入出力周辺デバイスであるタッチパネル付き表示装置５、入力装置６がバスラインを介して接続されており、入出力プログラムにしたがってＣＰＵ１はそれらの動作を制御する。

【０００７】タッチパネル付き表示装置５は液晶表示装置等の表示画面上に透明タッチパネルを積層配置したタッチスクリーンを構成するもので、任意の文字を手書き入力する入力フィールド上に入力ペンを用いて筆記された筆記データは、１文字毎に切り出されてＣＰＵ１に送られる。ＣＰＵ１はこの筆記ストロークを文字認識してその認識結果を候補表示する。図２はタッチパネル付き表示装置５の表示内容を例示したもので、入力フィールド上には複数文字分の手書き入力領域５ａが割り当てられている。手書き入力領域５ａが割り当てられている。手書き入力領域５ａは文字認識枠を定義するもので、この例では５文字分の手書き入力領域５ａを横方向に並列配置した構成となっている。この各手書き入力領域５ａには認識文字種が対応付けられている。ここで、手書き入力領域５ａを図中左側から文字枠Ａ、Ｂ、Ｃ、Ｄ、Ｅと称すると、文字枠Ａには「全文字」、文字枠Ｂには「ひらがな」、文字枠Ｃには「カタカナ」、文字枠Ｄには「英数字」、文字枠Ｅには「記号」が認識文字種として対応付けられており、各文字枠Ａ～Ｅは手書き入力領域５ａとして機能すると共に認識文字種別に文字種指示領域として一時的に機能するようになっている。すなわち、文字枠Ａは手書き入力された文字を全ての種類の文字として認識すべきことを指示し、文字枠Ｂは手書き入力された文字をひらがなとして認識すべきことを指示する文字種指示領域として機能する。同様に文字枠Ｃは手書き入力された文字をカタカナとして認識すべきことを指示し、文字枠Ｄは手書き入力された文字をアルファベットや数字として認識すべきことを指示し、更に、文字枠Ｅは手書き入力された文字を記号として認識すべきことを指示する文字種指示領域として機能するようになっている。ここで、手書き入力領域５ａが文字種指示領域として機能するのは、手書き文字の書き始め時であり、最初にどの文字枠がペンタッチされたかによってその文字枠に対応する文字種が指示され、以降、指定文字種が変更されるまでの間、どの文字枠に手書き文字が入力されても最初に指定された文字種によって文字認識が行われる。そして、指定文字種は認識候補が選択確定された場合等を条件として解除されると共に、次の手書き文字の書き始め時に、最初にどの文字枠がペンタッチされたかによってその文字枠に対応する文字種が指定されることにより、文字種の変更が行われる。

【０００８】認識候補表示領域５ｂは文字認識された候補が一覧表示されるもので、オペレータはこの認識候補群の中から所望する候補を選択する。認識結果表示領域５ｃは認識候補の中から選択確定された文字列が表示される領域である。またタッチパネル付き表示装置５上のその他の領域には各種のファンクションキーが割り当てられており、「変換」はかな漢字変換を指示するキー、「実行」は候補の確定等を指示するキー、「対応表示」は手書き入力領域５ａに対応付けられている認識文字種

を手書き入力領域５ａ内に一時的に表示させるキーである。すなわち、「対応表示」のキーがペンタッチされると、図２に示すように各文字枠Ａ～Ｅにはそれに対応付けられている認識文字種が一時的にガイド表示されることにより、オペレータは各手書き入力領域５ａと認識文字種との対応関係を確認することができる。

【０００９】図３（Ａ）は記憶装置２内に格納されている一部の記憶内容を示し、手書き文字認識辞書２－１は１文字毎に筆記パターンと文字コードとを対応付けた通常の構成で、ＣＰＵ１はこの手書き文字認識辞書２－１を参照することによって手書き文字を文字認識する。かな漢字変換辞書２－２はかな文字列を漢字混りの文字列に変換する際に参照されるもので、文字認識されたかな文字列はかな漢字変換辞書２－２を参照することによって漢字混りの文字列に変換される。文字枠／文字種対応テーブル２－３は文字枠Ａ、Ｂ、Ｃ、Ｄ、Ｅに対応してその認識文字種を記憶するもので、その内容は任意に変更可能となっている。図３（Ｂ）はＲＡＭ４内の一部を示した構成図で、ＲＡＭ４には各種のメモリ領域が割り当てられている。書き始めフラグレジスタ４－１は手書き文字を書き始めたか否かを示すフラグがセットされるもので、手書き入力領域５ａ上を最初にペンタッチした際に、書き始めと判断されて書き始めフラグがオンされる。認識文字種レジスタ４－２は手書き文字を書き始めた位置がどの手書き入力領域５ａかによってそれに対応する認識文字種がセットされるもので、この認識文字種レジスタ４－２の内容が変換されるまでの間、どの手書き入力領域５ａに手書き文字が入力されても、認識文字種レジスタ４－２にセットされている文字種によって文字認識が行われる。タイマ４－３は手書き文字を書き始めてからの経過時間を計測するもので、ＣＰＵ１はこのタイマ４－３の値に基づいて書き始めから所定時間の経過を検出した際に、書き始めフラグをリセットすると共に、認識文字種レジスタ４－２の内容をクリアする。ワークメモリ４－４は記憶装置２からロードされた各種プログラムや処理途中の中間結果等を一時記憶する作業域である。

【００１０】次に、この手書き文字入力装置の動作を図４～図６、図１０、図１２に示すフローチャートにしたがって説明する。ここで、これらのフローチャートに記述されている各機能を実現するためのプログラムは、読み取り可能なプログラムコードの形態で記憶媒体３に格納されており、ＣＰＵ１はこのプログラムコードにしたがった動作を逐次実行する。図４、図５は手書き入力処理を示したフローチャートであり、いずれかの手書き入力領域５ａにペン入力があった際に実行開始される。先ず、ペンオンされると、ＣＰＵ１は書き始めフラグレジスタ４－１を参照し、書き始めかを判断するが、いま書き始めフラグがオフされていれば、書き始めと判断し、その書き始め位置はどの手書き入力領域５ａかを調べる。ここで、書き始め位置（ペンオン座標）が各文字枠Ａ～Ｅを割り当てる座標系のどの位置に属するかによって書き始め位置の文字枠を特定する。文字枠Ａであれば（ステップＡ２）、それに対応する文字種を文字枠／文字種対応テーブル２－３から読み出し、認識文字種レジスタ４－２に指定文字種として「全文字」フラグをセットする（ステップＡ３）。また文字枠Ｂであれば（（ステップＡ４）、それに対応する文字種を文字枠／文字種対応テーブル２－３から読み出し、認識文字種レジスタ４－２に指定文字種として「ひらがな」フラグをセットする（ステップＡ５）。同様に、文字枠Ｃであれば（ステップＡ６）、認識文字種レジスタ４－２に「カタカナ」フラグをセットし（ステップＡ７）、文字枠Ｄであれば（ステップＡ８）、認識文字種レジスタ４－２に「英数字」フラグをセットし（ステップＡ９）、文字枠Ｅであれば（ステップＡ１０）、認識文字種レジスタ４－２に「記号」フラグをセットする（ステップＡ１１）。

【００１１】このように手書き文字の書き始め位置が文字枠Ａ～Ｅのどれかによってそれに対応付けられている文字種を文字枠／文字種対応テーブル２－３から読み出してそれを指定文字種として認識文字種レジスタ４－２にセットしておく。この状態において、ＣＰＵ１は書き始めフラグレジスタ４－１内のフラグをオンすると共に、タイマ４－３をクリアスタートさせ、計時動作を開始させる（ステップＡ１２）。そして、手書き入力領域５ａに入力された手書き文字を１文字分切り出すと共に、この入力ストロークに基づいて手書き文字認識辞書２－１を参照し、文字認識を行うが、その際、ＣＰＵ１は手書き文字を認識文字種レジスタ４－２内の指定文字種として文字認識を行う（ステップＡ１３）。これによって得られた認識候補は、認識文字種レジスタ４－２内の指定文字種に該当する複数の候補がその類似度に応じた並び順にしたがって認識候補表示領域５ｂに一覧表示される（ステップＡ１４）。ここで、ＣＰＵ１はタイマ４－３の計測時間を取り込み、予め決められている所定時間と比較することによってタイムオーバかを判断する（ステップＡ１５）。ここで、タイムオーバの判断時間は、例えば、２０秒あるいは３０秒程度の時間で、書き始めてからの経過時間である。ここで、タイムオーバが検出されると、書き始めフラグレジスタ４－１をリセットすると共に（ステップＡ１６）、認識文字種レジスタ４－２をクリアする（ステップＡ１７）。これによって指定文字種は解除される。

【００１２】図６はキー入力処理を示したフローチャートである。先ず、認識候補表示領域５ｂに表示されている候補群の中から所望の候補を選択すると（ステップＢ１）、選択候補を抽出して認識結果表示領域５ｃに表示させる（ステップＢ２）。また、変換が指示された場合には（ステップＢ７）、かな漢字変換辞書２－２を参照

してかな漢字変換が行われ、その変換候補が表示出力されると共に、所望の候補が選択されると、その選択候補は認識結果表示領域５ｃに表示される（ステップＢ８）。また、認識結果表示領域５ｃ内の文字列を確定させるために実行キーがタッチされると（ステップＢ３）、認識結果表示領域５ｃ内の文字列が確定文字列としてファイルレコードに書き込まれる（ステップＢ４）。ここで、実行キーに応答して書き始めフラグレジスタ４－１がリセットされると共に（ステップＢ５）、認識文字種レジスタ４－２がクリアされる（ステップＢ６）。なお、その他のキーがタッチされた場合にはそれに応じた入力処理が行われる（ステップＢ９）。

【００１３】このように書き始めフラグレジスタ４－１、認識文字種レジスタ４－２の内容はタイムオーバの検出（図５のステップＡ１５）あるいは実行キーの操作（図６のステップＢ３）によって解除されるため、それまでは書き始めフラグはオンされていると共に指定文字種の変更は行われない。したがって、図７（Ａ）に示すように、最初に手書き入力した文字「こ」の位置が文字枠Ｂであれば指定文字種は「ひらがな」となり、手書き文字は「ひらがな」として文字認識される。ここで、タイムオーバが検出される前に右隣りの文字枠Ｃに文字「の」を手書き入力したものとすると、書き始めフラグはオンされているので、図４のステップＡ１でそのことが検出されて図５のステップＡ１３に進み、認識文字種レジスタ４－２にセットされている指定文字種によって文字認識が行われる。この場合、認識文字種レジスタ４－２の内容は「ひらがな」のままとなっているので、文字枠Ｃに入力された文字もひらがなとして文字認識される。次に、タイムオーバあるいは実行キーの操作によって書き始めフラグレジスタ４－１、認識文字種レジスタ４－２の内容が解除された状態において、手書き入力領域５ａのいずれかがペンオンされると、図４のステップＡ１で書き始めと判断されるため、その書き始め位置がどの文字枠かによってその文字枠に対応する文字種が認識文字種レジスタ４－２にセットされる。この場合、図７（Ｂ）に示すように書き始めの位置が文字枠Ｄであれば、、文字種「英数字」が認識文字種レジスタ４－２にセットされるので、その文字枠Ｄに入力された文字は英数字として認識される。続いて、右隣りの文字枠Ｅに手書き入力された文字も英数字として認識される。

【００１４】以下、同様に、図７（Ｃ）は書き始めフラグレジスタ４－１、認識文字種レジスタ４－２を解除したのち文字枠Ｃを書き始めの位置とすることによって認識文字種レジスタ４－２に「カタカナ」をセットした状態で、文字枠Ｃ、Ｄ、Ｅに「ソフト」を入力した場合である。図７（Ｄ）は文字枠Ｂを書き始め位置として認識文字種「ひらがな」を指定した状態で、「は」を入力した場合、図８（Ａ）は文字枠Ｅを書き始め位置として認識文字種「記号」を指定した状態で「＄」を入力した場合である。図８（Ｂ）、（Ｃ）は文字枠Ｄを書き始めとして文字枠Ｄ、Ｅ、Ａに「３００」を入力した場合、図８（Ｄ）は文字枠Ｂを書き始めとして文字枠Ｂ、Ｃ、Ｄに「です。」を入力した場合である。このように一連の文字列「このＰＣソフトは＄３００です。」を手書き入力する場合には、その文字種が変わる毎に、それに対応する文字枠を書き始め位置とすることにより文字種をキー入力によって指定してなくても該当する文字種による文字認識が可能となる。

【００１５】図９はタッチパネル付き表示装置５上の「対応表示」キーが操作された場合の表示例を示し、図１０はこの場合の動作を示したフローチャートであり、図６のステップＢ９（その他の入力処理）の一部を示している。先ず、タッチパネル付き表示装置５上の「対応表示」キーが操作されると（ステップＣ１）、文字枠／文字種対応テーブル２－３の内容を読み取り（ステップＣ２）、手書き入力領域５ａである各文字枠Ａ～Ｅに対応付けてその認識文字種を文字枠内に表示出力させる（ステップＣ３）。ここで、認識文字種の表示は「対応表示」キーが操作されている間行われ、その操作を解除すると、認識文字種の表示は消去される。なお、「対応表示」キーが操作されてから一定時間経過するまでの間、認識文字種を表示するようにしてもよい。つまり、その表示はいずれにおいても文字枠Ａ～Ｅと認識文字種との対応関係を確認するために一時的に行われるものである。

【００１６】図１１は文字枠／文字種対応テーブル２－３の内容を変更する際の変更画面を示し、図１２はこの変更処理を示したフローチャートであり、図６のステップＢ９（その他の入力処理）の一部を示している。この対応関係変更画面は文字枠Ａ～Ｅ毎に現在文字枠／文字種対応テーブル２－３に設定されている認識文字種と変更後の認識文字種（次認識文字種）との対応関係が表示されると共に、認識種類の一覧がウインドウ表示されており、このウインドウ内の種類一覧から所望する種類（入力番号）を選択し、それを次認識文字種欄に設定する。すると、各文字枠Ａ～Ｅに対応する次認識文字種欄の全てに変更後の文字種を入力し終り（ステップＤ１）、かつ次認識文字種欄において入力番号が他の文字枠の入力番号に重複していないことを条件に（ステップＤ２）、この変更画面に設定した内容が文字枠／文字種対応テーブル２－３に書き込まれる（ステップＤ３）。このように文字枠／文字種対応テーブル２－３の内容はユーザによって任意に変更可能である。

【００１７】以上のようにこの手書き文字入力装置においては、認識候補表示領域５ａである文字枠Ａ～Ｅに認識文字種を割り当てておき、手書き文字の書き始め位置がどの文字枠かを判別し、この文字枠に対応付けられている認識文字種が指定されたものとして以降、手書き入力された文字をこの指定文字種として認識するようにし

たから、特別なキー操作等によって認識文字種を指定しなくても、手書き文字を所望の文字種として認識することができ、入力作業の簡素化と共に認識率を向上させることが可能となる。例えば、図１３（Ａ）に示すように、認識文字種を指定せずに記号「〒」を入力したものとすると、「〒」と認識されずに、漢字の「半」と「中」として認識される可能性があるが、この実施形態においては、特別なキー操作を行わなくても、文字枠Ｅに記号「〒」を手書き入力するだけで、正確に「〒」として認識することが可能となる。また、文字枠Ａ～Ｅと認識文字種との対応関係を定義する文字枠／文字種対応テーブル２－３の内容をユーザが任意に設定することができるので、ユーザの好みに合った操作環境とすることができ、入力作業の向上に通ずる。更に、文字枠／文字種対応テーブル２－３の内容を「対応表示」キーの操作によって表示させることができるので、その対応関係をいつでも確認することが可能である。また、手書き文字の書き始め時に指定された認識文字種は認識文字種レジスタ４－２にセットされると共に、その内容は、実行キーあるいはタイムオーバとなるまで保持されるので、最初に入力された文字枠の認識文字種で、他の文字枠に入力された手書き文字も認識されるため、同一種類の文字を連続的に入力することが可能となる。

【００１８】なお、上述した一実施形態においては、タッチパネル付き表示装置５の入力フィールド上に複数の手書き入力領域５ａを横方向に並列配置した構成としたが、手書き文字を入力する入力フィールド上において、その縦方向に認識文字種別に複数の文字種指示領域（手書き入力領域）を割り当てるようにしてもよい。すなわち、入力フィールド上の図中左側隅部に、縦方向（行方向）に配置した４文字分の文字種指示領域Ｋ、Ｌ、Ｍ、Ｎを配置し、それを図中上から順に認識文字種「ひらがな」、「カタカナ」、「英数字」、「記号」に対応付けておき、各文字種指示領域Ｋ、Ｌ、Ｍ、Ｎを各行の先頭文字の手書き入力領域とすることによって、各行を認識文字種別に割り当てるようにしてもよい。この場合、どの行の文字種指示領域に先頭文字を書き始めたかにより、認識文字種を特定し、その行内に筆記された文字をその文字種として文字認識するようにすればよい。

【００１９】

【発明の効果】この発明によれば、特別なキー操作等によって認識文字種を指定しなくても、手書き文字を所望の文字種として認識することができるので、認識率の向上と共に入力作業を効率良く行うことが可能となる。

【図面の簡単な説明】

【図１】手書き文字入力装置の全体構成を示したブロック図。

【図２】タッチパネル付き表示装置５の表示状態を示した図。

【図３】（Ａ）は記憶装置２内の一部を示した図、（Ｂ）はＲＡＭ４の一部を示した図。

【図４】手書き入力領域５ａ上にペンオンされた際に実行開始されるペンオン処理を示したフローチャート。

【図５】図４に続くペンオン処理を示したフローチャート。

【図６】キー入力処理を示したフローチャート。

【図７】（Ａ）～（Ｄ）は手書き入力例を示した図。

【図８】（Ａ）～（Ｄ）は図７に続く手書き入力例を示した図。

【図９】「対応表示」キーが操作される前、操作された後の表示状態を示した図。

【図１０】「対応表示」キーの操作に応じた動作を示したフローチャート。

【図１１】文字枠、文字種の対応関係を変更する際の変更画面を示した図。

【図１２】対応関係変更処理を示したフローチャート。

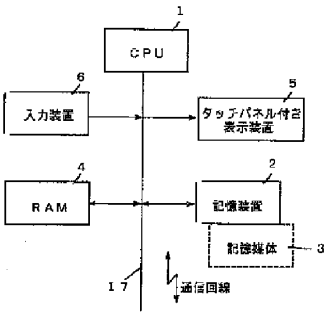
【図１３】（Ａ）は従来の手書き文字認識例、（Ｂ）はこの実施形態における手書き文字認識例を示した図。

【図１４】この実施形態における変形応用例を説明するための図。

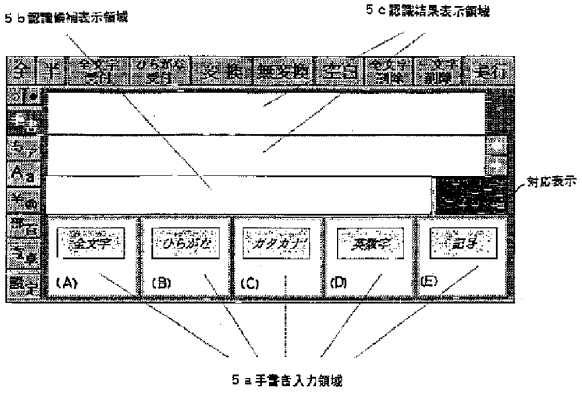
【符号の説明】

１　ＣＰＵ
２　記憶装置
２－１　手書き文字認識辞書
２－３　文字枠／文字種対応テーブル
３　記憶媒体
４　ＲＡＭ
４－１　書き始めフラグレジスタ
４－２　認識文字種レジスタ
４－３　タイマ
５　タッチパネル付き表示装置
５ａ　手書き入力領域
５ｂ　認識候補表示領域
６　入力装置

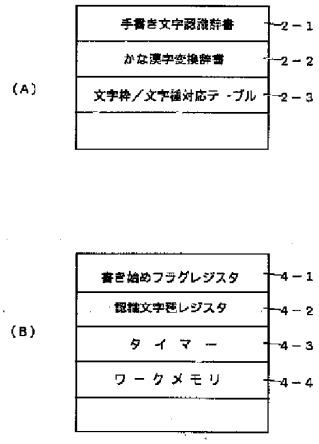
【図1】



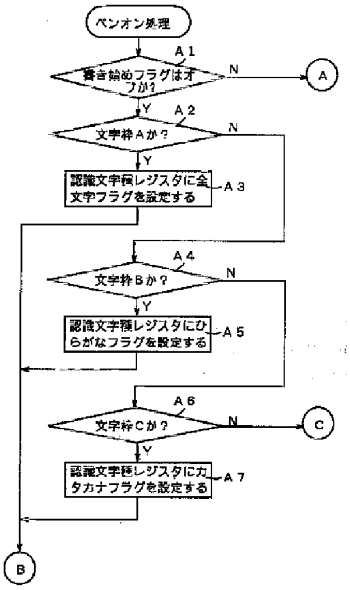
【図2】



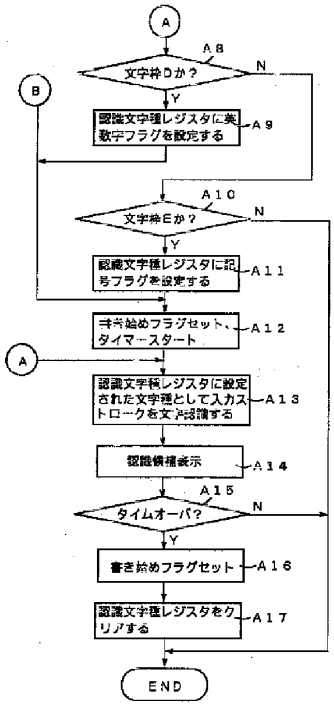
【図3】



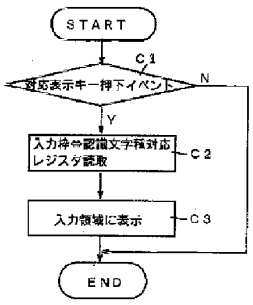
【図4】



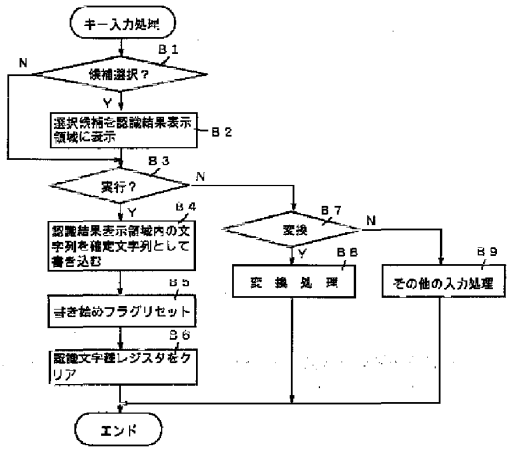
【図5】



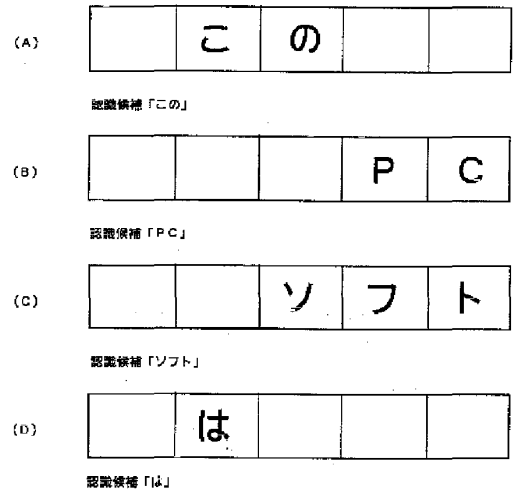
【図10】



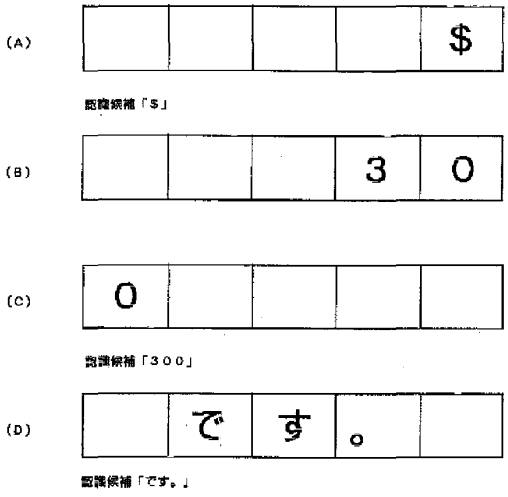
【図6】



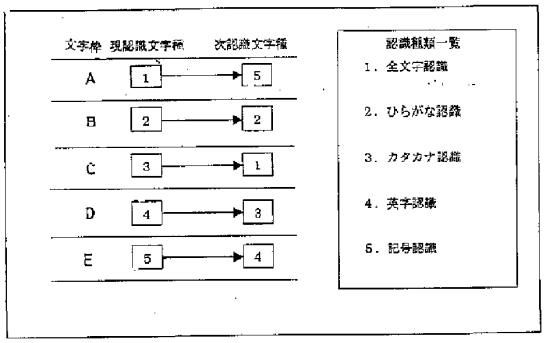
【図7】



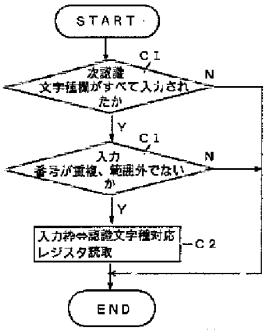
【図8】



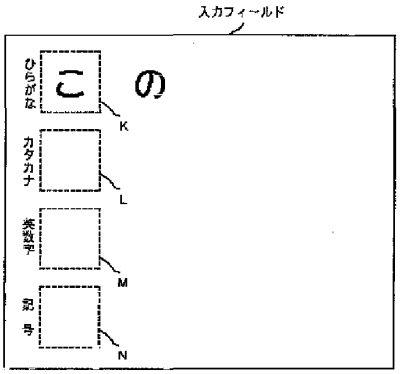
【図11】



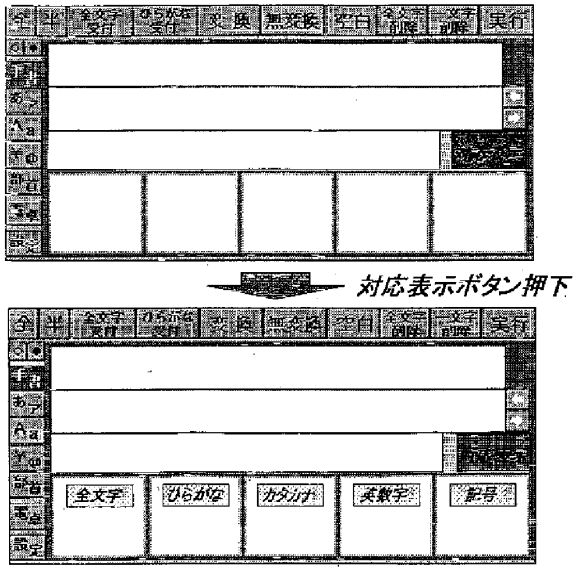
【図12】



【図14】

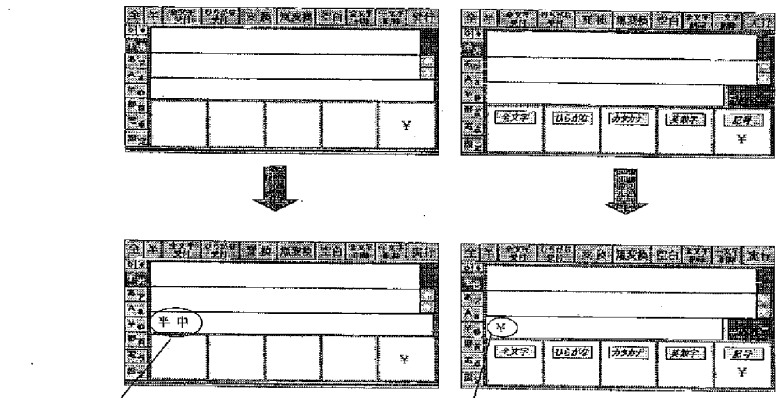


【図９】



入力枠⇔認識文字種　対応関係表示例

【図１３】



Espacenet

Bibliographic data: JP2012145971 (A) — 2012-08-02

HANDWRITTEN CHARACTER INPUT DEVICE, AND PORTABLE TERMINAL

Inventor(s):

Applicant(s): PANASONIC CORP ± (PANASONIC CORP)

Classification: **- international:** ***G06K9/62***
- cooperative: **G06F3/018**; **G06F3/04883**; **G06K9/00402**

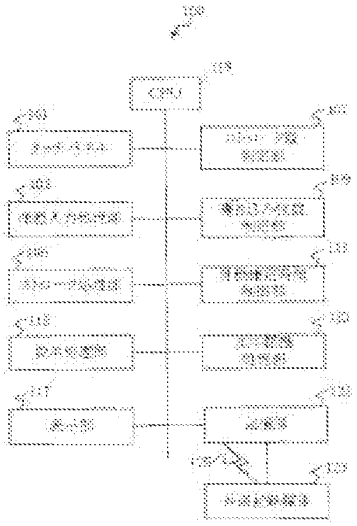
Application number: JP20110001391 20110106

Priority number (s): JP20110001391 20110106

Also published as: JP5305545 (B2) WO2012093657 (A1) TW201234280 (A) CN103299322 (A)

Abstract of JP2012145971 (A)

PROBLEM TO BE SOLVED: To prevent such a case that a character which a user does not intend is automatically determined. ; SOLUTION: In a handwritten character input device 100, a write position determination unit 109 determines deviation/non-deviation of stroke position information viewed from an input area on a touch panel 101. When there is a deviation in the stroke position information, the write position determination unit 109 determines that the input character is a kanji, and an automatic determination time control unit 111 sets an automatic determination time later than the usual. ; COPYRIGHT: (C) 2012,JPO&INPIT



101 Touch panel
103 Coordinate input processing part
105 Stroke processing part
107 Stroke number determination part
109 Write position determination part
111 Automatic fixing time control part
113 Character recognition processing part
115 Display processing part
117 Display part
121 Memory part
123 External recording medium

(19)日本国特許庁(JP)　(12)公開特許公報(A)　(11)特許出願公開番号
特開2012-145971
(P2012-145971A)
(43)公開日　平成24年8月2日(2012.8.2)

(51)Int.Cl.		F I		テーマコード（参考）
G06K 9/62	(2006.01)	G06K 9/62	G	5B064

審査請求 有　請求項の数 6　ＯＬ　（全 18 頁）

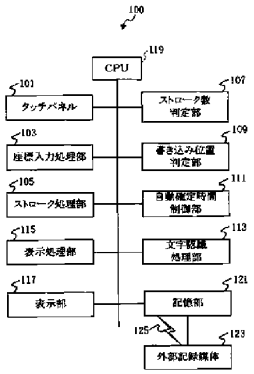
(21)出願番号　特願2011-1391(P2011-1391)
(22)出願日　平成23年1月6日(2011.1.6)

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Ｆターム(参考)　5B064 AA07 AB04 AB13 AB14 AB16
BA06 DD03 DD06 FA03 FA13

(54)【発明の名称】手書き文字入力装置および携帯端末

(57)【要約】
【課題】ユーザが意図しない文字が自動確定されることを防ぐ。
【解決手段】手書き文字入力装置１００では、書き込み位置判定部１０９がタッチパネル１０１上の入力エリアから見たストローク位置情報の偏りの有無を判定する。ストローク位置情報の偏りが有る場合には入力文字が漢字であると書き込み位置判定部１０９によって判定され、自動確定時間制御部１１１が自動確定時間を通常よりも遅く設定する。
【選択図】図１



【特許請求の範囲】
【請求項１】
接触を感知するタッチパネルと、
前記タッチパネルで感知された接触に基づき、前記タッチパネルへの接触開始位置から前記タッチパネルへの接触終了位置までの一連の座標で構成されるストローク情報をストローク毎に生成する第１生成部と、
前記ストローク情報に基づき、ストロークの数を判定する第１判定部と、
前記タッチパネルの入力エリア全体に対して、前記ストローク情報が示す前記タッチパネル上の入力エリアの偏りを判定する第２判定部と、
前記タッチパネル上のエリアの偏りに基づき、前記タッチパネル上で入力中の文字が漢字であるか否かを判定する第３判定部と、
前記第３判定部が前記タッチパネル上で入力中の文字が漢字でないと判定した場合には、前記タッチパネルへの接触終了時から前記入力文字を自動的に確定するまでの自動確定時間を通常の自動確定時間に設定し、前記第３判定部が前記タッチパネル上で入力中の文字が漢字であると判定した場合には、当該自動確定時間を前記通常の自動確定時間よりも長い時間に設定する自動確定時間制御部と、
前記ストローク情報に基づき、前記自動確定時間経過後に前記入力文字の文字認識処理を行う文字認識処理部と、
前記文字認識処理後の入力文字を表示するための表示処理を行う表示処理部と、
前記表示処理された入力文字を表示する表示部と、を備える手書き文字入力装置。
【請求項２】
前記第２判定部は、
前記第１判定部が判定したストロークの数が所定のストローク数以内である場合に、前記ストローク情報が示す前記タッチパネル上の入力エリアの偏りを判定する、請求項１に記載の手書き文字入力装置。
【請求項３】
前記第２判定部は、
前記第１判定部が判定したストロークの数が４ストローク以内である場合に、前記ストローク情報が示す前記タッチパネル上の入力エリアの偏りを判定する、請求項１又は２に記載の手書き文字入力装置。
【請求項４】
前記タッチパネルは、
その入力エリア全体が上下左右に４等分された４つのサブエリアで構成され、
前記第２判定部は、
前記ストローク情報が示す前記タッチパネル上の入力エリアが、１つ又は２つの前記サブエリアである場合には、前記ストローク情報が示す前記タッチパネル上の入力エリアに偏りがあると判定し、
前記ストローク情報が示す前記タッチパネル上の入力エリアが、３つ又は４つの前記サブエリアである場合には、前記ストローク情報が示す前記タッチパネル上の入力エリアに偏りがないと判定する、請求項１～３のいずれか１項に記載の手書き文字入力装置。
【請求項５】
前記第３判定部は、
前記タッチパネル上のエリアの偏り、及び前記第１判定部が判定したストロークの数に基づき、前記タッチパネル上で入力中の文字が漢字であるか否かを判定し、
前記第１判定部が判定したストロークの数が４ストローク数以内である場合には、前記タッチパネル上で入力中の文字が漢字であるか否かを判定し、
前記第１判定部が判定したストロークの数が５ストローク数以降である場合には、前記タッチパネル上で入力中の文字を漢字と判定する、請求項３又は４に記載の手書き文字入力装置。
【請求項６】

請求項１～５のいずれか１項に記載の手書き文字入力装置を備える携帯端末。
【発明の詳細な説明】
【技術分野】
【０００１】
本発明は、タッチパネルで入力操作を行う手書き文字入力装置および携帯端末に関する。
【背景技術】
【０００２】
一般に、タッチパネルを介して文字などを手書きで入力可能な携帯端末では、ユーザが１文字を書き終わるタイミングを正確に検知することができない場合がある。そのため、携帯端末は、ユーザのタッチパネル操作（確定ボタンの接触）を検出して、１文字を書き終わるタイミングを認識する必要がある。しかし、１文字書き終わる度にタッチパネル操作（確定ボタンの接触）を行う動作は、ユーザにとって煩わしい動作である。
【０００３】
そこで、特許文献１に開示されている手書き文字入力システムは、ユーザがタッチパネルを介して文字入力を行った後にタッチパネルから手を離して予め設定した時間（以下、「自動確定時間」という）が経過すると、文字の種類に依らず、自動的に文字入力操作を確定する機能を備える。そのため、ユーザは１文字書き終わる度にタッチパネル操作（確定ボタンの接触）を行う必要はない。
【先行技術文献】
【特許文献】
【０００４】
【特許文献１】特開平１１－２５２１１号公報
【発明の概要】
【発明が解決しようとする課題】
【０００５】
ところで、ユーザがタッチパネル操作により文字入力を行う場合、文字の種類によっては文字入力を終えるまでに長い時間がかかる場合がある。例えば、ユーザがタッチパネルを介して漢字入力を行う場合、ひらがな、カタカナ、記号、およびアルファベットなどの入力動作に比べて、ストローク間の時間が長くなる場合が多い。
【０００６】
そのため、特許文献１に開示されている手書き文字入力システムにおいて、ひらがな、カタカナ、記号、およびアルファベットなどの文字に合わせて自動確定時間を設定した場合に、ユーザがタッチパネル操作により漢字入力を行うと、実際には入力途中であっても自動確定時間が経過してしまい、手書き文字入力システムは、ユーザが意図した文字の入力操作を終えたと誤認識してしまう場合がある。
【０００７】
ここで、自動確定時間とは、ユーザがタッチパネルを介して文字入力操作を行っている間に、タッチパネルから手を離した時から、１文字分の入力操作を終えたと判定されるまでに経過した時間をいう。
【０００８】
本発明の目的は、ユーザが意図しない文字が自動確定されるのを防ぐことができる手書き文字入力装置および携帯端末を提供することである。
【課題を解決するための手段】
【０００９】
本発明は、接触を感知するタッチパネルと、前記タッチパネルで感知された接触に基づき、前記タッチパネルへの接触開始位置から前記タッチパネルへの接触終了位置までの一連の座標で構成されるストローク情報をストローク毎に生成する第１生成部と、前記ストローク情報に基づき、ストロークの数を判定する第１判定部と、前記タッチパネルの入力エリア全体に対して、前記ストローク情報が示す前記タッチパネル上の入力エリアの偏り

を判定する第２判定部と、前記タッチパネル上のエリアの偏りに基づき、前記タッチパネル上で入力中の文字が漢字であるか否かを判定する第３判定部と、前記第３判定部が前記タッチパネル上で入力中の文字が漢字でないと判定した場合には、前記タッチパネルへの接触終了時から前記入力文字を自動的に確定するまでの自動確定時間を通常の自動確定時間に設定し、前記第３判定部が前記タッチパネル上で入力中の文字が漢字であると判定した場合には、当該自動確定時間を前記通常の自動確定時間よりも長い時間に設定する自動確定時間制御部と、前記ストローク情報に基づき、前記自動確定時間経過後に前記入力文字の文字認識処理を行う文字認識処理部と、前記文字認識処理後の入力文字を表示するための表示処理を行う表示処理部と、前記表示処理された入力文字を表示する表示部と、を備える手書き文字入力装置を提供する。

【００１０】

上記手書き文字入力装置では、前記第２判定部は、前記第１判定部が判定したストロークの数が所定のストローク数以内である場合に、前記ストローク情報が示す前記タッチパネル上の入力エリアの偏りを判定する。

【００１１】

上記手書き文字入力装置では、前記第２判定部は、前記第１判定部が判定したストロークの数が４ストローク以内である場合に、前記ストローク情報が示す前記タッチパネル上の入力エリアの偏りを判定する。

【００１２】

上記手書き文字入力装置では、前記タッチパネルは、その入力エリア全体が上下左右に４等分された４つのサブエリアで構成され、前記第２判定部は、前記ストローク情報が示す前記タッチパネル上の入力エリアが、１つ又は２つの前記サブエリアである場合には、前記ストローク情報が示す前記タッチパネル上の入力エリアに偏りがあると判定し、前記ストローク情報が示す前記タッチパネル上の入力エリアが、３つ又は４つの前記サブエリアである場合には、前記ストローク情報が示す前記タッチパネル上の入力エリアに偏りがないと判定する。

【００１３】

上記手書き文字入力装置では、前記第３判定部は、前記タッチパネル上のエリアの偏り、及び前記第１判定部が判定したストロークの数に基づき、前記タッチパネル上で入力中の文字が漢字であるか否かを判定し、前記第１判定部が判定したストロークの数が４ストローク数以内である場合には、前記タッチパネル上で入力中の文字が漢字であるか否かを判定し、前記第１判定部が判定したストロークの数が５ストローク数以降である場合には、前記タッチパネル上で入力中の文字を漢字と判定する。

【００１４】

また、本発明は、上記手書き文字入力装置を備える携帯端末を提供する。

【発明の効果】

【００１５】

本発明に係る手書き文字入力装置および携帯端末によれば、ユーザが意図しない文字が自動確定されるのを防ぐことができる。

【図面の簡単な説明】

【００１６】

【図１】実施の形態１に係る手書き文字入力装置１００のブロック図

【図２】タッチパネル１０１上の入力エリアＡ示す図

【図３】ストローク位置情報の一例を示す図

【図４】（ａ）～（ｃ）はストローク位置情報の偏りを示す図

【図５】（ａ）は、図４（ｂ）に示すストローク位置情報の偏りを説明するための図、（ｂ）は、図４（ｃ）に示すストローク位置情報の偏りを説明するための図

【図６】（ａ）～（ｅ）は、入力文字が漢字以外のひらがな・カナ・英数字である場合の入力エリアの一例を説明するための図

【図７】（ａ）～（ｄ）は、図６（ａ）、及び図６（ｃ）～（ｅ）に示す文字に対応する

ストローク位置情報を説明するための図
【図８】手書き文字入力装置１００の文字認識処理フローチャート
【図９】実施の形態２に係る携帯端末１の斜視図
【図１０】携帯端末１の概略構成を示すブロック図
【発明を実施するための形態】
【００１７】
以下、本発明の実施の形態について、図面を参照して説明する。
【００１８】
（実施の形態１）
図１を参照して、実施の形態１に係る手書き文字入力装置１００の構成について説明する。図１は、本実施の形態に係る手書き文字入力装置１００のブロック図である。図１に示す手書き文字入力装置１００は、タッチパネル１０１と、座標入力処理部１０３と、ストローク処理部１０５と、ストローク数判定部１０７と、書き込み位置判定部１０９と、自動確定時間制御部１１１と、文字認識処理部１１３と、表示処理部１１５と、表示部１１７と、ＣＰＵ１１９と、記憶部１２１とを備える。なお、手書き文字入力装置１００は、外部装置として、外部記録媒体１２３を備える。
【００１９】
ＣＰＵ１１９は、手書き文字入力装置１００全体を制御する制御部として機能し、記憶部１２１に記憶されている処理プログラムやデータ等を実行する。
【００２０】
記憶部１２１は、ＣＰＵ１１９で実行される処理プログラムやデータ等が予め記憶されている。記憶部１２１に記憶するプログラムやデータ等は、フロッピー（登録商標）ディスクや光（磁気）ディスク等の外部記録媒体１２３から読み込むようにしても良いし、外部とのデータ送受用の通信回線（有線又は無線）１２５を介して接続された他の機器から受信して、記憶するようにしても良い。
【００２１】
タッチパネル１０１は、内蔵するセンサによって、タッチパネル１０１上の接触を感知し、その検出結果を座標入力処理部１０３に出力する。例えば、ユーザがひらがなである“い”を入力する場合、タッチパネル１０１は、書き始めの位置である指の接触位置から、タッチパネル１０１上をなぞって書き終わりの位置である指を離した位置までに検出した複数の接触位置を座標入力処理部１０３に出力する。
【００２２】
ここで、タッチパネル１０１が検出する接触とは、たとえば、手書き文字入力装置１００を操作するユーザの指の接触のことである。なお、タッチパネル１０１に直接接触するのはユーザの指でなくても、タッチペンなどのデバイスでも良い。
【００２３】
なお、タッチパネル１０１は、容量性、抵抗性、赤外線、及び弾性表面波技術、並びにその他の近接センサアレイ、又は、タッチパネル１０１と接触点を決定するための複数のタッチセンシティビティ技術を用いて、タッチパネル１０１上の接触及び接触による任意の動き又はその動きの中断を検出することができる。
【００２４】
表示部１１７は、タッチパネル１０１に一体的に備えられており、出力インタフェースとして、視覚的な出力をユーザに表示する。この視覚的な出力は、テキスト、グラフィック、ビデオ、及びこれらの任意の組合せを含むことができる。
【００２５】
座標入力処理部１０３は、タッチパネル１０１の検出結果をＸ－Ｙ平面上の座標に変換する。以下、指の接触位置に対応する座標を“座標情報”という。例えば、ユーザがひらがなである“い”を入力する場合、座標入力処理部１０３は、タッチパネル１０１の検出結果に基づき、書き始めの位置である指の接触位置から、タッチパネル１０１上をなぞって書き終わりの位置である指を離した位置までの複数の座標情報（Ｘｋ，Ｙｋ）（ｋ＝１

，２，…，ｎ：ｎは自然数）を算出する。そして、座標入力処理部１０３は、この複数の座標情報（Ｘｋ，Ｙｋ）をストローク処理部１０５に出力する。

【００２６】

ストローク処理部１０５は、座標入力処理部１０３から入力された座標情報（Ｘｋ，Ｙｋ）に基づき、ストローク情報を生成し、生成したストローク情報をストローク数判定部１０７に出力する。

【００２７】

ここで、本実施の形態の場合、“ストローク情報”とは、例えば、ユーザがひらがなである“い”を入力する場合、第１画目及び第２画目のそれぞれのストロークについて、書き始めの指の接触位置を示す座標情報、書き終わりの指の接触位置を示す座標情報、および書き始めから書き終わりまでの連続する指の複数の接触位置を示す複数の座標情報と、を含む。ストローク情報は、ストローク処理部１０５によってストローク毎に生成される。

【００２８】

以下、第Ｎ画目のストロークのストローク情報を第Ｎストローク情報と呼ぶ場合がある。例えば、ユーザがひらがなである“い”を入力する場合、第１画目のストロークのストローク情報は“第１ストローク情報”であり、第２画目のストロークのストローク情報は“第２ストローク情報”である。

【００２９】

ストローク数判定部１０７は、ストローク処理部１０５から入力されたストローク情報に基づき、ストローク数をストローク毎に判定して、判定したストローク数を示すストローク数情報をストローク毎に生成する。そして、ストローク数判定部１０７は、生成したストローク数情報をストローク毎に書き込み位置判定部１０９へ出力する。たとえば、ユーザがひらがなである“い”を入力する場合、ストローク数判定部１０７は、第１、２ストローク情報に基づきストローク数が２であると判定し、ストローク数情報（例えば“２”）を生成する。また、ストローク数判定部１０７は、ストローク情報も書き込み位置判定部１０９へ出力する。

【００３０】

書き込み位置判定部１０９は、ストローク数判定部１０７から出力されたストローク情報、およびストローク数情報に基づき、図２に示すタッチパネル１０１上の入力エリアＡを上下左右に４等分したサブエリアＡ１～Ａ４のうち、どのサブエリアにストロークが入力されているか（書き込み位置）をストローク毎に判定する。つまり、書き込み位置判定部１０９は、ストロークの書き込み位置をストローク毎に判定する。

【００３１】

ここで、書き込み位置判定部１０９が判定する書き込み位置とは、図２に示すタッチパネル１０１上の入力エリアＡを上下左右に４等分したサブエリアＡ１～Ａ４のうち、ストロークが入力されているサブエリアの位置を指す。以下、このストローク毎に判定された書き込み位置を示す情報をストローク位置情報という。そして、書き込み位置判定部１０９は、判定結果に基づき、ストローク位置情報をストローク毎に生成する。なお、入力エリアＡとストローク位置情報との関係については後述する。

【００３２】

ここで、本実施の形態の場合、“ストローク位置情報”は、各サブエリアに対してストロークが入力されている場合には１が割り当てられ、各サブエリアに対してストロークが入力されていない場合には０が割り当てられるフラグ情報である。フラグ情報は、書き込み位置判定部１０９によってストローク毎に生成される。

【００３３】

以下、第Ｎ画目のストロークのストローク位置情報を“第Ｎストローク位置情報”と呼ぶ場合がある。例えば、ユーザがひらがなである“い”を入力する場合、第１画目のストロークのストローク位置情報は“第１ストローク位置情報”であり、第２画目のストロークのストローク位置情報は“第２ストローク位置情報”である。

【００３４】
図３に入力文字がひらがなである“い”である場合の、ストローク毎のストローク位置情報を示す。図３に示すように、第１ストローク位置情報はサブエリアの組み（Ａ１，Ａ２，Ａ３，Ａ４）に対して、各サブエリアに対応するように（１，１，０，０）と表現される。同様に、第１ストローク位置情報はサブエリアの組み（Ａ１，Ａ２，Ａ３，Ａ４）に対して、各サブエリアに対応するように（０，０，１，１）と表現される。
【００３５】
書き込み位置判定部１０９は、ストローク数判定部１０７から出力されたストローク情報およびストローク数情報、並びに生成したストローク位置情報をストローク毎に、文字認識処理部１１３へ出力する。
【００３６】
記憶部１２１は、文字認識処理部１１３が参照する認識辞書を有しており、各種のストローク情報に対応付けて文字パターンが記憶されている。
【００３７】
文字認識処理部１１３は、記憶部１２１にストローク情報に対応付けて記憶された文字パターンを参照して、内蔵するＲＡＭ等の記憶媒体にストローク毎に蓄積された複数のストローク情報から、設定された自動確定時間の経過後に文字認識処理を行う。つまり、文字認識処理部１１３は、設定された自動確定時間の経過後に、認識辞書を検索して、複数のストローク情報から得られる文字パターンに対応する文字コードを表示処理部１１５へ出力する。なお、自動確定時間は、後述する自動確定時間制御部１１１により設定される。
【００３８】
文字認識処理部１１３は、上述した文字認識処理を行う前に、書き込み位置判定部１０９からストローク毎に入力された複数の情報、すなわち、（１）ストローク情報と、（２）ストローク数情報と、（３）ストローク位置情報とに基づき、現在入力中の文字の種類（漢字かそれ以外）を判定して、その判定結果をストローク数情報と共に、自動確定時間制御部１１１に出力する。具体的な判定方法として、文字認識処理部１１３は、（Ｉ）最初の４ストローク以内のストロークで、タッチパネル１０１上の入力エリアＡに対するストローク位置情報の偏りを検出し、（ＩＩ）検出した入力エリアＡに対するストローク位置情報の偏りから、現在入力中の文字の種類が漢字であるか、又は漢字以外の文字であるかを判定する。さらに、文字認識処理部１１３は、５ストローク目以降のストローク位置情報が入力された場合には、現在入力中の文字が漢字であると判定し、その判定結果をストローク数情報と共に、自動確定時間制御部１１１に出力する。
【００３９】
＜ストローク位置情報の偏り検出＞
ここで、本実施の形態では、ユーザがタッチパネル１０１上に漢字を入力する場合、最初の４ストローク以内のストロークでタッチパネル１０１上の入力エリアＡ（図２参照）に対するストローク位置情報に偏りが見られることに着目している。そのため、文字認識処理部１１３は、（Ｉ）最初の４ストローク以内のストロークで、タッチパネル１０１上の入力エリアＡに対するストローク位置情報の偏りを検出し、（ＩＩ）検出したタッチパネル１０１上の入力エリアＡに対するストローク位置情報の偏りから現在入力中の文字の種類が漢字かそれ以外であるかを判定する。
【００４０】
また、入力文字が漢字以外のひらがな・カナ・英数字のいずれかである場合には、最初の４ストローク以内に文字入力が終わる場合が多い。そのため、文字認識処理部１１３は、５ストローク目以降のストローク情報（第５ストローク情報）が存在する場合には、入力文字が漢字であると判定する。
【００４１】
本実施の形態では、タッチパネル１０１上の入力エリアＡに対するストローク位置情報の偏りを検出する基準として、漢字の部首を例にとって説明する。漢字の部首は、ある漢

字を構成する要素であって、漢字を分類する時の基準になる。

【００４２】

[入力文字が漢字である場合]

入力文字が漢字である場合には、漢字の部首がタッチパネル１０１上の入力エリアの一部に最初の４ストローク以内で偏っている場合が多い。図４（ａ）～図４（ｃ）を参照して、入力文字が漢字である場合に見られるタッチパネル１０１上の入力エリアＡの偏りの一例を説明する。なお、図４（ａ）に示すように、タッチパネル１０１上の入力エリアＡは上下左右に均等に４等分されたサブエリアＡ１～Ａ４で構成されている。これは図２と同じものである。

【００４３】

図４（ｂ）に示すように、例えば漢字の部首が「偏（へん）」である“さんずい”であれば、タッチパネル１０１上の入力エリアＡ全体のうち、左半分の２つのサブエリアＡ１、Ａ２にストロークが偏っている。また、図４（ｃ）に示すように、漢字の部首が「冠（かんむり）」である“くさかんむり”の場合、タッチパネル１０１上の入力エリアＡ全体のうち、上半分の２つのサブエリアＡ１、Ａ３にストロークが偏っている。

【００４４】

上述のように、入力文字が漢字である場合、その部首に対応するストロークが入力されるタッチパネル１０１上の入力エリアＡには、偏り（例えば、左半分、上半分）が見られることが分かる。

【００４５】

ここで“偏りが見られる”とは、最初の４ストローク以内で、入力エリアＡの１つ又は２つのサブエリアにだけストロークが存在している場合を指す。なお、最初の４ストローク以内で漢字の部首のすべてが入力される場合が多い。

【００４６】

図５（ａ）、（ｂ）を参照して、図４（ｂ）、図４（ｃ）に示す漢字の一部（部首）に対応するストローク位置情報を説明する。図５（ａ）は、図４（ｂ）に示す漢字の一部（部首）に対応するストローク位置情報であり、図５（ｂ）は、図４（ｃ）に示す漢字の一部（部首）に対応するストローク位置情報である。

【００４７】

図５（ａ）のストローク位置情報に示すように、漢字の部首“さんずい”の場合には、その画数が３画であるため、漢字の部首“さんずい”に対応するストローク位置情報は、第１～第３ストローク位置情報の３つのストローク位置情報から構成される。これらの第１～第３ストローク位置情報に対応するサブエリアは、タッチパネル１０１上の入力エリアＡ全体のうち、左半分の２つのサブエリアＡ１、Ａ２（図５（ａ）中、太枠線内）に偏っている。

【００４８】

図５（ａ）に示すように、入力文字が“さんずい”を部首として含む漢字である場合、入力エリアＡに対するストローク位置情報から、漢字の部首がタッチパネル１０１上の入力エリアの一部に最初の４ストローク以内で偏っていることがわかる。そのため、文字認識処理部１１３は、（Ｉ）最初の４ストローク以内のストロークで、タッチパネル１０１上の入力エリアＡに対するストローク位置情報の偏りを検出し、（ＩＩ）検出した入力エリアＡに対するストローク位置情報の偏りから、現在入力中の文字の種類が漢字であると判定することができる。

【００４９】

図５（ｂ）のストローク位置情報に示すように、漢字の部首“くさかんむり”であれば、その画数が３画であるため、漢字の部首“くさかんむり”に対応するストローク情報は、第１～第３ストローク情報の３つのストローク情報から構成される。これらの第１～第３ストローク情報に対応するサブエリアは、タッチパネル１０１上の入力エリアＡのうち、上半分の２つのサブエリアＡ１、Ａ３（図５（ｂ）中、太枠線内）に偏っている。

【００５０】

図５（ｂ）に示すように、入力文字が“くさかんむり”を部首として含む漢字である場合、タッチパネル１０１上の入力エリアＡに対するストローク位置情報からも、漢字の部首がタッチパネル１０１上の入力エリアの一部に最初の４ストローク以内で偏っていることがわかる。そのため、文字認識処理部１１３は、（Ｉ）最初の４ストローク以内のストロークで、タッチパネル１０１上の入力エリアＡに対するストローク位置情報の偏りを検出し、（ＩＩ）検出したタッチパネル１０１上の入力エリアＡに対するストローク位置情報の偏りから、現在入力中の文字の種類が漢字であると判定することができる。

【００５１】

[入力文字が漢字以外である場合]

一方、入力文字が漢字以外のひらがな・カナ・英数字のいずれかである場合には、最初の４ストローク以内に入力座標が検出されるタッチパネル１０１上の入力エリアに偏りが見られない場合が多い。以下、図６（ａ）～図６（ｅ）を参照して、入力文字が漢字以外のひらがな・カナ・英数字である場合のタッチパネル１０１上の入力エリアＡの一例（１）～（５）を説明する。なお、図６（ａ）～図６（ｅ）の各図の入力エリアＡの構成は、図４（ａ）と同じ構成である。

【００５２】

図６（ａ）に示すように、例えば“ひらがな”である「め」の場合、タッチパネル１０１上の入力エリアＡのうち全サブエリアＡ１～Ａ４に、入力座標が最初の２ストロークで検出される。そのため、第１～第２ストローク情報に対応するサブエリアは、タッチパネル１０１上の入力エリアＡの全サブエリアＡ１～Ａ４であり、ストロークの偏りが見られない。

【００５３】

また、図６（ｂ）に示すように、例えば“ひらがな”である「し」の場合、タッチパネル１０１上の入力エリア全体のうちサブエリアＡ１、Ａ２、Ａ４に、入力座標が最初の１ストロークで検出される。そのため、第１ストローク情報に対応するサブエリアは、タッチパネル１０１上の入力エリアＡのサブエリアＡ１、Ａ２、Ａ４であり、ストロークの偏りが見られない。

【００５４】

図６（ｃ）に示すように、例えば“カタカナ”である「ホ」の場合、タッチパネル１０１上の入力エリアＡのうち全サブエリアＡ１～Ａ４に、入力座標が最初の４ストロークで検出される。そのため、第１～４ストローク情報に対応するサブエリアは、タッチパネル１０１上の入力エリアＡの全サブエリアであり、ストロークの偏りが見られない。

【００５５】

図６（ｄ）に示すように、例えば“英字”である「Ｆ」の場合、タッチパネル１０１上の入力エリアＡ全体のうちサブエリアＡ１、Ａ２、Ａ３に、入力座標が最初の３ストロークで検出される。そのため、第１～３ストローク情報に対応するサブエリアは、タッチパネル１０１上の入力エリアＡのサブエリアＡ１、Ａ２、Ａ３であり、ストロークの偏りが見られない。

【００５６】

図６（ｅ）に示すように、例えば“数字”である「７」の場合、タッチパネル１０１上の入力エリアＡ全体のうちサブエリアＡ１、Ａ３、Ａ４に、入力座標が最初の２ストロークで検出される。そのため、第１～３ストローク情報に対応するサブエリアは、タッチパネル１０１上の入力エリアＡのサブエリアＡ１、Ａ３、Ａ４であり、ストロークの偏りが見られない。

【００５７】

上述のように、入力文字が漢字以外のひらがな・カナ・英数字のいずれかである場合には、最初の３ストローク又は最初の４ストロークで文字入力が終わる場合が多い、また最初の４ストローク以内で、入力座標が検出されるタッチパネル１０１上の入力エリアにはストロークの偏りが見られない場合が多い。

【００５８】

ここで、“偏りが見られない”とは最初の４ストローク以内で、入力エリアＡの３つ又は４つのサブエリアに入力座標が検出されている場合を指す。

【００５９】

図７（ａ）～（ｄ）を参照して、図６（ａ）、及び図６（ｃ）～（ｅ）に示す漢字以外の文字に対応するストローク位置情報を説明する。図７（ａ）は、図６（ａ）に示すひらがなに対応するストローク位置情報であり、図７（ｂ）は、図６（ｃ）に示すカタカナに対応するストローク位置情報であり、図７（ｃ）は、図６（ｄ）に示す英字に対応するストローク位置情報であり、図７（ｄ）は、図６（ｅ）に示す数字に対応するストローク位置情報である。

【００６０】

図７（ａ）のストローク位置情報に示すように、入力文字がひらがなである“め”の場合には、その画数が２画であるため、ひらがなである“め”に対応するストローク情報は、第１、２ストローク位置情報の２つのストローク位置情報から構成される。これら第１、２ストローク位置情報に対応するサブエリアは、タッチパネル１０１上の入力エリアＡ全体（図７（ａ）中、太枠線内）なので、ストローク位置情報の偏りが見られない。

【００６１】

そのため、文字認識処理部１１３は、（Ｉ）最初の４ストローク以内のストロークで、タッチパネル１０１上の入力エリアＡに対するストローク位置情報の偏りを検出し、（ＩＩ）検出したタッチパネル１０１上の入力エリアＡに対するストローク位置情報の偏りから、現在入力中の文字の種類が漢字以外であると判定することができる。

【００６２】

図７（ｂ）のストローク位置情報に示すように、入力文字がカタカナである“ホ”の場合には、その画数が４画であるため、カタカナである“ホ”に対応するストローク位置情報は、第１～４ストローク位置情報の４つのストローク位置情報から構成される。これら第１～４ストローク位置情報に対応するサブエリアは、タッチパネル１０１上の入力エリアＡ全体（図７（ｂ）中、太枠線内）なので、ストローク位置情報の偏りが見られない。

【００６３】

そのため、文字認識処理部１１３は、（Ｉ）最初の４ストローク以内のストロークで、タッチパネル１０１上の入力エリアＡに対するストローク位置情報の偏りを検出し、（ＩＩ）検出したタッチパネル１０１上の入力エリアＡに対するストローク位置情報の偏りから、現在入力中の文字の種類が漢字以外であると判定することができる。

【００６４】

図７（ｃ）のストローク位置情報に示すように、入力文字が英字である“Ｆ”の場合には、その画数が３画であるため、英字である“Ｆ”に対応するストローク位置情報は、第１～３ストローク位置情報の３つのストローク位置情報から構成される。これら第１～３ストローク位置情報に対応するサブエリアは、タッチパネル１０１上の入力エリアＡのうち、サブエリアＡ１～Ａ３（図７（ｃ）中、太枠線内）なので、ストローク位置情報の偏りが見られない。

【００６５】

そのため、文字認識処理部１１３は、（Ｉ）最初の４ストローク以内のストロークで、タッチパネル１０１上の入力エリアＡに対するストローク位置情報の偏りを検出し、（ＩＩ）検出したタッチパネル１０１上の入力エリアＡに対するストローク位置情報の偏りから、現在入力中の文字の種類が漢字以外であると判定することができる。

【００６６】

図７（ｄ）のストローク位置情報に示すように、入力文字が数字である“７”の場合には、その画数が２画であるため、数字である“７”に対応するストローク位置情報は、第１～３ストローク位置情報の３つのストローク位置情報から構成される。これら第１～３ストローク位置情報に対応するサブエリアは、タッチパネル１０１上の入力エリアＡのうち、サブエリアＡ１、Ａ３、Ａ４（図７（ｃ）太枠線内）なので、ストローク位置情報の偏りが見られない。

【００６７】
上述のように、文字認識処理部１１３は、文字認識処理を行う前に、書き込み位置判定部１０９からストローク毎に入力された複数の情報、すなわち、（１）ストローク情報と、（２）ストローク数情報と、（３）ストローク位置情報とに基づき、現在入力中の文字の種類（漢字かそれ以外）を判定して、その判定結果をストローク数情報と共に、自動確定時間制御部１１１に出力する。さらに、文字認識処理部１１３は、５ストローク目以降のストローク位置情報が入力された場合には、現在入力中の文字が漢字であると判定し、その判定結果をストローク数情報と共に、自動確定時間制御部１１１に出力する。
【００６８】
自動確定時間制御部１１１は、文字認識処理部１１３の判定結果に基づき、自動確定時間を設定する。なお、設定された自動確定時間が経過した後に、文字認識処理部１１３によって文字認識処理を行われて、入力文字が確定される。
【００６９】
ここで、自動確定時間とは、ユーザがタッチパネル１０１を介して文字入力操作を行った後にタッチパネル１０１から手を離した時から、１文字分の入力操作を終えたと文字認識処理部１１３が判定するまでに経過した時間をいう。
【００７０】
現在入力中の文字が漢字以外であると文字認識処理部１１３によって判定された場合には、自動確定時間制御部１１１は、現在入力中の文字に対する自動確定時間を通常の自動確定時間Ｔ１に設定する。
【００７１】
一方、現在入力中の文字が漢字であると文字認識処理部１１３によって判定された場合には、自動確定時間制御部１１１は、現在入力中の文字に対する通常の自動確定時間を、通常の自動確定時間Ｔ１よりも長い自動確定時間Ｔ２に設定する。これは、入力中の文字が漢字である場合には、ユーザは、漢字入力中にストローク間でタッチパネル１０１から指を離している時間が漢字以外の文字と比較して長い場合が多いからである。
【００７２】
また、文字認識処理部１１３が文字認識処理を行って１文字分の入力操作が終了した場合には、自動確定時間制御部１１１は、現在入力中の文字に対する自動確定時間を通常の自動確定時間Ｔ１に設定する。
【００７３】
表示処理部１１５は、文字認識処理部１１３から出力された文字コードに基づき、表示部１１７へ文字コードに対応する文字を表示するための表示処理を行う。
【００７４】
表示部１１７は、表示処理部１１５により表示処理された文字を表示する。
【００７５】
次に、図８を参照して、手書き文字入力装置１００の文字認識処理フローチャートを説明する。図８は手書き文字入力装置１００の文字認識処理フローチャートである。
【００７６】
ステップＳＴ８０１で、タッチパネル１０１上の接触が検出される。そして、ステップＳＴ８０３へ遷移する。
【００７７】
ステップＳＴ８０３で、座標入力処理部１０３は、タッチパネル１０１の検出結果を座標情報に変換する。そして、ステップＳＴ８０５へ遷移する。
【００７８】
ステップＳＴ８０５で、ストローク処理部１０５は、座標入力処理部１０３から入力された座標情報に基づき、ストローク毎にストローク情報を生成する。そして、ステップＳＴ８０７へ遷移する。
【００７９】
ステップＳＴ８０７で、ストローク数判定部１０７は、ストローク情報に基づき、スト

ローク毎にストローク数を判定する。そして、ステップＳＴ８０９へ遷移する。

【００８０】

ステップＳＴ８０９で、書き込み位置判定部１０９は、ストローク情報、およびストローク数情報に基づき、書き込み位置を示すストローク位置情報をストローク毎に生成する。そして、ステップＳＴ８１１へ遷移する。

【００８１】

ステップＳＴ８１１で、文字認識処理部１１３は、（１）ストローク情報と、（２）ストローク数情報と、（３）ストローク位置情報とに基づき、現在入力中の文字の種類を判定する。そして、ステップＳＴ８１３へ遷移する。

【００８２】

ステップＳＴ８１３で、自動確定時間制御部１１１は、文字認識処理部１１３によって判定された現在入力中の文字の種類に基づき、自動確定時間を設定する。そして、ステップＳＴ８１５へ遷移する。

【００８３】

ステップＳＴ８１５で、文字認識処理部１１３は、ステップＳＴ８１３で設定された自動確定時間が経過した後に、文字認識処理を行う。そして、ステップＳＴ８１７へ遷移する。

【００８４】

ステップＳＴ８１７で、表示処理部１１５は、文字認識処理された文字を表示部１１７に表示するための表示処理を行う。そして、手書き文字入力装置１００の文字認識処理フローが終了する。

【００８５】

上述のように、実施の形態１に係る手書き文字入力装置１００は、（１）タッチパネル１０１上の入力エリアＡ全体から見た、所定のストローク数（例えば、４ストローク）以内のストローク位置情報の偏りの有無を判定し、ストローク位置情報の偏りが有る場合には入力文字が漢字であると判定し、ストローク位置情報の偏りが無い場合には入力文字は漢字以外であると判定する。更に、実施の形態１に係る手書き文字入力装置１００は、（２）上記（１）の判定後、ストローク位置情報に、所定のストローク数より多いストローク数（例えば、５ストローク）のストローク位置情報が含まれる場合には入力文字が漢字であると判定する。

【００８６】

そのため、本実施の形態に係る手書き文字入力装置１００は、所定のストローク以内で検出された手書き入力操作の傾向（本実施の形態では、ストローク位置情報の偏り）に基づき、所定のストローク以内で入力文字が漢字であるか否かを判定することで、入力文字の種類（本実施の形態では、漢字かそれ以外の文字）に応じて自動確定時間を動的に変化させることができる。

【００８７】

したがって、本実施の形態に係る手書き文字入力装置１００は、少ないストローク数で漢字であるか否かを判定することができ、漢字であると判定した場合には、自動確定時間を遅く設定することで、ユーザが意図しない文字入力の確定動作を防ぐことができる。

【００８８】

なお、本実施の形態に係る手書き文字入力装置１００は、所定のストローク以内で検出された手書き入力操作の傾向（本実施の形態では、ストローク位置情報の偏り）に基づき、手書き入力文字が漢字であるか否かを判定するので、その時点では手書き入力された漢字を特定する必要はない。

【００８９】

なお、本実施の形態に係る手書き文字入力装置１００では、ストローク位置情報の偏りを示す指標として漢字の部首を例にとって説明しているが、これに限らない。漢字の部首以外でも漢字を分類する基準となる部分で、ストローク位置情報の偏りを検出しても良い。

【００９０】
なお、本実施の形態に係る手書き文字入力装置１００では、漢字の部首として「偏（へん）」及び「冠（かんむり）」を例にとって説明したがこれに限らない。漢字の部首としては、「偏（へん）」及び「冠（かんむり）」以外にも、「旁（つくり）」、「冠（かんむり）」、「脚（あし）」、「構（かまえ）」、「垂（たれ）」、および「繞（ひょう）」などがある。
【００９１】
なお、本実施の形態に係る手書き文字入力装置１００では、タッチパネル１０１上の入力エリアＡは上下左右に均等に４等分されたサブエリアＡ１～Ａ４で構成されているものとして説明したが、これに限らない。タッチパネル１０１上の入力エリアＡの分割方法や分割数は、漢字を分類する基準となる部分に対応するストローク位置情報の偏りを検出できれば良い。
【００９２】
なお、本実施の形態に係る手書き文字入力装置１００では、文字認識処理部１１３は、ストローク位置情報をストローク毎に蓄積しているがこれに限らない。本実施の形態では、自動確定時間が最初の４ストローク以内で判定された文字の種類に応じて設定されるので、文字認識処理部１１３は、ストローク位置情報を上書きして保持しても良い。例えば、文字認識処理部１１３は、図３に示す第１ストローク位置情報に第２ストローク位置情報を上書きして、サブエリアの組み（Ａ１，Ａ２，Ａ３，Ａ４）に対して、ストローク位置情報（１，１，１，１）を保持しても良い。これにより文字認識処理部１１３は、内蔵するメモリの容量を節約することができる。
【００９３】
（実施の形態２）
図９および図１０を参照して本発明の一実施の形態として、実施の形態１に係る手書き文字入力装置１００を備える携帯端末１について説明する。
【００９４】
図９は、携帯電話機などに用いられる携帯端末１の斜視図である。携帯端末１は、矩形の板状の筐体１０で構成される。
【００９５】
筐体１０の外面には、表示部１１７が一体に設けられたタッチパネル１０１と、音声を出力するスピーカ３３と、音声を集音するマイクロフォン３４と、が設けられている。
【００９６】
タッチパネル１０１、スピーカ３３、およびマイクロフォン３４は、外部に露出されており、ユーザはタッチパネル１０１の画面を視認しながら、携帯端末１を用いて通話を行うことができる。
【００９７】
図１０は、携帯端末１の概略構成を示すブロック図である。携帯端末１は、主制御部３０、電源回路部３１、タッチパネル制御部３２、音声制御部３５、通信制御部３６、記憶部３７、情報記録媒体３８がバスによって相互に通信可能に接続されて構成されている。
【００９８】
電源回路部３１は、電力供給源（バッテリ等）を備え、タッチパネル１０１上に表示された操作キーを介した入力に基づいて、携帯端末１の電源のＯＮ／ＯＦＦ状態を切り替え、電源がＯＮ状態の場合に電力供給源から各部に対して電力を供給して、携帯端末１を動作可能にする。
【００９９】
タッチパネル制御部３２は、タッチパネル１０１が物体の接触を検知すると、その接触があった位置座標を取得して主制御部３０に伝送する。なお、本実施の形態では、タッチパネル制御部３２に、手書き文字入力装置１００の機能が含まれる。
【０１００】
また、タッチパネル制御部３２は、タッチパネル１０１に接触していた物体が離れると

、接触時に取得した位置座標を消去する。例えばユーザの指がタッチパネル１０１に接触したまま任意の方向へなぞると、タッチパネル制御部３２は、なぞった始点と終点の接触位置座標を取得し主制御部３０に伝送する。

【０１０１】

また、タッチパネル制御部３２は、主制御部３０の制御に基づいて、データ等をタッチパネル１０１に表示する。

【０１０２】

タッチパネル１０１での接触入力が行われた時、タッチパネル１０１にデータを表示する時、または通信が行われる時に、タッチパネル制御部３２はタッチパネル１０１の照明を点灯させる。また、タッチパネル１０１からの入力が無く、通信も行われずに、所定時間を経過すると、タッチパネル制御部３２はタッチパネル１０１の照明を消灯させ、タッチパネル１０１からの入力操作を無効にし、次に入力操作があるまで携帯端末１の機能をスリープさせる。

【０１０３】

音声制御部３５は、主制御部３０の制御に基づいて、マイクロフォン３４で集音された音声からアナログ音声信号を生成し、このアナログ音声信号をデジタル音声信号に変換する。また音声制御部３５は、デジタル音声信号を取得すると、主制御部３０の制御に基づいて、このデジタル音声信号をアナログ音声信号に変換し、スピーカ３３から音声として出力する。

【０１０４】

通信制御部３６は、主制御部３０の制御に基づいて、基地局からアンテナ３６Ａを介して受信した受信信号をスペクトラム逆拡散処理してデータを復元する。このデータは、主制御部３０の指示により、音声制御部３５に伝送されてスピーカ３３から出力されたり、タッチパネル制御部３２に伝送されてタッチパネル１０１に表示されたり、または記憶部３７に記録されたりする。

【０１０５】

また通信制御部３６は、主制御部３０の制御に基づいて、マイクロフォン３４で集音された音声データや、タッチパネル１０１を介して入力されたデータや記憶部３７に記憶されたデータを取得すると、これらのデータに対してスペクトラム拡散処理を行い、基地局に対してアンテナ３６Ａを介して送信する。

【０１０６】

記憶部３７は、主制御部３０や通信制御部３６などのワーク領域となるもので、その機能はＲＡＭ（Ｒａｎｄｏｍ　Ａｃｃｅｓｓ　Ｍｅｍｏｒｙ）などにより実現できる。

【０１０７】

情報記録媒体３８は、プログラムやデータなどを格納するものであり、その機能は、ハードディスク、或いはメモリ（ＲＯＭ：Ｒｅａｄ　Ｏｎｌｙ　Ｍｅｍｏｒｙ）などにより実現できる。情報記録媒体３８は、本実施の形態の各部としてコンピュータを機能させるためのプログラム（各部の処理をコンピュータに実行させるためのプログラム）、複数のアプリケーション等が記憶される。

【０１０８】

主制御部３０は、ＣＰＵ（Ｃｅｎｔｒａｌ　Ｐｒｏｃｅｓｓｉｎｇ　Ｕｎｉｔ）を具備する。主制御部３０は、携帯端末１の総括的な制御を行うとともに、その他の様々な演算処理や制御処理などを行う。主制御部３０の機能は各種プロセッサ（ＣＰＵ、ＤＳＰ等）、ＡＳＩＣ（ゲートアレイ等）などのハードウェアや、プログラムにより実現できる。主制御部３０は、情報記録媒体３８に格納されるプログラム（データ）に基づいて本実施の形態の種々の処理を行う。

【０１０９】

主制御部３０が、情報記録媒体３８に格納されている任意のアプリケーションを起動した際、主制御部３０は、タッチパネル１０１への接触によりタッチパネル制御部３２から伝送される、アプリケーションに対応するよう変換し、所定の処理操作を行うようアプリ

ケーションを動作させる。

【０１１０】

上述のように、本実施の形態に係る携帯端末１は、実施の形態１に係る手書き文字入力装置１００を備える。そのため、本実施の形態に係る携帯端末１は、実施の形態１に係る手書き文字入力装置１００と同じ効果を得ることができる。すなわち、本実施の形態に係る携帯端末１は、少ないストローク数で漢字であるか否かを判定することができ、漢字であると判定した場合には、自動確定時間を遅く設定することで、ユーザが意図しない文字入力の確定動作を防ぐことができる。

【０１１１】

以上説明したように、実施の形態１及び２によれば、入力中の文字が漢字であるか否かによって、自動確定時間を動的に変更し、ユーザが意図しない文字が自動確定されるのを防ぐことができる。なお、自動確定時間とは、ユーザがタッチパネル１０１を介して文字入力操作を行っている間に、タッチパネル１０１から手を離した時から、１文字分の入力操作を終えたと判定されるまでに経過した時間をいう。

【産業上の利用可能性】

【０１１２】

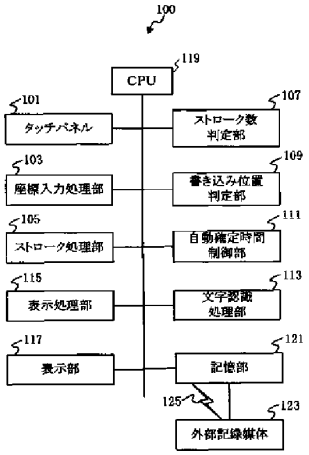
本発明に係る手書き文字入力装置および携帯端末は、ユーザが意図しない文字が自動確定されることを防ぐといった効果を有し、携帯電話機等として有用である。

【符号の説明】

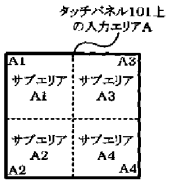
【０１１３】

１	携帯端末
３０	主制御部
３１	電源回路部
３２	タッチパネル制御部
３３	スピーカ
３４	マイクロフォン
３５	音声制御部
３６	通信制御部
３６Ａ	アンテナ
３７	記憶部
３８	情報記録媒体
１００	手書き文字入力装置
１０１	タッチパネル
１０３	座標入力処理部
１０５	ストローク処理部
１０７	ストローク数判定部
１０９	書き込み位置判定部
１１１	自動確定時間制御部
１１３	文字認識処理部
１１５	表示処理部
１１７	表示部
１１９	ＣＰＵ
１２１	記憶部
１２３	外部記録媒体
１２５	通信回線

【図１】



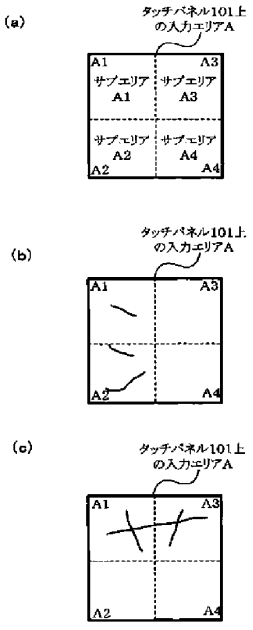
【図２】



【図３】

入力エリアA / ストローク位置情報	サブエリアA1	サブエリアA2	サブエリアA3	サブエリアA4
第1ストローク位置情報	1	1	0	0
第2ストローク位置情報	0	0	1	1

【図４】



【図５】

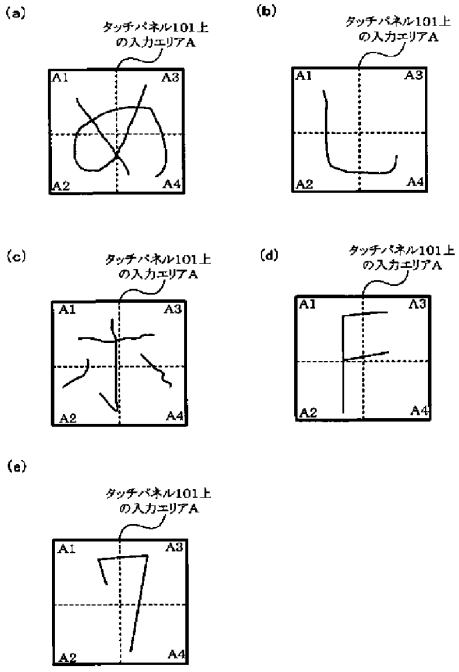
(a)

入力エリアA / ストローク位置情報	サブエリアA1	サブエリアA2	サブエリアA3	サブエリアA4
第1ストローク位置情報	1	0	0	0
第2ストローク位置情報	0	1	0	0
第3ストローク位置情報	0	1	0	0

(b)

入力エリアA / ストローク位置情報	サブエリアA1	サブエリアA2	サブエリアA3	サブエリアA4
第1ストローク位置情報	1	0	0	0
第2ストローク位置情報	1	0	1	0
第3ストローク位置情報	0	0	1	0

【図６】



【図７】

(a)

入力エリアA / ストローク位置情報	サブエリアA1	サブエリアA2	サブエリアA3	サブエリアA4
第1ストローク位置情報	1	1	0	1
第2ストローク位置情報	1	1	1	1

(b)

入力エリアA / ストローク位置情報	サブエリアA1	サブエリアA2	サブエリアA3	サブエリアA4
第1ストローク位置情報	1	0	1	0
第2ストローク位置情報	1	1	0	0
第3ストローク位置情報	1	1	0	0
第4ストローク位置情報	0	0	1	1

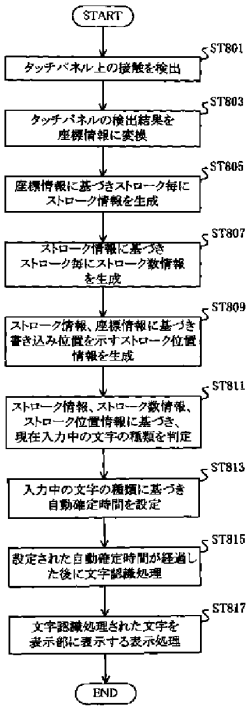
(c)

入力エリアA / ストローク位置情報	サブエリアA1	サブエリアA2	サブエリアA3	サブエリアA4
第1ストローク位置情報	1	0	1	0
第2ストローク位置情報	1	1	0	0
第3ストローク位置情報	1	1	0	0

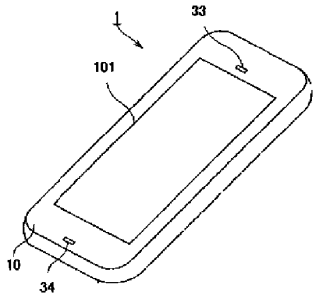
(d)

入力エリアA / ストローク位置情報	サブエリアA1	サブエリアA2	サブエリアA3	サブエリアA4
第1ストローク位置情報	1	0	0	0
第2ストローク位置情報	1	0	1	1

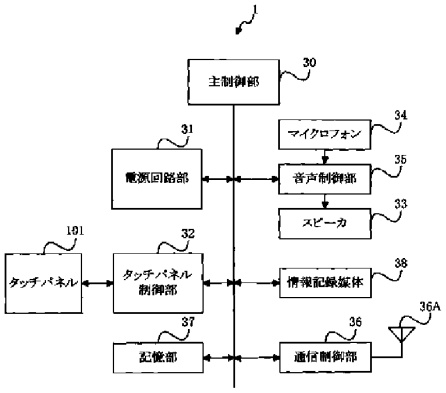
【図８】



【図９】



【図１０】


主制御部
30
マイクロフォン
34
31
電源回路部
音声制御部
35
スピーカ
33
101
32
タッチパネル
タッチパネル
制御部
38
情報記録媒体
36A
37
36
記憶部
通信制御部

Espacenet

Bibliographic data: JP2000123114 (A) — 2000-04-28

HANDWRITTEN CHARACTER INPUT DEVICE AND STORAGE MEDIUM

Inventor(s): ONO JUNJI; OTANI HIDEO ± (ONO JUNJI, ; OTANI HIDEO)

Applicant(s): CASIO COMPUTER CO LTD ± (CASIO COMPUT CO LTD)

Classification: **- international:** ***G06F3/00; G06F3/03; G06F3/033; G06F3/041; G06F3/048; G06K9/03; G06K9/62;*** (IPC1-7): G06F3/00; G06F3/03; G06F3/033; G06K9/03; G06K9/62

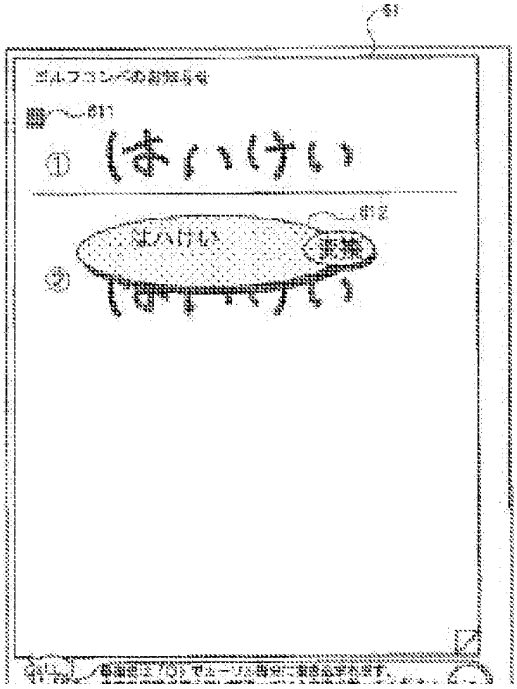
- cooperative:

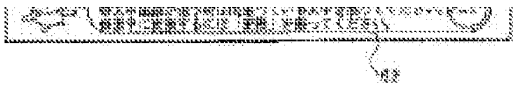
Application number: JP19980294029 19981015

Priority number (s): JP19980294029 19981015

Abstract of JP2000123114 (A)

PROBLEM TO BE SOLVED: To display the operations desired by a user in the smooth and easy-to- understand ways and to improve the operability of a handwritten character input device by attaining the free input operations of handwritten characters with no input frames required and also displaying a menu window etc., according to the characters, instructions, etc., which are inputted via a touch panel. SOLUTION: When the handwritten characters are inputted by a user at an optional position on an input panel, a CPU displays a transparent blue vertical or horizontal writing recognition window 612 in response to the direction of the inputted handwritten characters. The window 612 functions to change the recognition result of the inputted handwritten characters and





also to convert the recognition result into KANJI (Chinese character) from KANA (Japanese syllabary) in a character string. Then - or * is inputted by handwriting to decide or cancel the recognition result or the converted character string candidates.

(19)日本国特許庁（ＪＰ）　(12) **公開特許公報（Ａ）**　(11)特許出願公開番号
特開2000－123114
（P2000－123114A）
(43)公開日　平成12年４月28日(2000.4.28)

(51)Int.Cl.⁷		識別記号	FI			テーマコード（参考）
Ｇ０６Ｋ	9/62		Ｃ０６Ｋ	9/62	Ｃ	５Ｂ０６４
Ｇ０６Ｆ	3/00	６２０	Ｃ０６Ｆ	3/00	６２０Ｒ	５Ｂ０６８
	3/03	３８０		3/03	３８０Ｒ	５Ｂ０８７
	3/033	３６０		3/033	３６０Ｃ	５Ｅ５０１
Ｇ０６Ｋ	9/03		Ｃ０６Ｋ	9/03	Ｊ	

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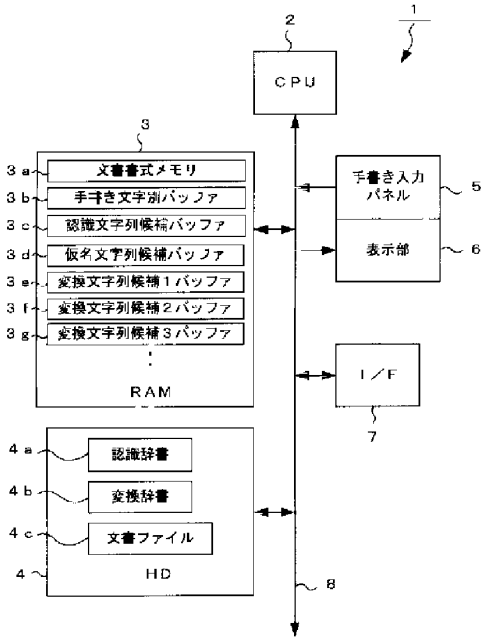
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(54)【発明の名称】　手書き文字入力装置及び記憶媒体

(57)【要約】
【課題】　本発明の課題は、入力枠等のない自由な手書き文字入力を可能とするとともに、タッチパネル上で入力される文字や指示等に応じて、メニューウィンドウ等を表示することにより、ユーザーの行いたい操作を円滑に分かり易く表示して、操作性を向上させることである。
【解決手段】　ユーザーにより手書き入力用パネル５上の任意の位置に手書き文字が入力されると、ＣＰＵ２が、入力された手書き文字の方向に応じて、半透明ブルーの縦書き用又は横書き用の認識ウィンドウ６１２を表示する。この認識ウィンドウ６１２は、入力された手書き文字の文字認識結果や、認識結果の変更、認識結果の文字列による仮名漢字変換を行うためのウィンドウであり、認識結果や変換文字列候補の確定やキャンセルが「○」又は「×」の手書き入力によって行われる。



【特許請求の範囲】
【請求項１】手書き入力領域を有する入力パネルと、
この手書き入力領域に対応した表示領域を有する表示手段と、
前記手書き入力領域に対する手書き入力文字や、前記表示領域に表示された文書に対する指示入力を検出し、その入力内容を判別する判別手段と、
この判別手段により判別された入力内容に対応するガイダンスウィンドウを、そのガイダンス内容に応じた表示色で、前記入力位置に対応した前記表示領域に識別表示する表示制御手段と、
を備えたことを特徴とする手書き文字入力装置。
【請求項２】前記手書き入力領域に対する手書き入力文字を認識して認識候補文字を出力する文字認識手段と、
この文字認識手段により出力された認識候補文字に対する変換候補文字を出力する文字変換手段と、
を更に備え、
前記表示制御手段は、前記ガイダンスウィンドウとして、前記文字認識手段により出力される認識候補文字を表示する認識候補ガイダンスウィンドウと、前記文字変換手段により出力される変換候補文字を表示する変換候補ガイダンスウィンドウと、前記表示領域に表示された文書に対する編集ガイダンスウィンドウと、を前記判別手段により判別された入力内容に応じて前記表示領域に適宜表示することを特徴とする請求項１記載の手書き文字入力装置。
【請求項３】前記表示制御手段は、前記入力内容に応じて前記ガイダンスウィンドウ全面をカラー表示、あるいは半透明カラー表示するようにしたことを特徴とする請求項１あるいは請求項２記載の手書き文字入力装置。
【請求項４】表示領域に表示された既入力文書上の指示入力位置を検出する検出手段と、
この検出手段により検出された指示入力位置近傍に、手書き入力用ウィンドウを表示する表示制御手段と、
この表示制御手段により表示された手書き入力用ウィンドウに入力された手書き文字を認識して認識候補文字を出力する文字認識手段と、
この文字認識手段により出力された認識候補文字を、前記検出手段により検出された指示入力位置に入力する文字入力手段と、
を備えたことを特徴とする手書き文字入力装置。
【請求項５】前記表示制御手段は、前記手書き入力用ウィンドウ全面を半透明表示するようにしたことを特徴とする請求項４記載の手書き文字入力装置。
【請求項６】任意の入力文字列を変換した変換候補文字や文書を表示する表示領域と、手書き入力領域とを一体的に有する入力手段と、
前記表示領域に表示された変換候補文字に対する前記手書き入力領域への手書きジェスチャー操作を検出し、そのジェスチャー操作内容を判別する判別手段と、
この判別手段により判別されたジェスチャー操作内容に対応する所定の処理を、前記変換候補文字に対して実行する処理手段と、
を備えたことを特徴とする手書き文字入力装置。
【請求項７】前記処理手段は、前記所定の処理として、前記表示領域に表示された変換候補文字を確定し、前記入力文字列に代えて前記表示領域に表示された文書上に入力する変換確定処理と、前記表示領域に表示された変換候補文字を消去する変換候補消去処理、等を前記判別手段により判別されたジェスチャー操作内容に応じて適宜実行することを特徴とする請求項６記載の手書き文字入力装置。
【請求項８】手書き入力領域を有する入力パネルと、この手書き入力領域に対応した表示領域を有する表示手段と、を備えた手書き文字入力装置におけるコンピュータが実行可能なプログラムを格納した記憶媒体であって、
前記手書き入力領域に対する手書き入力文字や、前記表示領域に表示された文書に対する指示入力を検出し、その入力内容を判別させるためのコンピュータが時刻可能なプログラムコードと、
前記判別された入力内容に対応するガイダンスウィンドウを、そのガイダンス内容に応じた表示色で、前記入力位置に対応した前記表示領域に識別表示させるためのコンピュータが実行可能なプログラムコードと、
を含むプログラムを格納したことを特徴とする記憶媒体。
【請求項９】コンピュータが実行可能なプログラムを格納した記憶媒体であって、
表示領域に表示された既入力文書上の指示入力位置を検出させるためのコンピュータが実行可能なプログラムコードと、
前記検出された指示入力位置近傍に、手書き入力用ウィンドウを表示させるためのコンピュータが実行可能なプログラムコードと、
前記表示された手書き入力用ウィンドウに入力された手書き文字を認識して認識候補文字を出力させるためのコンピュータが実行可能なプログラムコードと、
前記出力された認識候補文字を、前記検出された指示入力位置に入力させるためのコンピュータが実行可能なプログラムコードと、
を含むプログラムを格納したことを特徴とする記憶媒体。
【請求項１０】コンピュータが実行可能なプログラムを格納した記憶媒体であって、
任意の入力文字列を変換した変換候補文字や文書を表示する表示領域と、手書き入力領域とを一体的に有する入力手段と、
前記表示領域に表示された変換候補文字に対する前記手書き入力領域への手書きジェスチャー操作を検出し、そのジェスチャー操作内容を判別させるためのコンピュー

タが実行可能なプログラムコードと、
前記判別されたジェスチャー操作内容に対応する所定の処理を、前記変換候補文字に対して実行させるためのコンピュータが実行可能なプログラムコードと、
を含むプログラムを格納したことを特徴とする記憶媒体。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、表示パネルと一体的に形成されたタッチパネルに文字を手書き入力したり、入力済みの文字を編集する手書き文字入力装置及びその文字入力／編集プログラムを格納した記憶媒体に関する。

【０００２】

【従来の技術】近時、ＰＤＡ（Personal Digital Assistants ）等の携帯情報端末装置やワードプロセッサ等の情報処理装置では、入力環境として表示パネルと一体的に形成されたタッチパネルと、このタッチパネル上で専用ペンにより手書き入力される文字を認識する手書き文字認識機能と、を備えたものが普及してきており、ユーザーに対して簡便な文字入力環境を提供している。

【０００３】

【発明が解決しようとする課題】しかしながら、このような従来の手書き文字入力環境を提供する携帯情報端末装置や情報処理装置にあっては、タッチパネル上の入力領域内で予め手書き文字入力枠が設定されていたり、また、手書き入力モードへのモード切り換え操作が必要であったり、といった手書き入力機能で本来提供される自由な文字入力環境を制限するという問題があった。

【０００４】また、タッチパネル上での操作としては、手書き文字の入力の他に、入力済みの文字列の編集があり、この入力済みの文字列の編集に際しては、文字列を選択した上で、削除又はコピーしたり、新たな文字を挿入したり、書体を変更するといった作業を行う。しかし、これらの作業は、各作業に対応した入力画面または設定画面を、複数の固定したボタン等から１つのボタンを指示選択することにより別途開いて設定する必要があったため、この点についてもユーザーの操作が煩雑になり、操作性を低下させるという問題もあった。

【０００５】本発明の課題は、入力枠等のない自由な手書き文字入力を可能とするとともに、タッチパネル上で入力される文字や指示等に応じて、メニューウィンドウ等を表示することにより、ユーザーの行いたい操作を円滑に分かり易く表示して、操作性を向上させることである。

【０００６】

【課題を解決するための手段】請求項１記載の発明の手書き文字入力装置は、手書き入力領域を有する入力パネルと、この手書き入力領域に対応した表示領域を有する表示手段と、前記手書き入力領域に対する手書き入力文字や、前記表示領域に表示された文書に対する指示入力を検出し、その入力内容を判別する判別手段と、この判別手段により判別された入力内容に対応するガイダンスウィンドウを、そのガイダンス内容に応じた表示色で、前記入力位置に対応した前記表示領域に識別表示する表示制御手段と、を備えたことを特徴としている。

【０００７】この請求項１記載の発明の手書き文字入力装置によれば、入力パネルは、手書き入力領域を有し、表示手段は、この手書き入力領域に対応した表示領域を有し、判別手段は、前記手書き入力領域に対する手書き入力文字や、前記表示領域に表示された文書に対する指示入力を検出し、その入力内容を判別し、表示制御手段は、この判別手段により判別された入力内容に対応するガイダンスウィンドウを、そのガイダンス内容に応じた表示色で、前記入力位置に対応した前記表示領域に識別表示する。

【０００８】したがって、手書き入力文字や、文書に対する指示入力の内容に対応したガイダンスウィンドウが表示されるため、手書き入力文字等に付随するガイダンス内容等をユーザーに適宜表示して、操作性に優れた手書き文字入力装置を提供することができる。

【０００９】また、ガイダンスウィンドウは、そのガイダンス内容に応じた表示色で、かつ、手書き入力文字等の入力位置に対応した表示領域に識別表示されるため、ガイダンスウィンドウそれぞれを視覚的に強調することができ、ユーザーがガイダンス状態を直ちに把握することのできる、実用性に優れた手書き文字入力装置を提供することができる。

【００１０】請求項４記載の発明の手書き文字入力装置は、表示領域に表示された既入力文書上の指示入力位置を検出する検出手段と、この検出手段により検出された指示入力位置近傍に、手書き入力用ウィンドウを表示する表示制御手段と、この表示制御手段により表示された手書き入力用ウィンドウに入力された手書き文字を認識して認識候補文字を出力する文字認識手段と、この文字認識手段により出力された認識候補文字を、前記検出手段により検出された指示入力位置に入力する文字入力手段と、を備えたことを特徴としている。

【００１１】この請求項４記載の発明の手書き文字入力装置によれば、検出手段は、表示領域に表示された既入力文書上の指示入力位置を検出し、表示制御手段は、この検出手段により検出された指示入力位置近傍に、手書き入力用ウィンドウを表示し、文字認識手段は、この表示制御手段により表示された手書き入力用ウィンドウに入力された手書き文字を認識して認識候補文字を出力し、文字入力手段は、この文字認識手段により出力された認識候補文字を、前記検出手段により検出された指示入力位置に入力する。

【００１２】したがって、既入力文書上において文字の追加あるいは置換等の編集を行う際は、その編集指定位

置近傍に手書き入力用ウィンドウが表示されるので、手書き入力用ウィンドウ内に手書き文字を直ちに入力することができるとともに、その入力した手書き文字を認識した認識候補文字を編集指定位置に直ちに入力することのできる、操作性に優れた手書き文字入力装置を提供することができる。

【００１３】請求項６記載の発明の手書き文字入力装置は、任意の入力文字列を変換した変換候補文字や文書を表示する表示領域と、手書き入力領域とを一体的に有する入力手段と、前記表示領域に表示された変換候補文字に対する前記手書き入力領域への手書きジェスチャー操作を検出し、そのジェスチャー操作内容を判別する判別手段と、この判別手段により判別されたジェスチャー操作内容に対応する所定の処理を、前記変換候補文字に対して実行する処理手段と、を備えたことを特徴としている。

【００１４】この請求項６記載の発明の手書き文字入力装置によれば、入力手段は、任意の入力文字列を変換した変換候補文字や文書を表示する表示領域と、手書き入力領域とを一体的に有し、判別手段は、前記表示領域に表示された変換候補文字に対する前記手書き入力領域への手書きジェスチャー操作を検出し、そのジェスチャー操作内容を判別し、処理手段は、この判別手段により判別されたジェスチャー操作内容に対応する所定の処理を、前記変換候補文字に対して実行する。

【００１５】したがって、任意の入力文字列を変換した変換候補文字の表示上において手書きジェスチャー操作を行うだけで、その変換候補文字に対する処理を直ちに特定し、実行することのできる、実用性に優れた手書き文字入力装置を提供することができる。

【００１６】

【発明の実施の形態】以下、図を参照して本発明の実施の形態を詳細に説明する。図１～図１７は、本発明を適用した手書き文字入力装置の一実施の形態を示す図である。

【００１７】まず、構成を説明する。図１は、本発明を適用した一実施の形態における手書き文字入力装置１の構成を示すブロック図である。この図１において、手書き文字入力装置１は、ＣＰＵ２、ＲＡＭ３、ハードディスク４、手書き入力パネル５、表示部６、及びＩ／Ｆ７により構成されており、各部はバス８に接続されている。また、手書き文字入力装置１は、手書き入力パネル５と表示部６が一体的に形成され、手書き入力パネル５上の任意の位置に入力される手書き文字を文字認識し、また、表示部６に表示されるウィンドウから文字列を指示入力することにより、入力済みの文字を編集するものである。

【００１８】ＣＰＵ（Central Processing Unit ）２は、ハードディスク４内に格納された手書き文字入力処理プログラムに従って、後述する手書き文字入力処理（図４参照）を実行する。そして、ＣＰＵ２は、手書き入力パネル５上の任意位置における手書き文字の入力を検出すると、予め設定された手書き文字の認識方向（上方向、下方向、左方向、右方向）に従って、入力された各手書き文字を切り出して、ハードディスク４内の認識辞書４ａを用いて各手書き文字の文字認識を行い、各手書き文字に対する文字候補を判別して、ＲＡＭ３内の文字別バッファ３ｂに格納する。

【００１９】また、ＣＰＵ２は、半透明ブルー（青色）の認識ウィンドウ６１２を手書き入力された文字列の近傍に表示するとともに、認識ウィンドウ６１２内に各文字候補の中の最も認識率の高い文字候補を、入力された各手書き文字の認識結果として表示する。そしてさらに、認識ウィンドウ６１２に表示した認識結果の文字の中から、１つの文字が選択された場合には、ＣＰＵ２は、文字候補を変更する処理を行い、認識ウィンドウ６１２の変換ボタンが指定された場合には、認識結果の文字列を仮名漢字変換する処理を行い、認識ウィンドウ６１２内に”○”若しくは”×”と手書き入力された場合には、表示している認識結果や変換結果の確定又はキャンセルと判断してカーソル位置への文字挿入等を行う。なお、ここで説明した認識ウィンドウ６１２の表示例を、図を参照して詳細に後述する。また、以降、”○”若しくは”×”の手書き入力をジェスチャー入力、又は単にジェスチャーと呼び、このジェスチャーに係る操作をジェスチャー操作と呼ぶ。

【００２０】このように、ＣＰＵ２は、上記手書き文字入力処理を実行して、入力される手書き文字の文字認識とカーソル位置への文字挿入を繰り返し実行し、手書き入力パネル５上で手書き入力され、変換、決定された文字列を文書として、ハードディスク４内の文書ファイル４ｃに格納する。

【００２１】また、ＣＰＵ２は、ハードディスク４内に格納された既入力文字編集処理プログラムに従って、後述する既入力文字編集処理（図５参照）を実行し、表示部６に表示した入力済みの文書の中から任意の領域が選択入力されると、選択入力された領域内の背景色をピンク（桃色）として表示し、選択入力された領域内の文字列に対する編集処理の指示入力待ちとなって、半透明ピンク（桃色）の編集メニューウィンドウ６１３を表示する。そして、ＣＰＵ２は、編集メニューウィンドウ６１３から指定されたコピーや削除等の処理を実行する。

【００２２】また、編集処理の指示入力待ちの際に、編集メニューウィンドウ６１３ではなく、選択入力された領域が指示された場合には、ＣＰＵ２は、編集メニューウィンドウ６１３を消去するとともに半透明ブルーの手書き入力用ウィンドウ６１４を表示する。そして、手書き入力用ウィンドウ６１４内に新たな文字が入力されると、ＣＰＵ２は、選択入力された領域内の文字に代えて、新たに入力された文字を表示する。

【００２３】ＲＡＭ（Random Access Memory）３は、図１に示すように、文書書式メモリ３ａと、手書き文字別バッファ３ｂと、認識文字列候補バッファ３ｃと、仮名文字列候補バッファ３ｄと、変換文字列候補１バッファ３ｅと、変換文字列候補２バッファ３ｆと、変換文字列候補３バッファ３ｇと、…を備えている。各バッファには、ＣＰＵ２により手書き文字入力処理、及び既入力文字編集処理が実行される際の各種データが展開されるが、文書書式メモリ３ａには、表示部６に表示される文字等の文書書式が格納され、手書き文字別バッファ３ｂには、入力される手書き文字１文字毎のインクデータや文字候補等が格納される。また、同様にＣＰＵ２により、認識文字列候補バッファ３ｃには、各手書き文字に対応する文字候補１つずつを並べて文字列として、認識ウィンドウ６１２に表示する文字列候補（以降、認識文字列候補と呼ぶ）が格納され、仮名文字列候補バッファ３ｄには、認識文字列候補の内、仮名漢字変換するための仮名文字の文字列（以降、仮名文字列候補と呼ぶ）が格納され、変換文字列候補１バッファ３ｅには、仮名漢字変換した第１の変換文字列候補が格納され、以降同様に、変換文字列候補２バッファ３ｆには、仮名漢字変換した第２の変換文字列候補というように格納されている。

【００２４】また、手書き文字別バッファ３ｂは、図２に示すように、１文字目バッファ３ｂ－１と、２文字目バッファ３ｂ－２と、３文字目バッファ３ｂ－３と、というように、各手書き文字毎の構成となっている。手書き文字別バッファ３ｂは、ＣＰＵ２により手書き文字入力処理、及び既入力文字編集処理が実行される際に、入力される手書き文字の認識結果が確定するまで、一時的に各手書き文字のデータを格納するバッファであり、書き出し位置バッファ３ｂ－ａには各手書き文字の切り出し位置が格納され、文字パターンバッファ３ｂ－ｂには各手書き文字のインクデータが格納され、認識候補文字１バッファ３ｂ－ｃ以降には各手書き文字を文字認識した文字候補が認識率の最も高いものから降順に格納される。

【００２５】ハードディスク（ＨＤ）４は、図１に示すように、認識辞書４ａと、変換辞書４ｂと、文書ファイル４ｃとを格納しており、ＣＰＵ２により手書き文字入力処理、及び既入力文字編集処理が実行される際に利用される。また、ハードディスク４には、図示しないが手書き文字入力処理プログラムと既入力文字編集処理プログラムが格納されている。

【００２６】手書き入力パネル５は、表示部６の表示画面の上側に一体的に形成された透明のタッチパネルにより構成され、タッチパネル上で専用ペンの先端で押圧操作あるいは筆記操作される際に、その押圧位置座標あるいは座標の変化を検出してＣＰＵ２に出力する。

【００２７】表示部６は、表示画面の上側に手書き入力パネル５が一体的に形成された液晶表示パネルにより構成され、ＣＰＵ２から入力される表示データ（手書き文字、認識文字等）を表示する。

【００２８】Ｉ／Ｆ７は、所定のケーブルを介して外部の印刷装置と接続し、入力された文書を印刷するための文書イメージデータ等を送信したり、外部のパーソナルコンピュータと接続し、入力された文書をパーソナルコンピュータに送信したり、パーソナルコンピュータ内に格納された文書の受信等を行う。

【００２９】ここで、表示部６の表示画面例及び、認識ウィンドウ６１２、編集メニューウィンドウ６１３、手書き入力用ウィンドウ６１４について、図を参照して説明する。

【００３０】図３は、本発明における表示部６の表示画面の構成を示す図である。図３において、表示部６は、表示領域６１と、ガイダンスエリア６２と、メニューボタン６３と、スクロールバー６４とにより構成されている。表示領域６１は、手書き文字を入力することができ、また入力された文字が表示される領域であり、表示領域６１内には、入力された文字の挿入位置等を示すカーソル６１１が表示される。ガイダンスエリア６２には、ＣＰＵ２により実行される手書き文字入力処理（図４参照）及び既入力文字編集処理（図５参照）において、入力方法等のガイダンスが表示される。メニューボタン６３は、手書き文字入力処理や記入力文字編集処理等の他、手書き文字入力装置１が行う処理を一覧表示するためのボタンであり、表示部６上に表示され、専用ペンにより指示入力される。スクロールバー６４は、表示領域６１に表示される文章が、表示領域６１を超える量の文章である場合に表示されるスクロールバーであり、メニューボタン６３と同様、表示部６上に表示され、専用ペンによるドラッグ操作により、指示入力される。

【００３１】次に、認識ウィンドウ６１２、編集メニューウィンドウ６１３、手書き入力用ウィンドウ６１４を順次説明する。また、これらのウィンドウを総称してガイダンスウィンドウと呼ぶこととする。

【００３２】認識ウィンドウ６１２は、ＣＰＵ２により実行される手書き文字入力処理（図４参照）及び既入力文字編集処理（図５参照）において、手書き文字が入力された後、図６に示すように、手書き文字の認識結果と、変換ボタンとが併せて表示されるウィンドウである。また、認識ウィンドウ６１２は、図８に示す他の文字候補の表示、図１０に示す仮名漢字変換後の表示、図１１に示す変換した他の変換文字列候補の表示等のように、表示する項目に応じて、他のウィンドウと併せて表示されたり、変換ボタンが非表示となって表示される。このように他のウィンドウと併せて表示することを、以降、認識ウィンドウ６１２の拡張と呼ぶ。また、認識ウィンドウ６１２の背景色は半透明のブルーであり、手書き文字の入力が縦書きであった場合には、図１４に示す

ように、縦書き用のウィンドウが表示される。

【００３３】編集メニューウィンドウ６１３は、ＣＰＵ２により実行される既入力文字編集処理（図５参照）において、編集する対象の文字が選択された後に表示される背景色が半透明ピンクのウィンドウで、図１５に示すように、選択された文字に対する処理を一覧表示するウィンドウである。

【００３４】手書き入力用ウィンドウ６１４は、図１６に示す背景色が半透明ブルーのウィンドウで、ＣＰＵ２により実行される既入力文字編集処理（図５参照）において、編集対象の文字が選択された後、さらにその選択された文字が指示された場合に表示され、このウィンドウ上に入力される手書き文字を、選択された文字と置き換えるためのウィンドウである。

【００３５】次に動作を説明する。まず、ＣＰＵ２により実行される手書き文字入力処理について図４に示すフローチャートに基づいて説明する。

【００３６】図４において、ＣＰＵ２は、まず、手書き入力パネル５上での任意位置における文字の手書き入力が専用ペンにより行われると（ステップＳ１）、ハードディスク４内に格納された認識辞書４ａに基づいて各手書き文字の文字認識を行い、各文字毎に認識率の高い候補を抽出して、各文字に対する文字候補を手書き文字別バッファ３ｂに記憶する（ステップＳ２）。

【００３７】次いで、ＣＰＵ２は、文書の文字配列方向を予め設定された文書書式メモリ３ａから読み出して（ステップＳ３）、横書きの書式であれば、ステップＳ１において入力された手書き文字列の近傍に、横書き用の半透明ブルーの認識ウィンドウ６１２を表示し（ステップＳ４）、認識ウィンドウ６１２内に、認識率の最も高かった文字候補を並べて構成した認識文字列候補を表示する（ステップＳ５）。

【００３８】また、ステップＳ３において、文書が縦書きの書式であった場合には、ステップＳ１において入力された手書き文字列の近傍に、縦書き用の半透明ブルーの認識ウィンドウ６１２を表示し（ステップＳ６）、認識ウィンドウ６１２内に、認識率の最も高かった文字候補を並べて構成した認識文字列候補を表示する（ステップＳ７）。

【００３９】そして、ＣＰＵ２はユーザーによる操作入力待ちとなり（ステップＳ８）、認識ウィンドウ６１２内の変換ボタンが指示入力された場合には、認識ウィンドウ６１２に表示している認識文字列候補内の仮名文字列を、ハードディスク４内に格納されている変換辞書４ｂを用いて仮名漢字変換して、変換文字列候補を変換候補順に変換文字列候補１バッファ等に記憶する（ステップＳ９）とともに、第１の変換文字列候補を認識ウィンドウ６１２に表示する（ステップＳ１０）。また、図示しないが、この際、表示した第１の変換文字列候補を指示された場合には、他の変換文字列候補との変更と判断して、ＣＰＵ２は、他の変換文字列候補を認識ウィンドウ６１２を拡張して表示し、変換文字列候補の入れ替えを行う。そしてステップＳ１０の処理を実行後、ＣＰＵ２は、ステップＳ８に移行する。

【００４０】また、ステップＳ８において、ユーザーにより認識ウィンドウ６１２内に表示している認識文字列候補の何れかの文字が指示入力された場合には、指示された文字、即ち認識文字列候補を構成する文字候補の中で指示された文字候補、に対応する他の文字候補を手書き文字別バッファ３ｂの認識候補文字１バッファ３ｂ－ｃ等から読み出して、認識ウィンドウ６１２を拡張して表示する（ステップＳ１１）。そして、ユーザーにより他の文字候補が指示された場合には、ＣＰＵ２は、指示された文字候補と入れ替えた認識文字列候補を認識ウィンドウ６１２に表示して、認識ウィンドウ６１２の拡張表示部分を消去し、ステップＳ８に移行する。

【００４１】また、ステップＳ８において、ユーザーにより認識ウィンドウ６１２内にジェスチャー入力がなされた場合には（ステップＳ１２）、そのジェスチャーが”○”であれば、認識ウィンドウ６１２に表示されている文字列を、入力する文字列としてカーソル６１１の位置に挿入して表示領域６１内に表示する（ステップＳ１３）。ジェスチャーが”×”であった場合、及びステップＳ１３の処理の後、ＣＰＵ２は、ステップＳ１において入力された手書き文字と、認識ウィンドウ６１２を消去して（ステップＳ１４）、手書き文字入力処理を終了する。

【００４２】また、ステップＳ８において、ユーザーにより、認識ウィンドウ６１２内の変換ボタンの指示、認識ウィンドウ６１２内に表示している認識文字列候補の何れかの文字の指示、認識ウィンドウ６１２内のジェスチャー入力、の何れにも該当しない入力がなされた場合には、ＣＰＵ２は、ステップＳ８に移行して、上記何れかの入力がなされるまで、ユーザーによる操作入力待ちとなる。

【００４３】次に、ＣＰＵ２により実行される既入力文字編集処理について図５に示すフローチャートに基づいて説明する。

【００４４】図５において、ＣＰＵ２は、まず、表示部６の表示領域６１に表示された入力済みの文章の任意位置に専用ペンでチェックされると（ステップＳ２１）、チェックされた位置にカーソル６１１を移動する（ステップＳ２２）。そして、さらに、専用ペンによりドラッグされて文字領域が選択されると（ステップＳ２３）、ＣＰＵ２は、選択された領域内の背景色をピンク色として表示する（ステップＳ２４）。

【００４５】次いで、ＣＰＵ２は、選択された領域の近傍に、半透明ピンクの編集メニューウィンドウ６１３を表示して（ステップＳ２５）、ユーザーによる操作入力待ちとなる（ステップＳ２６）。

【００４６】そして、編集メニューウィンドウ６１３内のメニューの何れかが選択された場合には、ＣＰＵ２は、選択されたメニューに従って、ステップＳ２３において選択された領域内の文字に対する処理を行う（ステップＳ２７）。例えば、「削除」が選択された場合には、ステップＳ２３において選択された領域内の文字を削除する。そして、ＣＰＵ２は、編集メニューウィンドウ６１３を消去して、既入力文字編集処理を終了する。

【００４７】また、ステップＳ２６において、編集メニューウィンドウ６１３ではなく、ステップＳ２３において選択された領域がユーザーにより指示された場合には、ＣＰＵ２は、編集メニューウィンドウ６１３を消去して（ステップＳ２８）、ステップＳ２３において選択された領域の下側、若しくは上側に、半透明ブルーの手書き入力用ウィンドウ６１４を表示して（ステップＳ２９）、ユーザーによる操作入力待ちとなる（ステップＳ３１）。

【００４８】また、ステップＳ２６において、編集メニューウィンドウ６１３や、ステップＳ２３において選択された領域以外の位置が専用ペンにより指示入力された場合には、ＣＰＵ２は、選択された領域に対する処理のキャンセルと判断して、編集メニューウィンドウ６１３を消去し（ステップＳ３０）、ステップＳ２１に移行する。

【００４９】ステップＳ３１におけるユーザーによる操作入力待ちとなった後、手書き入力用ウィンドウ６１４内に手書き文字の入力が専用ペンにより行われると（ステップＳ３２）、ＣＰＵ２は、手書き文字入力処理（図４）のステップＳ２～Ｓ１４までの動作と同様な処理を行って、手書き文字の文字認識、及び仮名漢字変換を行う。具体的には、まず、ハードディスク４内に格納された認識辞書４ａに基づいて、入力された各手書き文字の文字認識を行って（ステップＳ３４）、半透明ブルーの認識ウィンドウ６１２を表示するとともに、認識ウィンドウ６１２内に認識文字列候補を表示する。

【００５０】以降は、手書き文字入力処理（図４）と同様であるため、図示しないが、ジェスチャー入力がなされた後（ステップＳ３５）、そのジェスチャーが”○”であれば、ＣＰＵ２は、認識ウィンドウ６１２内に表示されている文字列を、ステップＳ２３において選択された領域内の文字に代えて、表示領域６１内の文章を再表示する（ステップＳ３７）。ジェスチャー入力が”×”であった場合、及びステップＳ３７の後、ＣＰＵ２は、入力された手書き文字と、手書き入力用ウィンドウ６１４、及び認識ウィンドウ６１２を消去して、既入力文字編集処理を終了する。

【００５１】また、ステップＳ３１において、ステップＳ２３にて選択された領域が指示入力された場合には、ＣＰＵ２は、手書き入力用ウィンドウ６１４を消去して（ステップＳ３９）、ステップＳ２５に移行する。

【００５２】また、ステップＳ３１において、手書き入力用ウィンドウ６１４や、ステップＳ２３にて選択された領域以外の位置が専用ペンにより指示入力された場合には、ＣＰＵ２は、選択された領域に対する処理のキャンセルと判断して、手書き入力用ウィンドウ６１４を消去し（ステップＳ４０）、ステップＳ２１に移行する。

【００５３】以上の手書き文字入力処理と、既入力文字編集処理とに基づく、手書き入力パネル５における手書き入力動作と、この手書き入力動作に応じた表示部６における表示動作について図６～図１７を参照して説明する。

【００５４】図6は、手書き入力パネル５上に入力されて表示部６の表示領域６１に表示された手書き文字と、その認識結果が表示された認識ウィンドウ６１２と、ガイダンスエリア６２に表示されたガイダンスと、の関係の一例を示した図である。図６において、①のように手書き文字列「はいけい」が入力されると、②のように、入力された各手書き文字に対する認識結果として認識文字列候補「はハけい」が認識ウィンドウ６１２とともに表示される。また、この際にガイダンスエリア６２には、ガイダンスとして「●確定は「○」でカーソル部分に書き込まれます。●文字認識が違う時は間違っている文字を触ってください。●漢字に変換するには、「変換」を触ってください。」が表示される。

【００５５】図7は、手書き入力パネル５上に入力されて表示領域６１に表示された手書き文字と、認識ウィンドウ６１２に表示された認識文字列候補の内の１文字が選択された認識ウィンドウ６１２と、ガイダンスエリア６２に表示されたガイダンスと、の関係の一例を示した図である。図７において、入力された各手書き文字は「はいけい」であり、認識結果は「はハけい」である。このため、認識結果の２文字目「ハ」が異なって認識されたとして、ユーザーにより「ハ」が指定され、反転表示されている。また、この際にガイダンスエリア６２には、図６と同様のガイダンスが表示される。

【００５６】図8は、手書き入力パネル５上に入力されて表示領域６１に表示された手書き文字と、図７において指定された認識文字列候補の内の１文字に対応する他の文字候補を表示した拡張された認識ウィンドウ６１２と、ガイダンスエリア６２に表示されたガイダンスと、の関係の一例を示した図である。図８において、入力された手書き文字は、拡張された認識ウィンドウ６１２の下に表示されており、認識ウィンドウ６１２は、図７にて異なる認識結果としてユーザーにより指定された「ハ」に対応する他の文字候補を、認識ウィンドウ６１２を拡張して表示している。また、この際にガイダンスエリア６２には、「●文字認識の候補の中から、正しい文字を選んでください。」が表示される。

【００５７】図9は、手書き入力パネル５上に入力されて表示領域６１に表示された手書き文字と、図８におい

て指定された文字候補を含む認識文字列候補を表示した認識ウィンドウ６１２と、ガイダンスエリア６２に表示されたガイダンスと、の関係の一例を示した図である。図９において、認識ウィンドウ６１２は、図８にて指定された他の文字候補と入れ替えて、入力された手書き文字「はいけい」に対する正しい認識結果を認識文字列候補「はいけい」として表示している。また、認識ウィンドウ６１２は、変換ボタンがユーザーにより指示入力されたため、反転表示されている。また、この際にガイダンスエリア６２に表示されるガイダンスは、図６と同様である。

【００５８】図１０は、手書き入力パネル５上に入力されて表示領域６１に表示された手書き文字と、図９において変換ボタンが指示入力された後の認識ウィンドウ６１２と、ガイダンスエリア６２に表示されたガイダンスと、の関係の一例を示した図である。図１０において、認識ウィンドウ６１２は、図９にて認識ウィンドウ６１２上に表示した認識文字列候補「はいけい」を仮名漢字変換した結果、第１の候補となった「背景」が表示された状態である。また、認識ウィンドウ６１２の変換ボタンは消去されている。また、この際にガイダンスエリア６２には、「●確定は「○」でカーソル部分に書き込まれます。●漢字変換が間違っていたら、違う文字を触ってください。●キャンセルは「×」です。」が表示される。

【００５９】図１１は、手書き入力パネル５上に入力されて表示領域６１に表示された手書き文字と、図１０において変換した結果の変換文字列候補の他の変換文字列候補を表示した拡張された認識ウィンドウ６１２と、ガイダンスエリア６２に表示されたガイダンスと、の関係の一例を示した図である。図１１において、入力された手書き文字は、拡張された認識ウィンドウ６１２の下に表示されており、認識ウィンドウ６１２は、図１０にて変換した結果の変換文字列候補「背景」が間違っていた旨の指定がユーザーにより入力され、他の変換文字列候補「拝啓」、「ハイケイ」、「はいけい」、「　　」を、認識ウィンドウ６１２を拡張して表示している。また、この際にガイダンスエリア６２には、「●変換候補から漢字を選んでください。●手順を一つ戻すには「×」を書いて下さい。」が表示される。

【００６０】図１２は、手書き入力パネル５上に入力されて表示領域６１に表示された手書き文字と、図１１において他の変換文字列候補が指定された場合の認識ウィンドウ６１２と、カーソル６１１と、ガイダンスエリア６２に表示されたガイダンスと、の関係の一例を示した図である。図１２において、❶は、認識ウィンドウ６１２が、図１１にて指定された変換文字列候補「拝啓」を表示し、さらにユーザーにより変換文字列候補の確定を示す「○」のジェスチャー入力がなされた状態を示している。❷は、「○」のジェスチャー入力がなされた場合に、カーソル６１１の位置に「拝啓」が挿入された状態を示している。また、この際にガイダンスエリア６２には、「●確定は「○」でカーソル部分に書き込まれます。●文字認識が違う時は間違っている文字を触ってください。●漢字に変換するには「変換」を触ってください。」が表示される。

【００６１】図１３は、手書き入力パネル５上に入力されて表示領域６１に表示された手書き文字と、図１１において他の変換文字列候補が指定された場合の認識ウィンドウ６１２と、ガイダンスエリア６２に表示されたガイダンスと、の関係の一例を示した図である。図１３において、認識ウィンドウ６１２は、図１１にて指定された変換文字列候補「拝啓」を表示し、さらにユーザーによりキャンセルを示す「×」のジェスチャー入力がなされた状態を示している。また、この際にガイダンスエリア６２には、「●確定は「○」でカーソル部分に書き込まれます。●漢字変換が間違っていたら、違う文字を触ってください。●キャンセルは「×」です。」が表示される。

【００６２】図１４は、手書き入力パネル５上に縦書きに入力されて表示領域６１に表示された手書き文字と、入力された手書き文字を文字認識した結果が表示された縦書き用認識ウィンドウ６１２と、ガイダンスエリア６２に表示されたガイダンスと、の関係の一例を示した図である。図１４において、縦書き用認識ウィンドウ６１２は、手書き文字の入力が縦書きで行われた場合に、文字認識の結果を縦書きに表示するウィンドウである。また、この際にガイダンスエリア６２には、「●文字認識が違う時は間違っている文字をさわってください。●漢字に変換するには「変換」を触ってください。」が表示される。

【００６３】図１５は、表示領域６１に表示された入力済みの文章と、ユーザーにより編集するために領域が選択された文字列６１１ａと、編集メニューウィンドウ６１３と、ガイダンスエリア６２に表示されたガイダンスと、の関係の一例を示した図である。図１５において、ユーザーが専用ペンにより、表示領域６１に表示された入力済みの文章の中から、編集する領域を選択すると、その選択された領域内の文字列６１１ａの背景色がピンクとして表示され、さらに、編集するメニューボタンを表示した編集メニューウィンドウ６１３が表示された状態を示している。また、この際にガイダンスエリア６２には、ガイダンスとして「●選択部分をもう一度触ると「文字入力」になります。●選択部分をドラッグすると、移動ができます。」が表示される。

【００６４】図１６は、表示領域６１に表示された入力済みの文章と、ユーザーにより編集のために選択された文字列６１１ａと、半透明ブルーの手書き入力用ウィンドウ６１４上に入力された手書き文字と、ガイダンスエリア６２に表示されたガイダンスと、の関係の一例を示

した図である。また、図16は、ユーザーにより編集する領域が選択され、その選択された領域内の文字列611aである「マッチ」の背景色がピンクとして表示され、さらに、ユーザーにより文字列611aが指示入力された場合に表示される手書き入力用ウィンドウ614上に「ストローク」が手書き入力された状態を示している。また、この際にガイダンスエリア62には、ガイダンスとして「●青い枠内ならどこでも書き出せます。●選択部分をもう一度触ると「編集」になります。」が表示される。

【0065】図17は、表示領域61に表示された入力済みの文章と、ユーザーにより編集のために選択された文字列611aと、半透明ブルーの手書き入力用ウィンドウ614上に入力された手書き文字と、その手書き入力用ウィンドウ614上に入力された手書き文字の文字認識結果を表示する認識ウィンドウ612と、ガイダンスエリア62に表示されたガイダンスと、の関係の一例を示した図である。また、図17は、図16において手書き入力用ウィンドウ614上に手書き入力された文字「ストローク」が文字認識され、文字認識された結果が認識ウィンドウ612に表示されて、さらに、ユーザーによりジェスチャー入力「○」が入力された状態を示している。また、この際にガイダンスエリア62には、ガイダンスとして「●確定は「○」でカーソル部分に書き込まれます。●文字認識が違う時は間違っている文字を触ってください。●漢字に変換するには「変換」を触ってください。」が表示される。

【0066】以上のように、本発明を適用した手書き文字入力装置1では、ユーザーにより手書き入力用パネル5上の任意の位置に手書き文字が入力されると、CPU2が、入力された手書き文字の方向に応じて、半透明ブルーの縦書き用又は横書き用の認識ウィンドウ612を表示する。この認識ウィンドウ612は、入力された手書き文字の文字認識結果や、認識結果の変更、認識結果の文字列による仮名漢字変換を行うためのウィンドウであり、認識結果や変換文字列候補の確定やキャンセルが「○」又は「×」の手書き入力によって行われる。また、CPU2は、ユーザーにより表示部6に表示された文章の中から任意の領域が選択指定されると、指定された領域内の文字列の背景色をピンクとして表示するとともに、指定された文字列に対する編集処理を開始する。そして、CPU2は、編集用のメニューを表示した半透明ピンクの編集メニューウィンドウ613や、指定された文字列と交換する文字列を入力するための半透明ブルーの手書き入力用ウィンドウ614等を表示する。

【0067】したがって、入力枠等のない手書き入力パネル5上で任意の位置に手書き文字を入力することができ、また、入力された手書き文字に対する認識結果の表示や仮名漢字変換等の、手書き文字に付随する処理を一括して行うウィンドウを表示するため、手書き文字に付随する処理をユーザーに分かり易く表示して、操作性に優れた手書き文字入力装置を提供することができる。また、このウィンドウ内に表示される認識結果や、変換後の漢字の確定、処理のキャンセル等は、「○」又は「×」の手書き入力によって行うことができるため、ユーザーは容易に処理結果の正否を入力することができる。

【0068】また、この手書き文字に付随する処理を行うためのウィンドウは、手書き文字が縦書きか横書きかに応じて縦書き用若しくは横書き用のウィンドウが表示されるため、文字認識結果等を確認するための視認性を向上させることができる。

【0069】また、入力済みの文字列を編集するためには、編集対象の文字列の領域を専用ペンで指定することにより、編集メニュー用のウィンドウや、置き換える文字列を入力するための文字入力用のウィンドウが表示される。このため、手書き文字の入力と同様な入力／指定方法により、編集対象の文字列の選択や、行いたい編集処理の選択を行うことができるため、手書き文字の入力と同様の一貫した操作方法による、編集作業の円滑、かつ容易な操作性を実現することができ、実用性に優れた手書き文字入力装置を提供することができる。

【0070】また、上記各ウィンドウの色は、手書き文字に付随する処理を行うウィンドウか、編集のためのウィンドウかによって異なるため、現在実行中の処理は何かをユーザーに直感的に訴えるとともに、半透明であるため、ウィンドウの下に文字が隠れてしまうことがなく、視認性を向上させることが可能である。

【0071】なお、上記実施の形態では、CPU2により実行される既入力文字編集処理（図5参照）において、ユーザーが文字領域を選択した後、領域内の文字列と、手書き入力用ウィンドウ614に入力された文字とを入れ替えることとして説明したが、ユーザーが単に位置だけ指定した後、手書き入力用ウィンドウ614に入力された文字を挿入することとしても良い。

【0072】

【発明の効果】請求項1及び請求項8記載の発明によれば、手書き入力文字や、文書に対する指示入力の内容に対応したガイダンスウィンドウが表示されるため、手書き入力文字等に付随するガイダンス内容等をユーザーに適宜表示して、操作性に優れた手書き文字入力装置を提供することができる。また、ガイダンスウィンドウは、そのガイダンス内容に応じた表示色で、かつ、手書き入力文字等の入力位置に対応した表示領域に識別表示されるため、ガイダンスウィンドウそれぞれを視覚的に強調することができ、ユーザーがガイダンス内容を直ちに把握することのできる、実用性に優れた手書き文字入力装置を提供することができる。

【0073】請求項2記載の発明によれば、請求項1記載の発明の効果に加えて、手書き文字に対する認識候補

文字の表示や、変換候補文字の表示、及び文書に対する編集に対応するガイダンスウィンドウが、入力された内容に応じて適宜表示されるため、手書き文字に付随する処理等をその処理毎にユーザーに分かり易く表示することのできる、操作性に優れた手書き文字入力装置を提供することができる。

【００７４】請求項３記載の発明によれば、請求項１又は請求項２記載の発明の効果に加えて、ウィンドウ全面がカラー表示されるため、より視覚効果が高く、また、ウィンドウ全面が半透明であるため、ガイダンスの為のウィンドウ表示によってその下の位置に表示されている文字や文書等が隠れてしまうことがなくなり、ウィンドウ表示後であってもその下の文字、文書等を確認することのできる、実用性に優れた手書き文字入力装置を提供することができる。

【００７５】請求項４及び請求項９記載の発明によれば、既入力文書上において文字の追加あるいは置換等の編集を行う際は、その編集指定位置近傍に手書き入力用ウィンドウが表示されるので、手書き入力用ウィンドウ内に手書き文字を直ちに入力することができるとともに、その入力した手書き文字を認識した認識候補文字を編集指定位置に直ちに入力することのできる、操作性に優れた手書き文字入力装置を提供することができる。

【００７６】請求項５記載の発明によれば、請求項４記載の発明の効果に加えて、手書き入力用ウィンドウ全面が半透明であるため、手書き入力用ウィンドウの表示によってその下の位置に表示されている文字や文書等が隠れてしまうことがなくなり、手書き入力用ウィンドウ表示後であってもその下の文字、文書等を確認することのできる、実用性に優れた手書き文字入力装置を提供することができる。

【００７７】請求項６及び請求項１０記載の発明によれば、任意の入力文字列を変換した変換候補文字の表示上において手書きジェスチャー操作を行うだけで、その変換候補文字に対する処理を直ちに特定し、実行することのできる、実用性に優れた手書き文字入力装置を提供することができる。

【００７８】請求項７記載の発明によれば、請求項６記載の発明の効果に加えて、変換候補文字の確定や、表示されている変換候補文字の消去を、ジェスチャー操作によって行うことができるため、ユーザーは容易に変換結果の正否を入力することができる。

【図面の簡単な説明】

【図１】本発明を適用した一実施の形態における手書き文字入力装置１の構成を示すブロック図である。

【図２】図１のＲＡＭ３内に格納される手書き文字別バッファ３ｂのメモリ構成を示す図である。

【図３】図１の表示部６に表示される表示画面の構成を示す図である。

【図４】図１のＣＰＵ２により実行される手書き文字入力処理を示すフローチャートである。

【図５】図１のＣＰＵ２により実行される既入力文字編集処理を示すフローチャートである。

【図６】図１の手書き文字入力装置１の手書き入力パネル５上に入力されて表示部６の表示領域６１に表示された手書き文字と、その認識結果が表示された認識ウィンドウ６１２と、ガイダンスエリア６２に表示されたガイダンスと、の関係の一例を示す図である。

【図７】図１の手書き文字入力装置１の手書き入力パネル５上に入力されて表示領域６１に表示された手書き文字と、認識ウィンドウ６１２に表示された認識文字列候補の内の１文字が選択された認識ウィンドウ６１２と、ガイダンスエリア６２に表示されたガイダンスと、の関係の一例を示す図である。

【図８】図１の手書き文字入力装置１の手書き入力パネル５上に入力されて表示領域６１に表示された手書き文字と、図７において指定された認識文字列候補の内の１文字に対応する他の文字候補を表示した拡張された認識ウィンドウ６１２と、ガイダンスエリア６２に表示されたガイダンスと、の関係の一例を示す図である。

【図９】図１の手書き文字入力装置１の手書き入力パネル５上に入力されて表示領域６１に表示された手書き文字と、図８において指定された文字候補を含む認識文字列候補を表示した認識ウィンドウ６１２と、ガイダンスエリア６２に表示されたガイダンスと、の関係の一例を示す図である。

【図１０】図１の手書き文字入力装置１の手書き入力パネル５上に入力されて表示領域６１に表示された手書き文字と、図９において変換ボタンが指示入力された後の認識ウィンドウ６１２と、ガイダンスエリア６２に表示されたガイダンスと、の関係の一例を示す図である。

【図１１】図１の手書き文字入力装置１の手書き入力パネル５上に入力されて表示領域６１に表示された手書き文字と、図１０において変換した結果の変換文字列候補の他の変換文字列候補を表示した拡張された認識ウィンドウ６１２と、ガイダンスエリア６２に表示されたガイダンスと、の関係の一例を示す図である。

【図１２】図１の手書き文字入力装置１の手書き入力パネル５上に入力されて表示領域６１に表示された手書き文字と、図１１において他の変換文字列候補が指定された場合の認識ウィンドウ６１２と、カーソル６１１と、ガイダンスエリア６２に表示されたガイダンスと、の関係の一例を示す図である。

【図１３】図１の手書き文字入力装置１の手書き入力パネル５上に入力されて表示領域６１に表示された手書き文字と、図１１において他の変換文字列候補が指定された場合の認識ウィンドウ６１２と、ガイダンスエリア６２に表示されたガイダンスと、の関係の一例を示す図である。

【図１４】図１の手書き文字入力装置１の手書き入力パ

ネル５上に縦書きに入力されて表示領域６１に表示された手書き文字と、入力された手書き文字を文字認識した結果が表示された縦書き用認識ウィンドウ６１２と、ガイダンスエリア６２に表示されたガイダンスと、の関係の一例を示す図である。

【図１５】図１の手書き文字入力装置１の表示領域６１に表示された入力済みの文章と、ユーザーにより編集するために領域が選択された文字列６１１ａと、編集メニューウィンドウ６１３と、ガイダンスエリア６２に表示されたガイダンスと、の関係の一例を示す図である。

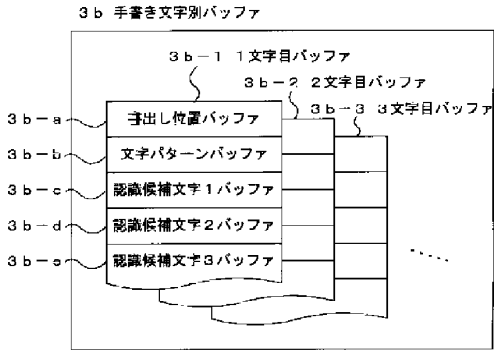
【図１６】図１の手書き文字入力装置１の表示領域６１に表示された入力済みの文章と、ユーザーにより編集のために選択された文字列６１１ａと、半透明ブルーの手書き入力用ウィンドウ６１４上に入力された手書き文字と、ガイダンスエリア６２に表示されたガイダンスと、の関係の一例を示す図である。

【図１７】図１の手書き文字入力装置１の表示領域６１に表示された入力済みの文章と、ユーザーにより編集のために選択された文字列６１１ａと、半透明ブルーの手書き入力用ウィンドウ６１４上に入力された手書き文字と、その手書き入力用ウィンドウ６１４上に入力された手書き文字の文字認識結果を表示する認識ウィンドウ６１２と、ガイダンスエリア６２に表示されたガイダンスと、の関係の一例を示す図である。

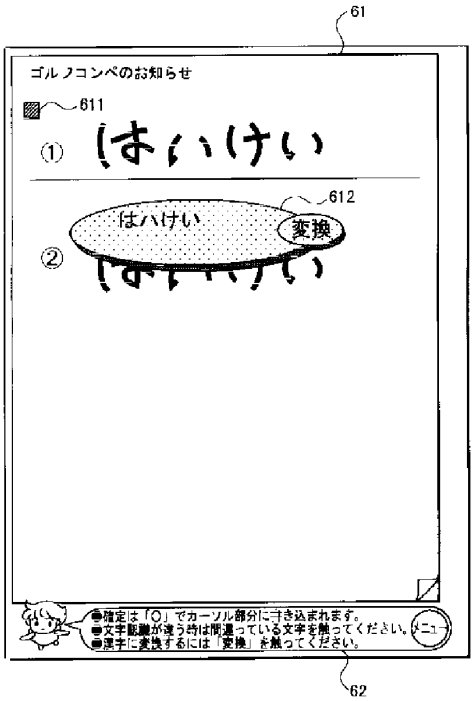
【符号の説明】

１　手書き文字入力装置
２　ＣＰＵ
３　ＲＡＭ
３ａ　文書書式メモリ
３ｂ　手書き文字別バッファ
３ｃ　認識文字列候補バッファ
３ｄ　仮名文字列候補バッファ
３ｅ　変換文字列候補１バッファ
３ｆ　変換文字列候補２バッファ
３ｇ　変換文字列候補３バッファ
４　ハードディスク
５　手書き入力パネル
６　表示部
６１　表示領域
６１１　カーソル
６１２　認識ウィンドウ
６１３　編集メニューウィンドウ
６１４　手書き入力用ウィンドウ
６２　ガイダンスエリア
６３　メニューボタン
６４　スクロールバー
７　Ｉ／Ｆ
８　バス

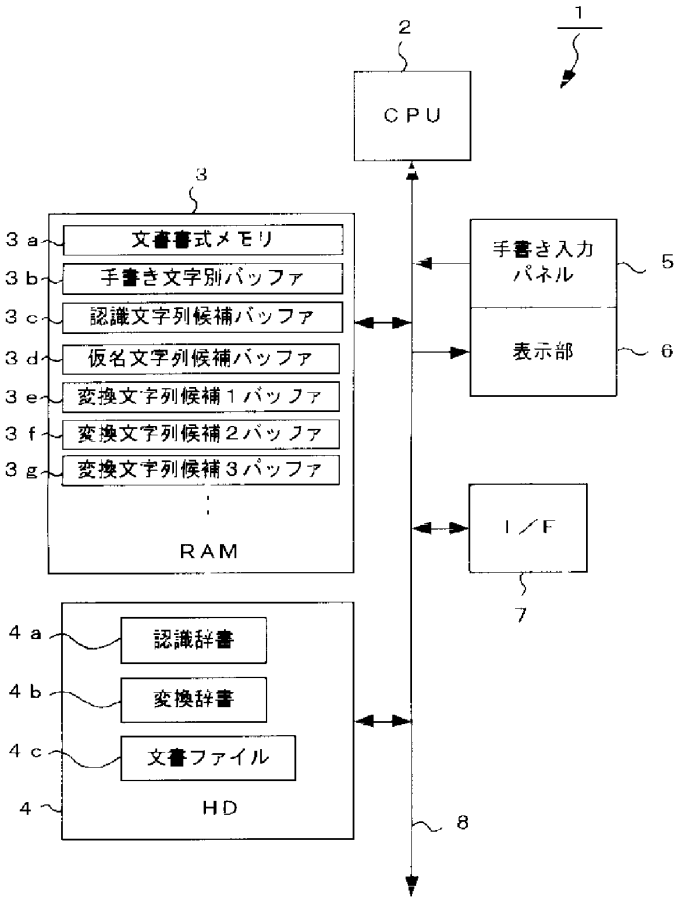
【図２】



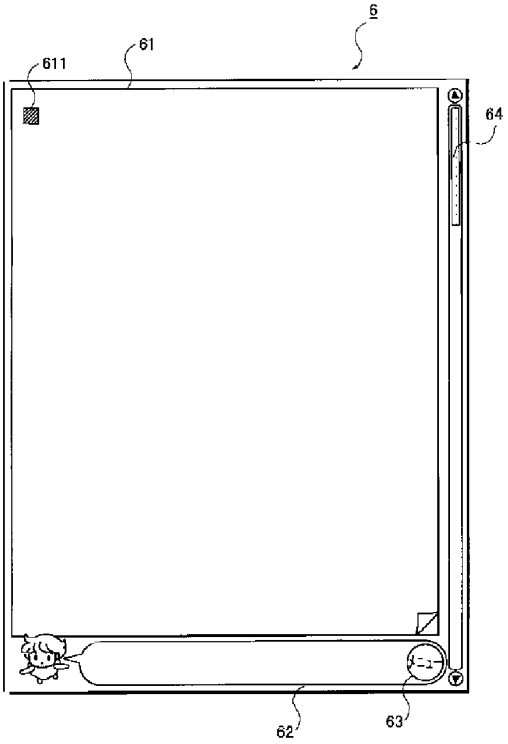
【図６】



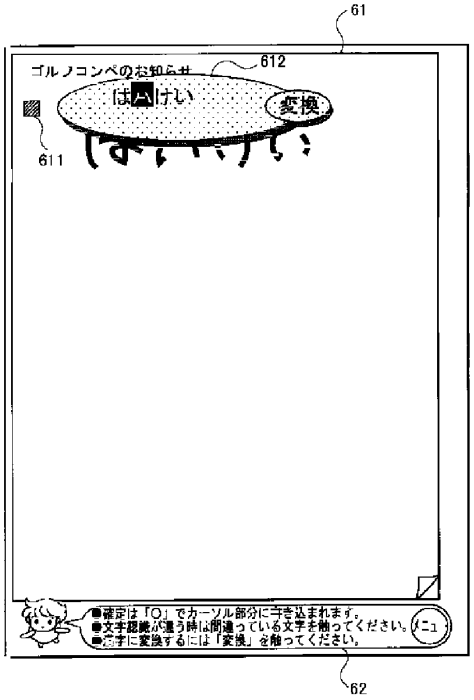
【図１】


1
2
CPU
3
3a
文書書式メモリ
3b
手書き文字別バッファ
3c
認識文字列候補バッファ
3d
仮名文字列候補バッファ
3e
変換文字列候補１バッファ
3f
変換文字列候補２バッファ
3g
変換文字列候補３バッファ
RAM
手書き入力パネル
5
表示部
6
I／F
7
4a
認識辞書
4b
変換辞書
4c
文書ファイル
4
HD
8

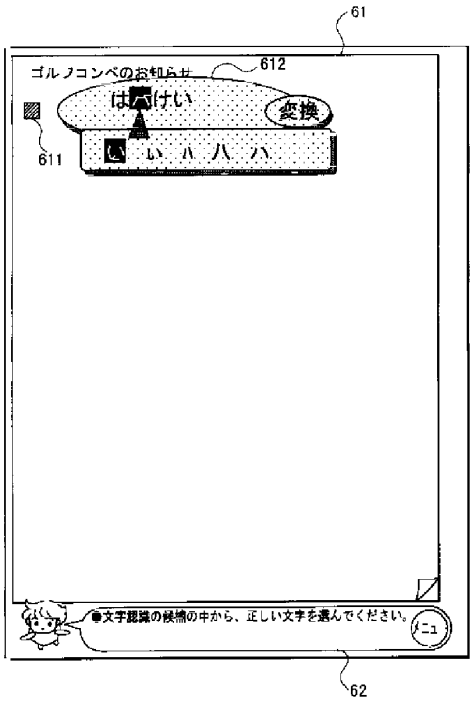
【図３】


6
61
611
64
メニュー
62
63

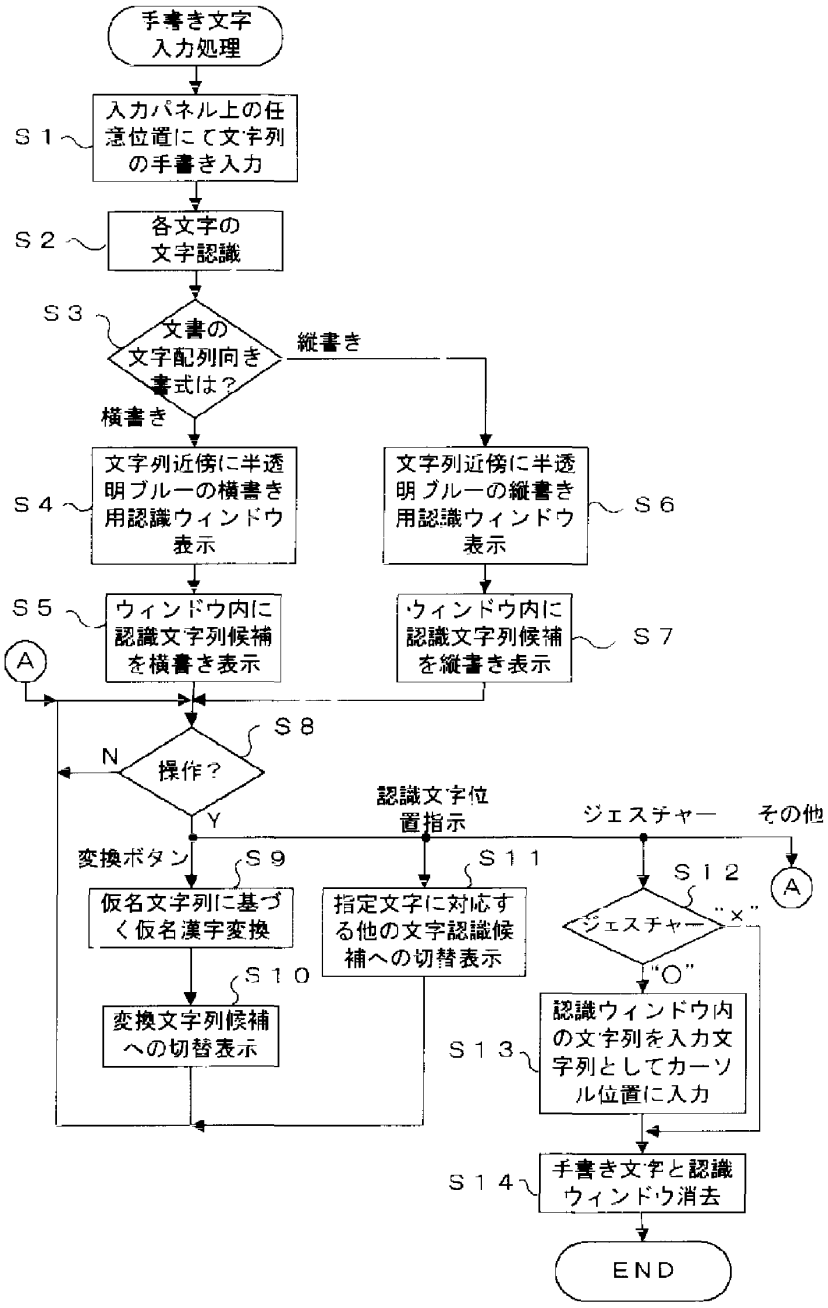
【図７】


61
ゴルフコンペのお知らせ
612
変換
611
■確定は「0」でカーソル部分に字き込まれます。
■文字認識が違う時は間違っている文字を触ってください。
■○字に変換するには「変換」を触ってください。
メニュー
62

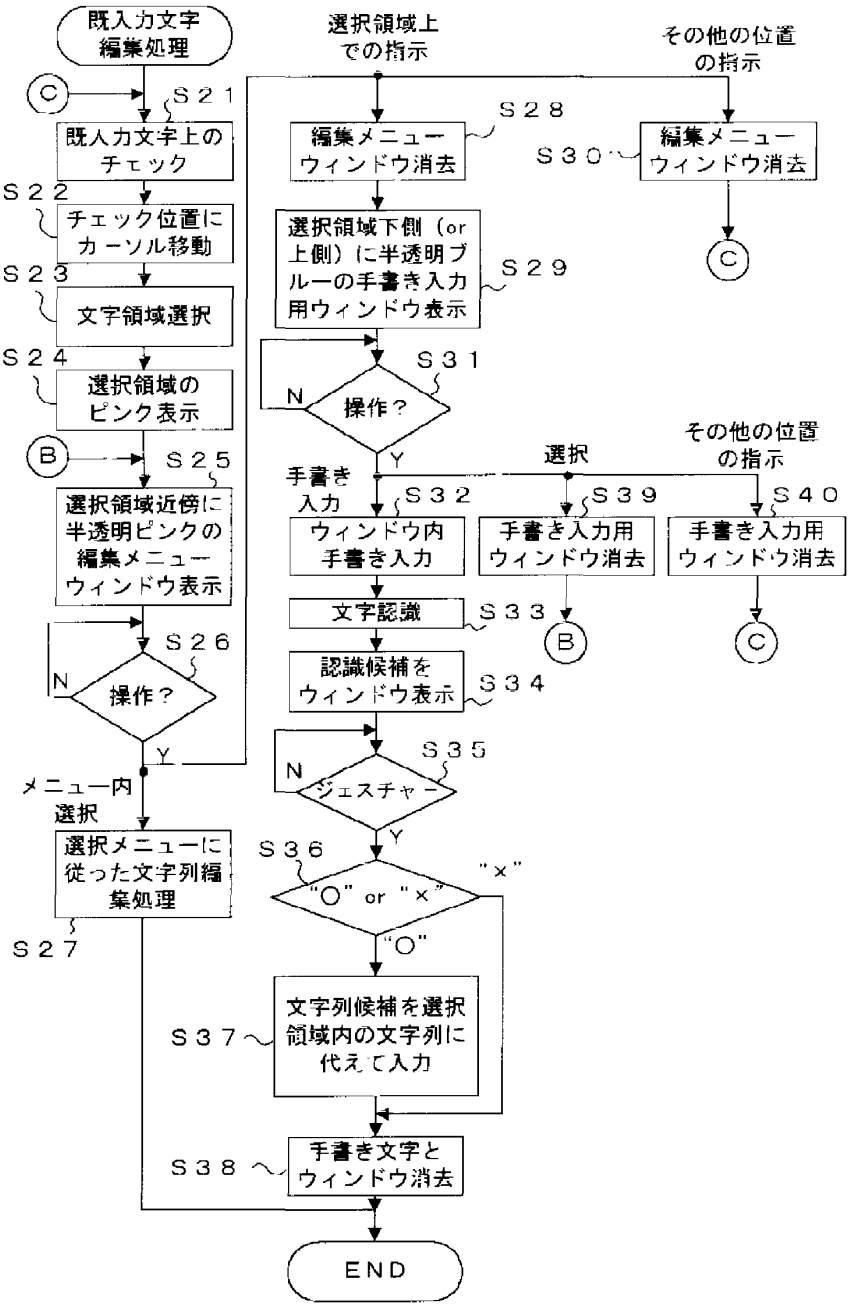
【図８】


61
ゴルフコンペのお知らせ
612
変換
611
■文字認識の候補の中から、正しい文字を選んでください。
メニュー
62

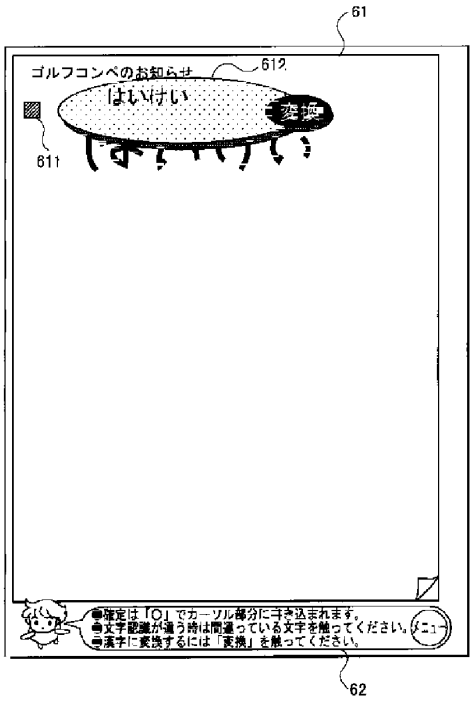
【図4】


手書き文字入力処理
S1
入力パネル上の任意位置にて文字列の手書き入力
S2
各文字の文字認識
S3
文書の文字配列向き書式は？
縦書き
横書き
S4
文字列近傍に半透明ブルーの横書き用認識ウィンドウ表示
S6
文字列近傍に半透明ブルーの縦書き用認識ウィンドウ表示
S5
ウィンドウ内に認識文字列候補を横書き表示
S7
ウィンドウ内に認識文字列候補を縦書き表示
A
S8
N
操作？
Y
認識文字位置指示
ジェスチャー
その他
変換ボタン
S9
仮名文字列に基づく仮名漢字変換
S10
変換文字列候補への切替表示
S11
指定文字に対応する他の文字認識候補への切替表示
S12
ジェスチャー
"×"
"○"
A
S13
認識ウィンドウ内の文字列を入力文字列としてカーソル位置に入力
S14
手書き文字と認識ウィンドウ消去
END

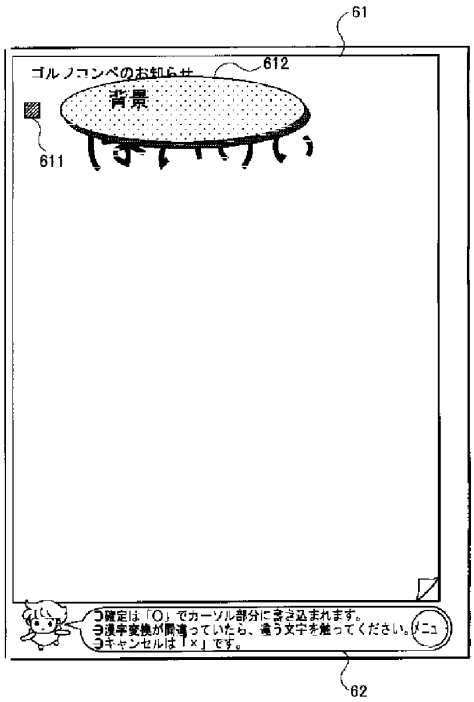
【図5】


既入力文字編集処理
C
S21
既入力文字上のチェック
S22
チェック位置にカーソル移動
S23
文字領域選択
S24
選択領域のピンク表示
B
S25
選択領域近傍に半透明ピンクの編集メニューウィンドウ表示
S26
操作？
N
Y
メニュー内選択
選択メニューに従った文字列編集処理
S27
選択領域上での指示
その他の位置の指示
S28
編集メニューウィンドウ消去
S30
編集メニューウィンドウ消去
C
選択領域下側（or上側）に半透明ブルーの手書き入力用ウィンドウ表示
S29
S31
操作？
N
Y
手書き入力
選択
その他の位置の指示
S32
S39
S40
ウィンドウ内手書き入力
手書き入力用ウィンドウ消去
手書き入力用ウィンドウ消去
文字認識
S33
B
C
認識候補をウィンドウ表示
S34
S35
ジェスチャー
N
Y
S36
"O" or "×"
"×"
"O"
文字列候補を選択領域内の文字列に代えて入力
S37
手書き文字とウィンドウ消去
S38
END

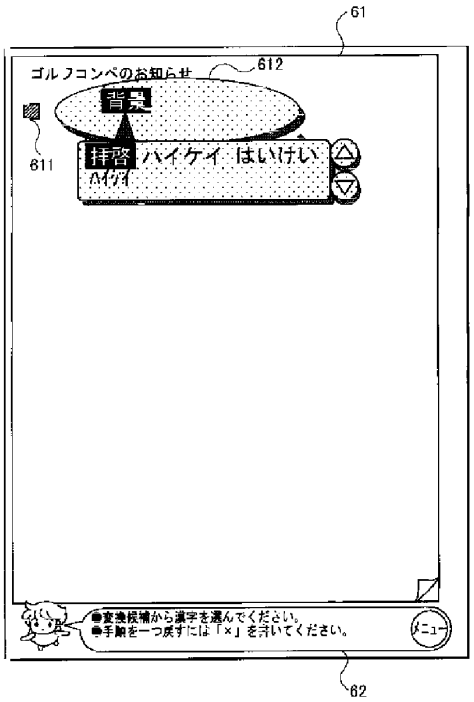
【図９】



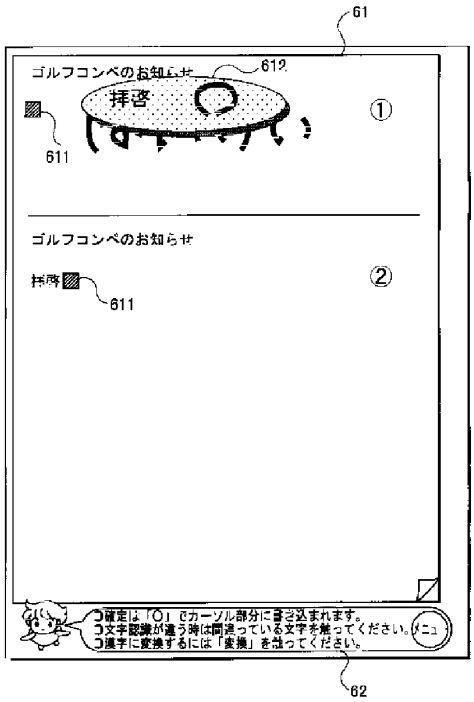
【図１０】



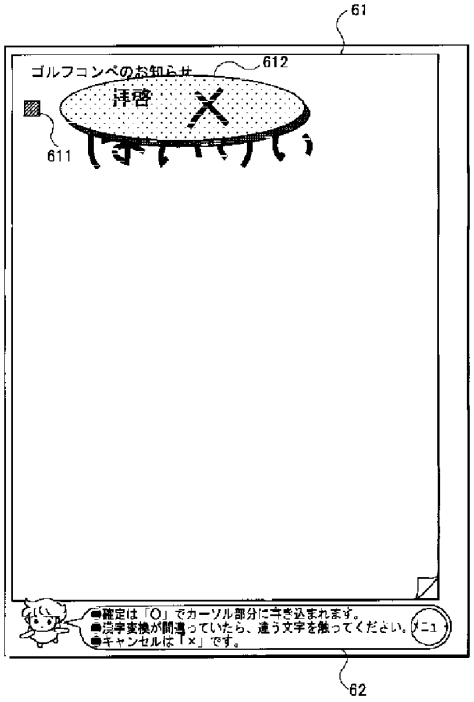
【図１１】



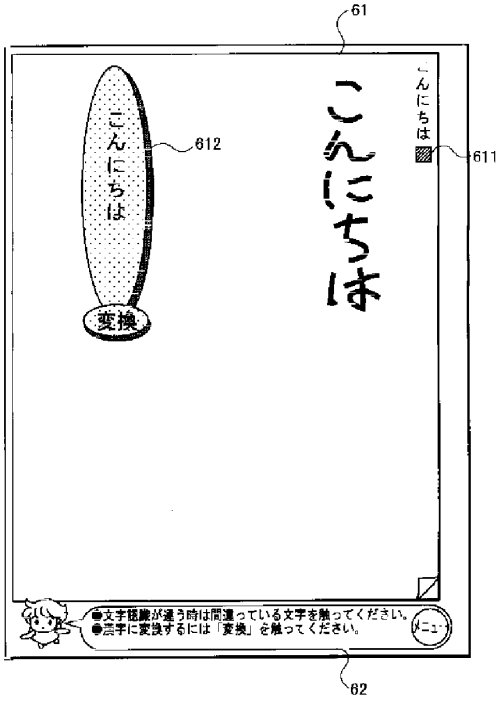
【図１２】



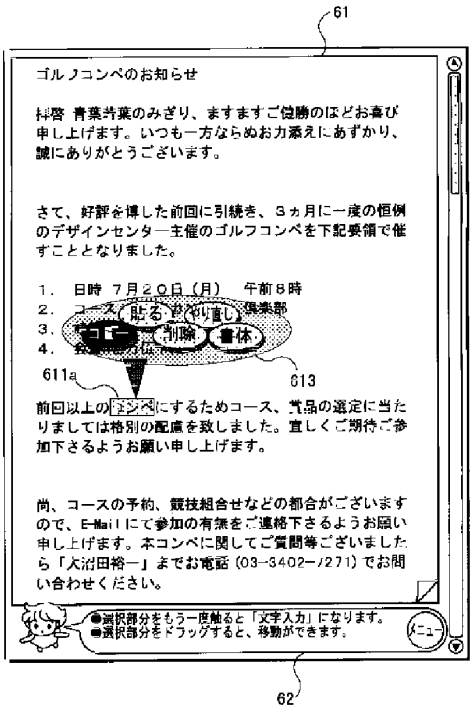
【図１３】



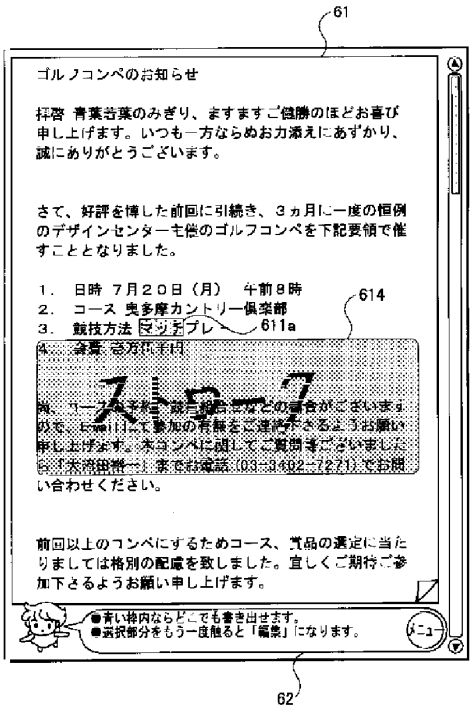
【図１４】



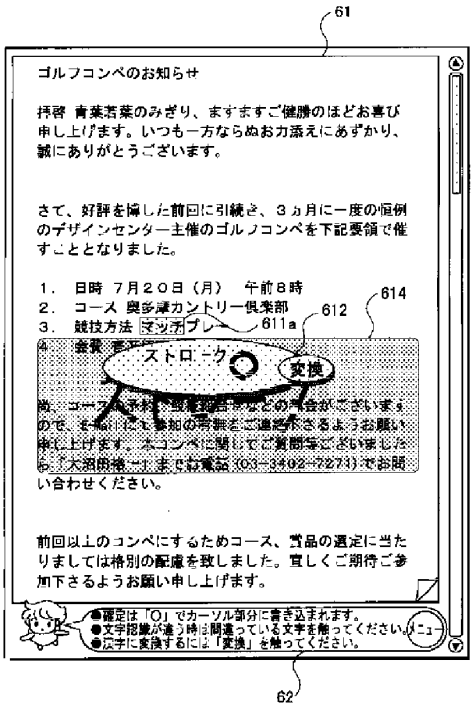
【図１５】



【図１６】



【図１７】



フロントページの続き

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FA04 FA10 FA13
5B068 AA05 AA22 BD02 BD17 BE12
CC02 CC06 CC15 CC16 CC17
CC19 CD04 CD05 CD06
5B087 AA09 BC03 DD09 DD14 DD17
DE01 DE05 DE07
5E501 BA05 CB11 CC04 EB05 EB06
EB17 EB18 EB19 FA06 FA13
FA14 FA22 FA25

Espacenet

Bibliographic data: JP2012048589 (A) — 2012-03-08

CHARACTER INPUT DEVICE, CHARACTER INPUT METHOD AND CHARACTER INPUT PROGRAM

Inventor(s):

Applicant(s): KYOCERA CORP ± (KYOCERA CORP)

Classification: - international: ***G06F17/21; G06F3/041; G06F3/048; G06F3/14; H04M1/00***
- cooperative: **G06F3/0237**; **G06F3/04883**; **H04M1/247**; H04M2250/22; H04M2250/70

Application number: JP20100191545 20100827

Priority number (s): JP20100191545 20100827

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Abstract of JP2012048589 (A)

PROBLEM TO BE SOLVED: To minimize increase in a user's burden, and to switch a character to be recognized in character recognition processing in a handwriting method to a desired character. SOLUTION: A mobile phone terminal (character input device) 1 includes: a touch panel 2 for detecting a touch performed on a surface; a character recognition processing unit 10A for performing first character recognition processing for recognizing a character belonging to a group of characters used for a first function on the basis of a locus connecting positions where the touch panel 2 detects the touch, and second character recognition processing for recognizing a character belonging to a group of characters used for a second function on the basis of the locus; ; and an input control unit 10B for displaying, on the touch panel, one or both of a first input screen for the first function and a second input screen for the second function on the basis of a probability that the first character recognition processing correctly recognizes the character and a probability that the second character recognition processing correctly recognizes the character. ; COPYRIGHT: (C)2012,JPO&INPIT

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H04M	1/00	(2006.01)	H04M	1/00	R	5B109
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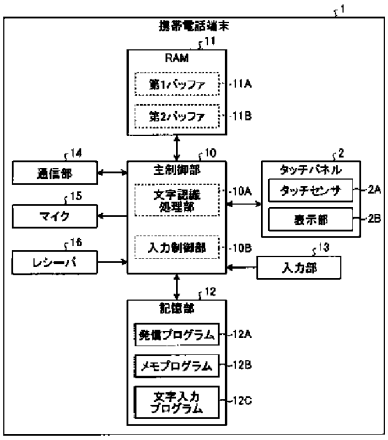
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Ｆターム(参考)　5B068 AA05 BB01 CC06 CC19 CD06
5B069 DB16 JA06
5B109 KA02 KA04 TB11 TB14

最終頁に続く

(54)【発明の名称】文字入力装置、文字入力方法および文字入力プログラム

(57)【要約】
【課題】利用者の負担の増加を抑制しつつ、手書き方式での文字認識処理の認識対象の文字を所望の文字へ切り替えること。
【解決手段】携帯電話端末（文字入力装置）１は、表面に対して行われる接触を検出するタッチパネル２と、タッチパネル２によって接触が検出された位置を結ぶ軌跡に基づいて、第１の機能に用いられる文字の集団に属する文字を認識する第１の文字認識処理と、軌跡に基づいて、第２の機能に用いられる文字の集団に属する文字を認識する第２の文字認識処理とを行う文字認識処理部１０Ａと、第１の文字認識処理によって文字が正しく認識された確度と、第２の文字認識処理によって文字が正しく認識された確度とに基づいて、第１の機能のための第１の入力画面と、第２の機能のための第２の入力画面とのいずれか一方または両方をタッチパネルに表示させる入力制御部１０Ｂとを備える。
【選択図】図７



【特許請求の範囲】
【請求項１】
表示部と、
表面に対して行われる接触を検出するタッチセンサと、
前記タッチセンサによって接触が検出された位置を結ぶ軌跡に基づいて、第１の機能に用いられる文字の集団に属する文字を認識する第１の文字認識処理と、前記軌跡に基づいて、第２の機能に用いられる文字の集団に属する文字を認識する第２の文字認識処理とを行う文字認識処理部と、
前記第１の文字認識処理によって認識された文字を入力した前記第１の機能のための第１の入力画面と、前記第２の文字認識処理によって認識された文字を入力した前記第２の機能のための第２の入力画面とのいずれか一方または両方を前記表示部に表示させる入力制御部と
を備えることを特徴とする文字入力装置。
【請求項２】
前記入力制御部は、前記第１の入力画面を表示させる場合に、前記第１の文字認識処理によって認識済みの文字を、入力済みの文字として、前記第１の入力画面上に出力し、前記第２の入力画面を表示させる場合に、前記第２の文字認識処理によって認識済みの文字を、入力済みの文字として、前記第２の入力画面上に出力することを特徴とする請求項１に記載の文字入力装置。
【請求項３】
前記入力制御部は、前記第１の文字認識処理によって文字が認識された確度と、前記第２の文字認識処理によって文字が認識された確度とに基づいて、前記第１の入力画面と前記第２の入力画面とのいずれか一方または両方を前記表示部に表示させることを特徴とする請求項１または２に記載の文字入力装置。
【請求項４】
前記入力制御部は、前記第１の文字認識処理によって文字が認識された確度が閾値よりも高い場合には、前記第１の入力画面を表示させ、前記第１の文字認識処理によって文字が認識された確度が前記閾値よりも低い場合には、前記第２の入力画面を表示させることを特徴とする請求項３に記載の文字入力装置。
【請求項５】
前記入力制御部は、前記第１の文字認識処理によって文字が認識された確度が第１の閾値よりも高い場合には、前記第１の入力画面を表示させ、前記第１の文字認識処理によって文字が認識された確度が前記第１の閾値より低く設定された第２の閾値よりも低い場合には、前記第２の入力画面を表示させ、前記第１の文字認識処理によって文字が認識された確度が前記第１の閾値と前記第２の閾値の間である場合には、前記第１の入力画面と前記第２の入力画面の両方を表示させることを特徴とする請求項３に記載の文字入力装置。
【請求項６】
前記第１の機能は電話機能であり、前記文字認識処理部は、前記第１の文字認識処理によって、数字を認識することを特徴とする請求項１から５のいずれか１項に記載の文字入力装置。
【請求項７】
前記第２の機能は電話機能と異なる機能であり、前記文字認識処理部は、前記第２の文字認識処理によって、数字とその他の文字とを認識することを特徴とする請求項６に記載の文字入力装置。
【請求項８】
前記入力制御部は、前記第１の文字認識処理によって文字が認識された確度と、前記第２の文字認識処理によって文字が認識された確度との差が所定の閾値よりも小さい場合には、前記第１の入力画面と前記第２の入力画面の両方を表示させ、前記第１の文字認識処理によって文字が認識された確度と、前記第２の文字認識処理によって文字が認識された確度との差が所定の閾値よりも大きい場合には、前記第１の入力画面と前記第２の入力画

面のうち、文字が認識された確度がより高い文字認識処理に対応する入力画面のみを表示させることを特徴とする請求項３に記載の文字入力装置。
【請求項９】
前記入力制御部は、前記第１の入力画面と前記第２の入力画面の両方を表示させている場合に、前記第１の文字認識処理によって認識された文字と、前記第２の文字認識処理によって認識された文字との少なくとも一方を、入力された文字の候補として前記表示部に表示させ、いずれかの候補が選択された場合は、前記第１の入力画面と前記第２の入力画面のうち、選択された候補を認識した文字認識処理に対応する入力画面のみを表示させることを特徴とする請求項１から８のいずれか１項に記載の文字入力装置。
【請求項１０】
前記入力制御部は、前記第１の文字認識処理によって認識されたそれぞれの文字についての文字が認識された確度の累計値または代表値を前記第１の文字認識処理によって文字が認識された確度として処理し、前記第２の文字認識処理によって認識されたそれぞれの文字についての文字が認識された確度の累計値または代表値を前記第２の文字認識処理によって文字が認識された確度として処理することを特徴とする請求項３、４、５または８に記載の文字入力装置。
【請求項１１】
前記入力制御部は、前記第１の文字認識処理または前記第２の文字認識処理によって認識された文字数が所定数よりも多くなった場合に、前記第１の文字認識処理と前記第２の文字認識処理のうち、文字が認識された確度がより低い文字認識処理を停止させることを特徴とする請求項１から１０のいずれか１項に記載の文字入力装置。
【請求項１２】
前記入力制御部は、前記第１の入力画面と前記第２の入力画面のうち、前記第１の入力画面のみを表示させる場合は、第１の機能に用いられる文字を入力するための第１のモード、または、第２の機能に用いられる文字を入力するための第２のモードへ切り替え可能なキーボードを、前記第１のモードへ切り替え、前記第２の入力画面のみを表示させる場合は、前記キーボードを前記第２のモードへ切り替えることを特徴とする請求項１から１１のいずれか１項に記載の文字入力装置。
【請求項１３】
前記入力制御部は、前記第１の文字認識処理と前記第２の文字認識処理の少なくともいずれか一方によって２文字目の文字が認識された場合に、前記第１の入力画面と前記第２の入力画面とのいずれか一方のみを前記表示部に表示させることを特徴とする請求項１から１２のいずれか１項に記載の文字入力装置。
【請求項１４】
表示部と、
表面に対して行われる接触を検出するタッチセンサと、
前記タッチセンサによって接触が検出された位置を結ぶ軌跡に基づいて、文字を認識する文字認識処理部と、
前記文字認識処理部で認識された文字が、第１の機能で用いられる文字であれば、当該文字を入力した前記第１の機能の画面を前記表示部に表示させ、前記文字認識処理部で認識された文字が、第２の機能で用いられる文字であれば、当該文字を入力した前記第２の機能の画面を前記表示部に表示させる入力制御部と
を備えることを特徴とする文字入力装置。
【請求項１５】
前記入力制御部は、前記文字認識処理部で認識された文字が、第１の機能で用いられる文字であるか、第２の機能で用いられる文字であるかを特定できない場合に、前記第１の機能の画面と前記第２の機能の画面の両方を前記表示部に表示させることを特徴とする請求項１４に記載の文字入力装置。
【請求項１６】
前記入力制御部は、前記第１の機能の画面と前記第２の機能の画面の両方を前記表示部

に表示させた場合に、前記文字認識処理部で認識された次の文字が、第１の機能で用いられる文字であれば、当該文字を入力した前記第１の機能の画面のみを前記表示部に表示させ、前記文字認識処理部で認識された次の文字が、第２の機能で用いられる文字であれば、当該文字を入力した前記第２の機能の画面のみを前記表示部に表示させることを特徴とする請求項１５に記載の文字入力装置。

【請求項１７】

表示部と、表面に対する接触を検出するタッチセンサとを有する文字入力装置によって実行される文字入力方法であって、

前記タッチセンサによって接触が検出された位置を結ぶ軌跡に基づいて、第１の機能に用いられる文字の集団に属する文字を認識する第１の文字認識処理を行うステップと、

前記軌跡に基づいて、第２の機能に用いられる文字の集団に属する文字を認識する第２の文字認識処理を行うステップと、

前記第１の文字認識処理によって認識された文字を入力した前記第１の機能のための第１の入力画面と、前記第２の文字認識処理によって認識された文字を入力した前記第２の機能のための第２の入力画面とのいずれか一方または両方を前記表示部に表示させるステップと

を含むことを特徴とする文字入力方法。

【請求項１８】

表示部と、表面に対する接触を検出するタッチセンサを有する文字入力装置に、

前記タッチセンサによって接触が検出された位置を結ぶ軌跡に基づいて、第１の機能に用いられる文字の集団に属する文字を認識する第１の文字認識処理を行うステップと、

前記軌跡に基づいて、第２の機能に用いられる文字の集団に属する文字を認識する第２の文字認識処理を行うステップと、

前記第１の文字認識処理によって認識された文字を入力した前記第１の機能のための第１の入力画面と、前記第２の文字認識処理によって認識された文字を入力した前記第２の機能のための第２の入力画面とのいずれか一方または両方を前記表示部に表示させるステップと

を実行させることを特徴とする文字入力プログラム。

【発明の詳細な説明】

【技術分野】

【０００１】

本発明は、文字入力装置、文字入力方法および文字入力プログラムに関する。

【背景技術】

【０００２】

近年、直感的な操作を可能にするとともに、キーボードのように物理的に大きな面積を必要とするデバイスを具備しない小型の文字入力装置を実現するために、タッチパネルが広く利用されるようになっている。タッチパネルを用いて文字を入力するための技術として、タッチパネル上で文字を手書き入力する技術（例えば、特許文献１）が知られている。

【０００３】

また、文字を手書き入力する場合、認識対象の文字が限定されているほど認識精度が高くなる。そこで、特許文献２では、利用者がモード切り替えのためのボタン等を操作して、認識対象の文字を所望の文字の手段に切り替える技術が開示されている。

【先行技術文献】

【特許文献】

【０００４】

【特許文献１】特開２００３－１４１４４８号公報

【特許文献２】特開２００１－２０２１９１号公報

【発明の概要】

【発明が解決しようとする課題】

【０００５】
しかしながら、上記の従来技術のように、利用者がモード切り替えのためのボタン等を操作して、認識対象の文字を所望の文字の手段に切り替えることとすると、認識精度は向上するものの、利用者が行うべき判断と操作が増大し、利用者の負担が大きくなる。
【０００６】
本発明は、上記に鑑みてなされたものであって、利用者の負担の増加を抑制しつつ、手書き方式での文字認識処理の認識対象の文字を意図した文字としつつ認識精度を高めることができる文字入力装置、文字入力方法および文字入力プログラムを提供することを目的とする。
【課題を解決するための手段】
【０００７】
上述した課題を解決し、目的を達成するために、本発明は、文字入力装置であって、表示部と、表面に対して行われる接触を検出するタッチセンサと、前記タッチセンサによって接触が検出された位置を結ぶ軌跡に基づいて、第１の機能に用いられる文字の集団に属する文字を認識する第１の文字認識処理と、前記軌跡に基づいて、第２の機能に用いられる文字の集団に属する文字を認識する第２の文字認識処理とを行う文字認識処理部と、前記第１の文字認識処理によって認識された文字を入力した前記第１の機能のための第１の入力画面と、前記第２の文字認識処理によって認識された文字を入力した前記第２の機能のための第２の入力画面とのいずれか一方または両方を前記表示部に表示させる入力制御部とを備えることを特徴とする。
【０００８】
ここで、前記入力制御部は、前記第１の入力画面を表示させる場合に、前記第１の文字認識処理によって認識済みの文字を、入力済みの文字として、前記第１の入力画面上に出力し、前記第２の入力画面を表示させる場合に、前記第２の文字認識処理によって認識済みの文字を、入力済みの文字として、前記第２の入力画面上に出力することが好ましい。
【０００９】
また、前記入力制御部は、前記第１の文字認識処理によって文字が認識された確度と、前記第２の文字認識処理によって文字が認識された確度とに基づいて、前記第１の入力画面と前記第２の入力画面とのいずれか一方または両方を前記表示部に表示させることが好ましい。
【００１０】
また、前記入力制御部は、前記第１の文字認識処理によって文字が認識された確度が閾値よりも高い場合には、前記第１の入力画面を表示させ、前記第１の文字認識処理によって文字が認識された確度が前記閾値よりも低い場合には、前記第２の入力画面を表示させることが好ましい。
【００１１】
また、前記入力制御部は、前記第１の文字認識処理によって文字が認識された確度が第１の閾値よりも高い場合には、前記第１の入力画面を表示させ、前記第１の文字認識処理によって文字が認識された確度が前記第１の閾値より低く設定された第２の閾値よりも低い場合には、前記第２の入力画面を表示させ、前記第１の文字認識処理によって文字が認識された確度が前記第１の閾値と前記第２の閾値の間である場合には、前記第１の入力画面と前記第２の入力画面の両方を表示させることが好ましい。
【００１２】
また、前記第１の機能は電話機能であり、前記文字認識処理部は、前記第１の文字認識処理によって、数字を認識することが好ましい。
【００１３】
また、前記第２の機能は電話機能と異なる機能であり、前記文字認識処理部は、前記第２の文字認識処理によって、数字とその他の文字とを認識することが好ましい。
【００１４】
また、前記入力制御部は、前記第１の文字認識処理によって文字が認識された確度と、

前記第２の文字認識処理によって文字が認識された確度との差が所定の閾値よりも小さい場合には、前記第１の入力画面と前記第２の入力画面の両方を表示させ、前記第１の文字認識処理によって文字が認識された確度と、前記第２の文字認識処理によって文字が認識された確度との差が所定の閾値よりも大きい場合には、前記第１の入力画面と前記第２の入力画面のうち、文字が認識された確度がより高い文字認識処理に対応する入力画面のみを表示させることとしてもよい。

【００１５】

また、前記入力制御部は、前記第１の入力画面と前記第２の入力画面の両方を表示させている場合に、前記第１の文字認識処理によって認識された文字と、前記第２の文字認識処理によって認識された文字との少なくとも一方を、入力された文字の候補として前記表示部に表示させ、いずれかの候補が選択された場合は、前記第１の入力画面と前記第２の入力画面のうち、選択された候補を認識した文字認識処理に対応する入力画面のみを表示させることが好ましい。

【００１６】

また、前記入力制御部は、前記第１の文字認識処理によって認識されたそれぞれの文字についての文字が認識された確度の累計値または代表値を前記第１の文字認識処理によって文字が認識された確度として処理し、前記第２の文字認識処理によって認識されたそれぞれの文字についての文字が認識された確度の累計値または代表値を前記第２の文字認識処理によって文字が認識された確度として処理することが好ましい。

【００１７】

また、前記入力制御部は、前記第１の文字認識処理または前記第２の文字認識処理によって認識された文字数が所定数よりも多くなった場合に、前記第１の文字認識処理と前記第２の文字認識処理のうち、文字が認識された確度がより低い文字認識処理を停止させることが好ましい。

【００１８】

また、前記入力制御部は、前記第１の入力画面と前記第２の入力画面のうち、前記第１の入力画面のみを表示させる場合は、第１の機能に用いられる文字を入力するための第１のモード、または、第２の機能に用いられる文字を入力するための第２のモードへ切り替え可能なキーボードを、前記第１のモードへ切り替え、前記第２の入力画面のみを表示させる場合は、前記キーボードを前記第２のモードへ切り替えることが好ましい。

【００１９】

また、前記入力制御部は、前記第１の文字認識処理と前記第２の文字認識処理の少なくともいずれか一方によって２文字目の文字が認識された場合に、前記第１の入力画面と前記第２の入力画面とのいずれか一方のみを前記表示部に表示させることが好ましい。

【００２０】

また、上述した課題を解決し、目的を達成するために、本発明は、文字入力装置であって、表示部と、表面に対して行われる接触を検出するタッチセンサと、前記タッチセンサによって接触が検出された位置を結ぶ軌跡に基づいて、文字を認識する文字認識処理部と、前記文字認識処理部で認識された文字が、第１の機能で用いられる文字であれば、当該文字を入力した前記第１の機能の画面を前記表示部に表示させ、前記文字認識処理部で認識された文字が、第２の機能で用いられる文字であれば、当該文字を入力した前記第２の機能の画面を前記表示部に表示させる入力制御部とを備えることを特徴とする。

【００２１】

ここで、前記入力制御部は、前記文字認識処理部で認識された文字が、第１の機能で用いられる文字であるか、第２の機能で用いられる文字であるかを特定できない場合に、前記第１の機能の画面と前記第２の機能の画面の両方を前記表示部に表示させることが好ましい。

【００２２】

また、前記入力制御部は、前記第１の機能の画面と前記第２の機能の画面の両方を前記表示部に表示させた場合に、前記文字認識処理部で認識された次の文字が、第１の機能で

用いられる文字であれば、当該文字を入力した前記第１の機能の画面のみを前記表示部に表示させ、前記文字認識処理部で認識された次の文字が、第２の機能で用いられる文字であれば、当該文字を入力した前記第２の機能の画面のみを前記表示部に表示させることが好ましい。

【００２３】

また、上述した課題を解決し、目的を達成するために、本発明は、表示部と、表面に対する接触を検出するタッチセンサとを有する文字入力装置によって実行される文字入力方法であって、前記タッチセンサによって接触が検出された位置を結ぶ軌跡に基づいて、第１の機能に用いられる文字の集団に属する文字を認識する第１の文字認識処理を行うステップと、前記軌跡に基づいて、第２の機能に用いられる文字の集団に属する文字を認識する第２の文字認識処理を行うステップと、前記第１の文字認識処理によって認識された文字を入力した前記第１の機能のための第１の入力画面と、前記第２の文字認識処理によって認識された文字を入力した前記第２の機能のための第２の入力画面とのいずれか一方または両方を前記表示部に表示させるステップとを含むことを特徴とする。

【００２４】

また、上述した課題を解決し、目的を達成するために、本発明は、表示部と、表面に対する接触を検出するタッチセンサを有する文字入力装置に、前記タッチセンサによって接触が検出された位置を結ぶ軌跡に基づいて、第１の機能に用いられる文字の集団に属する文字を認識する第１の文字認識処理を行うステップと、前記軌跡に基づいて、第２の機能に用いられる文字の集団に属する文字を認識する第２の文字認識処理を行うステップと、前記第１の文字認識処理によって認識された文字を入力した前記第１の機能のための第１の入力画面と、前記第２の文字認識処理によって認識された文字を入力した前記第２の機能のための第２の入力画面とのいずれか一方または両方を前記表示部に表示させるステップとを実行させることを特徴とする。

【発明の効果】

【００２５】

本発明に係る文字入力装置、文字入力方法および文字入力プログラムは、利用者の負担の増加を抑制しつつ、手書き方式での文字認識処理の認識対象の文字を意図した文字としつつ認識精度を高めることができるという効果を奏する。

【図面の簡単な説明】

【００２６】

【図１】図１は、携帯電話端末の外観を示す正面図である。

【図２】図２は、図１に示したキーボードの詳細を示す図である。

【図３】図３は、待受画面に対して数字が手書き入力された場合の携帯電話端末の動作を示す図である。

【図４】図４は、待受画面に対して英字が手書き入力された場合の携帯電話端末の動作を示す図である。

【図５】図５は、待受画面に対して数字か英字かを判別困難な文字が手書き入力された場合の携帯電話端末の動作を示す図である。

【図６】図６は、数字が手書き入力された後に英字が手書き入力された場合の携帯電話端末の動作を示す図である。

【図７】図７は、携帯電話端末の機能的な構成を示すブロック図である。

【図８】図８は、第１バッファの一例を示す図である。

【図９】図９は、第２バッファの一例を示す図である。

【図１０】図１０は、文字認識処理部による文字認識実施処理の処理手順を示すフロー図である。

【図１１】図１１は、入力制御部によって実行される入力制御処理の処理手順を示すフロー図である。

【図１２】図１２は、入力制御処理の処理手順の変形例を示すフロー図である。

【図１３】図１３は、候補の選択に基づいて、利用者がどのような情報を入力しようとし

ているかを判定する場合の携帯電話端末の動作を示す図である。

【発明を実施するための形態】

【００２７】

以下に、本発明に係る文字入力装置、文字入力方法および文字入力プログラムの実施例を図面に基づいて詳細に説明する。なお、この実施例によりこの発明が限定されるものではない。また、以下の説明における構成要素には、当業者が容易に想定できるもの、実質的に同一のもの、いわゆる均等の範囲のものが含まれる。以下においては、文字入力装置として携帯電話端末を例として説明するが、本発明の適用対象は携帯電話端末に限定されるものではなく、タッチパネルを備える各種装置、例えば、スマートフォン、ＰＨＳ（Personal Handyphone System）、ＰＤＡ、ポータブルナビゲーション装置、パーソナルコンピュータ、ゲーム機等に対しても本発明は適用できる。

【００２８】

（実施形態）

まず、図１および図２を参照しながら、本発明に係る文字入力装置の一実施形態である携帯電話端末１の外観について説明する。図１は、携帯電話端末１の外観を示す正面図である。携帯電話端末１は、筐体１Ｃが複数の筐体で構成される。具体的には、筐体１Ｃは、第１筐体１ＣＡと第２筐体１ＣＢとが開閉可能に構成される。すなわち、携帯電話端末１は、折り畳み式の筐体を有する。

【００２９】

なお、携帯電話端末１の筐体は、このような構造に限定されるものではない。例えば、携帯電話端末１の筐体は、第１筐体１ＣＡと第２筐体１ＣＢとが一体に形成されたストレート型の筐体であってもよいし、両方の筐体を重ね合わせた状態から一方の筐体と他方の筐体とを互いにスライドできるように形成されたスライド式の筐体であってもよい。また、重ね合わせ方向に沿う軸線を中心に一方の筐体を回転させるようにした回転式の筐体であってもよいし、２軸ヒンジを介して連結された筐体であってもよい。

【００３０】

第１筐体１ＣＡと第２筐体１ＣＢとは、連結部であるヒンジ機構８で連結される。ヒンジ機構８で第１筐体１ＣＡと第２筐体１ＣＢとを連結することにより、第１筐体１ＣＡおよび第２筐体１ＣＢは、ヒンジ機構８を中心として、相対的に回動できる。

【００３１】

第１筐体１ＣＡは、表示手段および入力手段として機能するタッチパネル２を備える。タッチパネル２は、文字、図形、画像等を表示するとともに、指、スタイラス、ペン等（以下、単に「指」という）を用いてタッチパネル２に対して行われる各種動作を検出する。また、第１筐体１ＣＡは、携帯電話端末１の通話時に音声を出力する出力手段であるレシーバ１６を備える。

【００３２】

第２筐体１ＣＢは、各種入力を受け付ける入力部１３を備える。入力部１３には、数字やその他の文字の入力を受け付けるキーボード１３Ａと、携帯電話端末１が備える各種機能を呼び出したり、カーソルの移動を指示したりするための機能キー１３Ｂとが含まれる。また、第２筐体１ＣＢは、携帯電話端末１の通話時に音声を受け取る音声取得手段であるマイク１５を備える。

【００３３】

図２は、図１に示したキーボード１３Ａの詳細を示す図である。図２に示すように、キーボード１３Ａは、いわゆるテンキー配列に従って配置された１２個のキーを有する。キーボード１３Ａは、複数のモードを有し、キーボード１３Ａのモードを切り替えることによって、キーボード１３Ａの操作に応じて入力される文字が変化する。キーボード１３Ａは、例えば、電話番号等を構成する数字を入力するための数字モードと、英字または記号を入力するための英字モードと、平仮名を入力するための仮名モードとのいずれかに切り替えられる。

【００３４】

キーボード１３Ａの左上に配置されたキー１３Ｃは、キーボード１３Ａが数字モードに切り替えられているときに押下されると、数字である「１」を入力された文字として受け付ける。また、キー１３Ｃは、キーボード１３Ａが英字モードに切り替えられているときに押下されると、押下された回数に応じて、記号である「．（ピリオド）」、「＠（アットマーク）」、「／（スラッシュ）」、「：（コロン）」のいずれかを入力された文字として受け付ける。また、キー１３Ｃは、キーボード１３Ａが仮名モードに切り替えられているときに押下されると、押下された回数に応じて、平仮名である「あ」、「い」、「う」、「え」、「お」のいずれかを入力された文字として受け付ける。

【００３５】

なお、図２に示したキーボード１３Ａが有するキーの数と配列は一例であり、図２に示した通りである必要はない。また、キーボード１３Ａが有するモードは、上記の説明の通りである必要はなく、用途に応じてどのようなモードを備えていてもよい。

【００３６】

次に、図１に示したタッチパネル２を用いた文字の入力について説明する。携帯電話端末１は、タッチパネル２を通じて手書き方式による文字の入力を受け付ける。手書き方式とは、タッチパネル２に触れたまま移動した指の接触が検出された位置を結んだ軌跡と、文字の字体とを照合して入力された文字を認識する方式である。携帯電話端末１は、手書き方式による文字の入力を受け付けるために、２種類の文字認識処理を実行する。

【００３７】

第１の文字認識処理は、電話番号の入力を受け付けるために実行される。第１の文字認識処理では、０～９の数字と、「＃（シャープ）」等の電話番号の入力時に用いられる記号とが認識される。第２の文字認識処理は、携帯電話端末１で扱われるほぼ全ての文字の入力を受け付けるために実行される。第２の文字認識処理で認識される文字には、第１の文字認識処理で認識される文字が含まれる。

【００３８】

第１の文字認識処理と第２の文字認識処理とを比較すると、第１の文字認識処理は、認識可能な文字の数が少ないが、数字等の認識対象の文字については認識精度が高い。一方、第２の文字認識処理は、数多くの文字を認識可能であるが、第１の文字認識処理が認識可能な数字等に限定すると、第１の文字認識処理よりも認識精度が劣ることがある。例えば、数字の「０（ゼロ）」が入力された場合、第１の文字認識処理では文字が正しく認識されるが、第２の文字認識処理では、「Ｏ（オー）」等の類似する文字と誤認するおそれがある。

【００３９】

携帯電話端末１は、電話番号の入力を受け付ける場面では入力された文字を第１の文字認識処理によって認識し、それ以外の場面では入力された文字を第２の文字認識処理によって認識するというように２つの文字認識処理を状況に応じて使い分ける。

【００４０】

ただし、利用者が電話番号を入力しようとしているのか、その他の情報を入力しようとしているのかを判別できない状況で、文字入力が開始される場合がある。そのような場合、携帯電話端末１は、第１の文字認識処理と第２の文字認識処理とを実行し、それぞれの文字入力処理で正しく文字が認識できた確度に基づいて、利用者がどのような文字を入力しようとしているのかを判定する。

【００４１】

図３から図６を参照しながら具体的に説明する。図３は、待受画面に対して数字が手書き入力された場合の携帯電話端末１の動作を示す図である。図３に示すステップＳ１１では、タッチパネル２に待受画面が表示されている。

【００４２】

ここで、待受画面とは、電話の発着信を待ち受けている状態の画面、または、アプリケーションプログラムの起動を待ち受けている状態の画面である。換言すると、待受画面は、携帯電話端末１が提供する各種機能画面へ画面が変わる前の画面である。なお、待受画

面は、例えば、デスクトップ画面、ホーム画面、または、壁紙と呼ばれることもある。また、図３に示した例では、無地の画面が待受画面として表示されているが、画像データやアニメーションデータを待受画面として表示してもよい。また、待受画面の一部として、カレンダや時計のように動的に変化する部分が含まれていてもよい。

【００４３】

ステップＳ１２では、利用者が、タッチパネル２に表示された待受画面に対して数字の「２」を手書き入力している。待受画面は特定の文字の入力を受け付ける画面ではなく、この段階では利用者が電話番号を入力しようとしているのか、その他の情報を入力しようとしているのかが不明確であるため、携帯電話端末１は、第１の文字認識処理と第２の文字認識処理とを実行して、入力された文字を認識する。

【００４４】

この場合、第１の文字認識処理と第２の文字認識処理とのいずれにおいても、同等の高い確度で「２」が入力された文字として認識される。ここで、携帯電話端末１が認識可能な文字のうち、認識できる文字数が少ない第１の文字認識処理で認識可能な文字を入力したということは、利用者は、電話番号を入力しようとしている可能性が高いと考えられる。そこで、携帯電話端末１は、ステップＳ１３では、電話番号を入力するための入力画面である発信番号入力画面２０Ａをタッチパネル２に表示し、第１の文字認識処理によって認識された「２」を入力済みの文字として発信番号入力画面２０Ａに出力する。

【００４５】

ここで、発信番号入力画面２０Ａは、入力された電話番号を用いてそのまま発信処理を実行したり、入力された電話番号をアドレス帳データに登録したりするために用いられる画面である。

【００４６】

図４は、待受画面に対して英字が手書き入力された場合の携帯電話端末１の動作を示す図である。図４に示すステップＳ２１では、タッチパネル２に待受画面が表示されている。

【００４７】

ステップＳ２２では、利用者が、タッチパネル２に表示された待受画面に対して英字の「ｃ」を手書き入力している。待受画面は特定の文字の入力を受け付ける画面ではなく、この段階では利用者が電話番号を入力しようとしているのか、その他の情報を入力しようとしているのかが不明確であるため、携帯電話端末１は、第１の文字認識処理と第２の文字認識処理とを実行して、入力された文字を認識する。

【００４８】

この場合、第２の文字認識処理においては、高い確度で「ｃ」が入力された文字として認識される。一方、第１の文字認識処理においては、例えば、電話番号の入力時に用いられる文字のうち「ｃ」に字体が比較的近い「０」が認識されるが、確度は非常に低くなる。なお、本実施形態では、文字認識処理によって文字を認識できなかった場合、いずれかの文字が０の確度で認識されたものとして処理されるものとする。

【００４９】

このように、第１の文字認識処理によって認識された文字の確度が低いと言うことは、利用者は、電話番号以外の情報を入力しようとしている可能性が高いと考えられる。そこで、携帯電話端末１は、ステップＳ２３では、任意の文字を入力可能な入力画面であるメモデータ画面２０Ｂをタッチパネル２に表示し、認識された「２」を入力済みの文字としてメモデータ画面２０Ｂに出力する。

【００５０】

ここで、メモデータ画面２０Ｂは、入力された文字を読み出し可能な状態で携帯電話端末１内や携帯電話端末１が無線通信によってアクセス可能なサーバ装置内に保存したり、付箋紙のように容易に取り外すことが可能な状態で待受画面上に表示させたりするために利用される画面である。なお、ステップＳ２３でタッチパネル２に表示させる画面は、必ずしもメモデータ画面２０Ｂである必要はなく、例えば、電子メールの本文の入力画面の

ように、任意の文字の入力を受け付ける画面であればどのような画面であってもよい。

【００５１】

図５は、待受画面に対して数字か英字かを判別困難な文字が手書き入力された場合の携帯電話端末１の動作を示す図である。図５に示すステップＳ３１では、タッチパネル２に待受画面が表示されている。

【００５２】

ステップＳ３２では、利用者が、タッチパネル２に表示された待受画面に対して縦長の線を手書き入力している。待受画面は特定の文字の入力を受け付ける画面ではなく、この段階では利用者が電話番号を入力しようとしているのか、その他の情報を入力しようとしているのかが不明確であるため、携帯電話端末１は、第１の文字認識処理と第２の文字認識処理とを実行して、入力された文字を認識する。

【００５３】

この場合、第１の文字認識処理においては、中程度の確度で数字の「１」が入力された文字として認識されたものとする。一方、第２の文字認識処理においては、中程度の確度で英字の「Ｉ」が入力された文字として認識されたものとする。このように、第１の文字認識処理によって認識された文字の確度が中程度の場合、利用者が電話番号を入力しようとしているのか、その他の情報を入力しようとしているのか曖昧である。

【００５４】

そこで、携帯電話端末１は、ステップＳ３３では、電話番号を入力するための入力画面である発信番号入力画面２０Ａと、任意の文字を入力可能な入力画面であるメモデータ画面２０Ｂとを両方ともタッチパネル２に表示する。そして、携帯電話端末１は、第１の文字認識処理で認識された「１」を入力済みの文字として発信番号入力画面２０Ａに出力し、第２の文字認識処理で認識された「Ｉ」を入力済みの文字としてメモデータ画面２０Ｂに出力する。

【００５５】

携帯電話端末１は、その後も、第１の文字認識処理と第２の文字認識処理とを実行して入力された文字を認識する。例えば、ステップＳ３３の後、ステップＳ３４のように、発信番号入力画面２０Ａとメモデータ画面２０Ｂが表示されている状態で、利用者が、英字の「ｃ」を手書き入力したものとする。この場合、第２の文字認識処理においては、高い確度で「ｃ」が入力された文字として認識されるが、第１の文字認識処理においては、非常に低い確度でしか文字が認識されない。

【００５６】

その結果、携帯電話端末１は、ステップＳ３５では、発信番号入力画面２０Ａを消去してメモデータ画面２０Ｂのみをタッチパネル２に表示し、第２の文字認識処理によって認識された文字である「ｃ」をメモデータ画面２０Ｂに追加する。

【００５７】

また、ステップＳ３３の後、ステップＳ３６のように、発信番号入力画面２０Ａとメモデータ画面２０Ｂが表示されている状態で、利用者が、数字の「２」を手書き入力したものとする。この場合、第１の文字認識処理と第２の文字認識処理とのいずれにおいても、同等の高い確度で「２」が入力された文字として認識される。

【００５８】

その結果、携帯電話端末１は、ステップＳ３７では、メモデータ画面２０Ｂを消去して発信番号入力画面２０Ａのみをタッチパネル２に表示し、第１の文字認識処理によって認識された文字である「２」を発信番号入力画面２０Ａに追加する。

【００５９】

携帯電話端末１は、発信番号入力画面２０Ａとメモデータ画面２０Ｂのいずれか一方をタッチパネル２に表示した後も、第１の文字認識処理と第２の文字認識処理とを実行する。図６は、数字が手書き入力された後に英字が手書き入力された場合の携帯電話端末１の動作を示す図である。

【００６０】

図３に示したステップＳ１３で、電話番号を入力するための入力画面である発信番号入力画面２０Ａがタッチパネル２に表示され、第１の文字認識処理によって認識された「２」を入力済みの文字として発信番号入力画面２０Ａに出力された後、ステップＳ１４として、利用者が、英字の「ｃ」を手書き入力したものとする。

【００６１】

この場合、第２の文字認識処理においては、高い確度で「ｃ」が入力された文字として認識されるが、第１の文字認識処理においては、非常に低い確度でしか文字が認識されない。その結果、携帯電話端末１は、ステップＳ１５では、発信番号入力画面２０Ａを消去してメモデータ画面２０Ｂをタッチパネル２に表示し、ステップＳ１２で第２の文字認識処理によって認識された文字である「２」と、第２の文字認識処理によって新たに認識された文字である「ｃ」とをメモデータ画面２０Ｂに出力する。

【００６２】

図６では、発信番号入力画面２０Ａが表示されている状態で英字が入力された場合に、発信番号入力画面２０Ａに代えてメモデータ画面２０Ｂが表示される例が示されているが、同様に、メモデータ画面２０Ｂが表示されている状態で数字が入力された場合には、メモデータ画面２０Ｂに代えて発信番号入力画面２０Ａが表示されることとしてもよい。

【００６３】

なお、携帯電話端末１は、所定数の文字を認識した後は、その時点で認識された文字の確度に基づいて、第１の文字認識処理と第２の文字認識処理のうち、一方の文字認識処理のみを実行するようになる。例えば、所定数の文字を３文字と定めたものとして、入力された文字が３文字続けて第１の文字認識処理によって高い確度で認識された場合、携帯電話端末１は、発信番号入力画面２０Ａをタッチパネル２に表示し、それ以降は、第１の文字認識処理のみによって入力された文字を認識するようになる。

【００６４】

一定数以上の文字が入力された場合、第１の文字認識処理と第２の文字認識処理のそれまでの認識結果の確度に基づいて、利用者が電話番号を入力しようとしているのか、その他の情報を入力しようとしているのかがほぼ明らかとなる。このため、それ以降は、利用者が入力しようとしている情報に対応した文字認識処理のみを行うことにより、文字の認識精度を向上させることができる。また、文字認識処理は負荷が比較的重い処理であるため、実行する文字認識処理を絞り込むことにより、利用者の操作への応答性の向上と、消費電力の削減とを実現することができる。

【００６５】

上記の説明のように、携帯電話端末１は、利用者がどのような情報を入力しようとしているか不明な場合でも、利用者が入力しようとしている情報に応じた文字認識処理を実行することができる。

【００６６】

次に、携帯電話端末１の機能的な構成について説明する。図７は、携帯電話端末１の機能的な構成を示すブロック図である。図７に示すように、携帯電話端末１は、タッチパネル２と、主制御部１０と、ＲＡＭ（Random Access Memory）１１と、記憶部１２と、入力部１３と、通信部１４と、マイク１５と、レシーバ１６とを有する。

【００６７】

タッチパネル２は、表示部２Ｂと、表示部２Ｂに重畳されたタッチセンサ２Ａとを有する。タッチセンサ２Ａは、指を用いてタッチパネル２に対して行われた各種動作を、動作が行われた場所のタッチパネル２上での位置とともに検出する。タッチセンサ２Ａによって検出される動作には、指をタッチパネル２の表面に接触させる動作や、指をタッチパネル２の表面に接触させたまま移動させる動作や、指をタッチパネル２の表面から離す動作が含まれる。なお、タッチセンサ２Ａは、感圧式、静電式等のいずれの検出方式を採用していてもよい。表示部２Ｂは、例えば、液晶ディスプレイ（ＬＣＤ、Liquid Crystal Display）や、有機ＥＬ（Organic Electro－Luminescence）パネルなどで構成され、文字、図形、画像等を表示する。

【００６８】
主制御部１０は、例えば、ＣＰＵ（Central Processing Unit）であり、携帯電話端末１の動作を統括的に制御する。具体的には、主制御部１０は、記憶部１２に記憶されているデータを必要に応じて参照しつつ、記憶部１２に記憶されているプログラムを実行して、タッチパネル２、通信部１４等を制御することによって各種処理を実行する。主制御部１０は、記憶部１２に記憶されているプログラムや、処理を実行することによって取得／生成／加工されたデータを、一時的な記憶領域を提供するＲＡＭ１１に必要に応じて展開する。なお、主制御部１０が実行するプログラムや参照するデータは、通信部１４による無線通信でサーバ装置からダウンロードすることとしてもよい。

【００６９】
例えば、主制御部１０は、記憶部１２に記憶されている文字入力プログラム１２Ｃを実行することによって、文字認識処理部１０Ａと、入力制御部１０Ｂとを実現する。文字認識処理部１０Ａは、上述した第１の文字認識処理と、第２の文字認識処理とを実行する。入力制御部１０Ｂは、文字認識処理部１０Ａによる文字認識処理と、キーボード１３Ａのモードの切り替えとを制御する。また、入力制御部１０Ｂは、状況に応じた入力画面をタッチパネル２に表示させる。なお、文字認識処理部１０Ａおよび入力制御部１０Ｂの機能の詳細については後述する。

【００７０】
ＲＡＭ１１は、主制御部１０によって実行される処理で用いられるデータを一時的に記憶する。例えば、ＲＡＭ１１には、文字認識処理部１０Ａによる文字認識処理の結果を格納する領域として、第１バッファ１１Ａと、第２バッファ１１Ｂとが設けられる。第１バッファ１１Ａは、第１の文字認識処理による文字認識結果が格納される領域であり、第２バッファ１１Ｂは、第２の文字認識処理による文字認識結果が格納される領域である。

【００７１】
第１バッファ１１Ａの一例を図８に示す。図８に示すように、第１バッファ１１Ａには、第１の文字認識処理によって認識された文字と、その文字を正しく認識できた確度とが対応づけて時系列に格納される。図８に示した例は、図５に示したステップＳ３５の時点での第１バッファ１１Ａを示しており、１番目に認識された文字として「１」が、確度「８０％」と対応づけて格納され、２番目に認識された文字として「０」が、確度「１０％」と対応づけて格納されている。

【００７２】
第２バッファ１１Ｂの一例を図９に示す。図９に示すように、第２バッファ１１Ｂには、第２の文字認識処理によって認識された文字と、その文字を正しく認識できた確度とが対応づけて時系列に格納される。図９に示した例は、図５に示したステップＳ３５の時点での第２バッファ１１Ｂを示しており、１番目に認識された文字として「Ｉ」が、確度「８０％」と対応づけて格納され、２番目に認識された文字として「ｃ」が、確度「９０％」と対応づけて格納されている。

【００７３】
なお、第１バッファ１１Ａおよび第２バッファ１１Ｂには、タッチパネル２に表示されている入力画面に対してキーボード１３Ａから入力された文字も格納される。ただし、例えば、タッチパネル２に表示されている入力画面が発信番号入力画面２０Ａのように英字の入力を受け付けない画面であり、キーボード１３Ａが英字モードへ切り替えられている場合は、キーボード１３Ａから入力された文字は、入力画面ではじかれてしまい、第１バッファ１１Ａおよび第２バッファ１１Ｂには格納されない。

【００７４】
記憶部１２は、例えば、不揮発性メモリや磁気記憶装置であり、主制御部１０での処理に利用されるプログラムやデータを保存する。具体的には、記憶部１２は、電話をかけるための発信プログラム１２Ａや、メモデータの表示／編集／保存／削除等を行うためのメモプログラム１２Ｂや、上述した手書き方式での文字入力を受け付けるための文字入力プログラム１２Ｃを記憶する。図３で示した発信番号入力画面２０Ａは、発信プログラム１

２Ａが提供する機能に基づいて主制御部１０が表示させる画面であり、図４で示したメモデータ画面２０Ｂは、メモプログラム１２Ｂが提供する機能に基づいて主制御部１０が表示させる画面である。

【００７５】

記憶部１２には、携帯電話端末１の基本的な機能を実現するオペレーティングシステムプログラムや、氏名、電話番号、メールアドレス等が登録されたアドレス帳データ等の他のプログラムやデータも記憶される。

【００７６】

入力部１３は、キーボード１３Ａと機能キー１３Ｂとを通じて利用者の操作を受け付け、受け付けた操作に対応する信号を主制御部１０へ送信する。通信部１４は、基地局によって割り当てられるチャネルを介し、基地局との間でＣＤＭＡ方式などによる無線信号回線を確立し、基地局との間で電話通信及び情報通信を行う。マイク１５は、利用者等の音声を電気的な信号へ変換する。レシーバ１６は、電話通信における相手側の音声や着信音等を出力する。

【００７７】

次に、主制御部１０によって実現される文字認識処理部１０Ａと入力制御部１０Ｂとによって実行される処理の処理手順について説明する。図１０は、文字認識処理部１０Ａによる文字認識実施処理の処理手順を示すフロー図である。文字認識処理部１０Ａは、タッチパネル２において手書き文字入力のための接触が新たに検出されるたびに、入力制御部１０Ｂの制御に従って、図１０に示す処理手順を実行する。

【００７８】

なお、図１０に示す処理手順は、第１の文字認識処理と第２の文字認識処理の一方を実行するものであり、第１の文字認識処理と第２の文字認識処理とが実行される場合、文字認識処理部１０Ａは、それぞれの文字認識処理について図１０に示す処理手順を実行する。

【００７９】

図１０に示すように、まず、文字認識処理部１０Ａは、ステップＳ１０１として、新たに検出された接触によってタッチパネル２上に描かれた軌跡を認識対象データに追加する。ここで、認識対象データは、軌跡が文字の字画を構成する一画として順次格納されるデータであり、ＲＡＭ１１に保持される。そして、文字認識処理部１０Ａは、ステップＳ１０２として、認識対象データに基づいて文字認識処理を実行する。

【００８０】

ここで、何らかの文字が認識された場合（ステップＳ１０３，Ｙｅｓ）、文字認識処理部１０Ａは、ステップＳ１０４として、認識された文字と、その文字を正しく認識できた確度とを、実行した文字認識処理に対応するバッファ（第１バッファ１１Ａと第２バッファ１１Ｂのいずれか）へ格納する。そして、文字認識処理部１０Ａは、ステップＳ１０５として、認識対象データを初期化して、文字認識実施処理を終了させる。

【００８１】

一方、文字が認識されなかった場合、すなわち、まだ文字の入力途中である場合（ステップＳ１０３，Ｎｏ）、文字認識処理部１０Ａは、対応するバッファに処理を加えることなく文字認識実施処理を終了させる。

【００８２】

なお、図１０に示した処理手順では、新たな軌跡が検出されるたびに文字認識処理が実行されることとなっているが、利用者が所定の操作を行って文字認識処理の実行を指示したタイミングや、認識対象データに一画目の軌跡が格納されてから所定の時間が経過したタイミングで文字認識処理を実行することとしてもよい。ここで、所定の操作とは、例えば、「文字認識」と表示されたタッチパネル上の領域内をタップする操作であり、所定の時間とは、１文字分の字画を入力し終えるのに十分な時間である。

【００８３】

図１１は、利用者がどのような情報を入力しようとしているかが不明な場合に入力制御

部１０Ｂによって実行される入力制御処理の処理手順を示すフロー図である。入力制御部１０Ｂは、タッチパネル２において手書き文字入力のための接触が新たに検出されるたびに、図１１に示す処理手順を実行する。

【００８４】

なお、利用者がどのような情報を入力しようとしているかが不明な場合、第１の文字認識処理と、第２の文字認識処理とが、予め有効に設定される。ここでいう有効に設定されるとは、実行すべき処理として設定されることを意味する。一方、無効に設定するとは、停止すべき処理として設定されることを意味する。

【００８５】

図１１に示すように、ステップＳ２０１として、タッチパネル２において新たな接触が検出されると、入力制御部１０Ｂは、ステップＳ２０２として、第１の文字認識処理が有効であるかを判定する。そして、第１の文字認識処理が有効である場合（ステップＳ２０２，Ｙｅｓ）、入力制御部１０Ｂは、ステップＳ２０３として、文字認識処理部１０Ａに対して、第１の文字認識処理による文字認識の実施を指示する。この指示に応じて、文字認識処理部１０Ａは、第１の文字認識処理による文字認識の実施のために、図１０に示した文字認識実施処理を実行する。第１の文字認識処理が無効となっている場合（ステップＳ２０２，Ｎｏ）、入力制御部１０Ｂは、第１の文字認識処理による文字認識の実施を指示しない。

【００８６】

続いて、入力制御部１０Ｂは、ステップＳ２０４として、第２の文字認識処理が有効であるかを判定する。そして、第２の文字認識処理が有効である場合（ステップＳ２０４，Ｙｅｓ）、入力制御部１０Ｂは、ステップＳ２０５として、文字認識処理部１０Ａに対して、第２の文字認識処理による文字認識の実施を指示する。この指示に応じて、文字認識処理部１０Ａは、第２の文字認識処理による文字認識の実施のために、図１０に示した文字認識実施処理を実行する。第２の文字認識処理が無効となっている場合（ステップＳ２０４，Ｎｏ）、入力制御部１０Ｂは、第２の文字認識処理による文字認識の実施を指示しない。

【００８７】

そして、入力制御部１０Ｂは、ステップＳ２０６として、文字認識実施処理の実行にともなって、第１バッファ１１Ａと第２バッファ１１Ｂの少なくとも一方が更新されたかを判定する。ここで、第１バッファ１１Ａと第２バッファ１１Ｂの少なくとも一方が更新されたということは、新たに文字が認識されたことを意味する。第１バッファ１１Ａと第２バッファ１１Ｂがいずれも更新されていない場合（ステップＳ２０６，Ｎｏ）、入力制御部１０Ｂは、入力制御処理を終了させる。

【００８８】

第１バッファ１１Ａと第２バッファ１１Ｂの少なくとも一方が更新されていた場合（ステップＳ２０６，Ｙｅｓ）、入力制御部１０Ｂは、ステップＳ２０７として、第１の文字認識処理と第２の文字認識処理とがいずれも有効であるかを判定する。ここで、第１の文字認識処理と第２の文字認識処理とがいずれも有効であるということは、利用者がどのような情報を入力しようとしているかが依然として不明であることを意味する。

【００８９】

そして、第１の文字認識処理と第２の文字認識処理のいずれかが無効となっている場合、すなわち、利用者がどのような情報を入力しようとしているかが判別され、利用者が入力しようとしている情報に適応した文字認識処理と入力画面が選択済みである場合（ステップＳ２０７，Ｎｏ）、入力制御部１０Ｂは、ステップＳ２１３として、第１バッファ１１Ａと第２バッファ１１Ｂのうち、タッチパネル２に表示されている入力画面に対応するバッファの内容を入力画面に出力して、入力制御処理を終了させる。

【００９０】

一方、第１の文字認識処理と第２の文字認識処理とがいずれも有効である場合（ステップＳ２０７，Ｙｅｓ）、入力制御部１０Ｂは、以下のようにして、利用者がどのような情

報を入力しようとしているかの判定を試みる。

【００９１】

入力制御部１０Ｂは、まず、ステップＳ２０８として、第１の文字認識処理の確度が第１の閾値ＴＨ１よりも高いかを判定する。ここで用いられるＴＨ１は、確度が十分に高いことを判定するための値である。また、文字認識処理の確度は、対応するバッファに格納された各文字に対応付けられた確度の代表値（例えば、平均値や最小値）であることが好ましい。なお、キーボード１３Ａから入力された文字については、確度の評価に反映させないことが好ましい。

【００９２】

第１の文字認識処理の確度が第１の閾値ＴＨ１よりも高い場合、すなわち、第１の文字認識処理の確度が十分に高い場合（ステップＳ２０８，Ｙｅｓ）、入力制御部１０Ｂは、ステップＳ２０９として、タッチパネル２に、第１の文字認識処理に対応する入力画面（例えば、発信番号入力画面２０Ａ）を表示させる。

【００９３】

さらに、入力制御部１０Ｂは、ステップＳ２１０として、キーボード１３Ａを第１の文字認識処理に対応するモードへ切り替える。ここで、第１の文字認識処理は、数字を主たる認識対象とする文字認識処理であるので、第１の文字認識処理に対応するモードは、数字モードである。このようにキーボード１３Ａのモードを切り替えることにより、利用者は、キーボード１３Ａのモード切り替えのための特別な操作をすることなく、ステップＳ２０９で表示された入力画面に適した文字をキーボード１３Ａから入力することができる。

【００９４】

キーボード１３Ａのモード切り替えは、通常、機能キー１３Ｂのいずれかを押下することで行われるが、機能キー１３Ｂは状況によって異なる機能が割り当てられることが多く、機能キー１３Ｂの操作によるモードの切り替えは直感的ではない。一方、上記のように、手書き入力に結果に応じてキーボード１３Ａのモードが切り替わる動作は、利用者にとって自然な動作であり、良好な使い勝手を利用者に提供する。

【００９５】

続いて、入力制御部１０Ｂは、ステップＳ２１１として、認識された文字数が所定数よりも多いかを判定する。ここでいう認識された文字数は、第１の文字認識処理に対応するバッファである第１バッファ１１Ａに格納された文字数を意味する。そして、認識された文字数が所定数よりも多い場合（ステップＳ２１１，Ｙｅｓ）、入力制御部１０Ｂは、ステップＳ２１２として、第２の文字認識処理を無効とする。認識された文字数が所定数以下の場合（ステップＳ２１１，Ｎｏ）、入力制御部１０Ｂは、第２の文字認識処理を有効なままにしておく。

【００９６】

そして、入力制御部１０Ｂは、ステップＳ２１３として、第１バッファ１１Ａと第２バッファ１１Ｂのうち、タッチパネル２に表示されている入力画面に対応するバッファの内容を入力画面に出力して、入力制御処理を終了させる。

【００９７】

第１の文字認識処理の確度が第１の閾値ＴＨ１よりも低い場合（ステップＳ２０８，Ｎｏ）、入力制御部１０Ｂは、ステップＳ２１４として、第１の文字認識処理の確度が第２の閾値ＴＨ２よりも低いかを判定する。ここで用いられるＴＨ２は、確度が不十分であり、第１の文字認識処理の認識対象でない文字が入力されている可能性が高いことを判定するための値であり、第１の閾値ＴＨ１よりも低く設定される。

【００９８】

第１の文字認識処理の確度が第２の閾値ＴＨ２よりも低い場合、すなわち、第１の文字認識処理の確度が不十分であり、第１の文字認識処理の認識対象でない文字が入力されている可能性が高い場合（ステップＳ２１４，Ｙｅｓ）、入力制御部１０Ｂは、ステップＳ２１５として、第２の文字認識処理の確度が第３の閾値ＴＨ３よりも高いかを判定する。

ここで用いられるＴＨ３は、確度が十分に高いことを判定するための値である。なお、第２の文字認識処理は、第１の文字認識処理よりも認識対象の文字が多く、認識精度が第１の文字認識処理よりも低いため、ＴＨ３は、ＴＨ１よりも低い値であってもよい。

【００９９】

そして、第２の文字認識処理の確度が第３の閾値ＴＨ３よりも高い場合、すなわち、第２の文字認識処理の確度が十分に高い場合（ステップＳ２１５，Ｙｅｓ）、入力制御部１０Ｂは、ステップＳ２１６として、タッチパネル２に、第２の文字認識処理に対応する入力画面（例えば、メモデータ画面２０Ｂ）を表示させる。

【０１００】

さらに、入力制御部１０Ｂは、ステップＳ２１７として、キーボード１３Ａを第２の文字認識処理に対応するモードへ切り替える。ここで、第２の文字認識処理は、英字と平仮名とを認識対象に含む文字認識処理であるので、第２の文字認識処理に対応するモードは、英字モードであってもよいし、仮名モードであってもよいが、日本語環境では、仮名モードであることがより好ましい。

【０１０１】

続いて、入力制御部１０Ｂは、ステップＳ２１８として、認識された文字数が所定数よりも多いかを判定する。ここでいう認識された文字数は、第２の文字認識処理に対応するバッファである第２バッファ１１Ｂに格納された文字数を意味する。そして、認識された文字数が所定数よりも多い場合（ステップＳ２１８，Ｙｅｓ）、入力制御部１０Ｂは、ステップＳ２１９として、第１の文字認識処理を無効とする。認識された文字数が所定数以下の場合（ステップＳ２１８，Ｎｏ）、入力制御部１０Ｂは、第１の文字認識処理を有効なままにしておく。

【０１０２】

そして、入力制御部１０Ｂは、ステップＳ２１３として、第１バッファ１１Ａと第２バッファ１１Ｂのうち、タッチパネル２に表示されている入力画面に対応するバッファの内容を入力画面に出力して、入力制御処理を終了させる。

【０１０３】

第２の文字認識処理の確度が第３の閾値ＴＨ３よりも低い場合、すなわち、第１の文字認識処理と第２の文字認識処理の確度がいずれも不十分な場合（ステップＳ２１５，Ｎｏ）、入力制御部１０Ｂは、ステップＳ２２０として、入力された文字を正しく認識できない旨のエラー表示を行って、入力制御処理を終了させる。

【０１０４】

また、第１の文字認識処理の確度が第１の閾値ＴＨ１よりも低く、第２の閾値ＴＨ２よりも高い場合、すなわち、第１の文字認識処理の確度が中程度で、文字を正しく認識できているか否かが曖昧である場合（ステップＳ２１４，Ｎｏ）、入力制御部１０Ｂは、ステップＳ２２１として、タッチパネル２に、第１の文字認識処理に対応する入力画面と第２の文字認識処理に対応する入力画面の両方を表示させる。そして、入力制御部１０Ｂは、ステップＳ２１３として、タッチパネル２に表示されている各入力画面に対応するバッファの内容を対応する入力画面に出力して、入力制御処理を終了させる。

【０１０５】

上述してきたように、本実施形態では、文字が正しく認識された確度に基づいて、第１の文字認識処理および第２の文字認識処理の実行を制御することとしたので、利用者の負担の増加を抑制しつつ、手書き方式での文字認識処理の認識対象の文字を所望の文字へ切り替えることができる。

【０１０６】

なお、上記の実施形態で示した本発明の態様は、本発明の要旨を逸脱しない範囲で任意に変更することができる。上記の実施形態では、携帯電話端末１が、物理的なキーボード１３Ａを備えることとしたが、携帯電話端末１が備えるキーボードは、タッチパネル２上に表示される仮想的なものであってもよい。

【０１０７】

また、上記の実施形態では、文字入力プログラム１２Ｃを実行することによって、文字認識処理部１０Ａと、入力制御部１０Ｂとを実現することとしたが、文字認識処理部１０Ａと、入力制御部１０Ｂとは、ワイヤードロジックによって実現されていてもよい。また、文字入力プログラム１２Ｃは、複数のプログラムに分割されていてもよいし、他のプログラムと統合されていてもよい。

【０１０８】

また、上記の実施形態では、利用者がどのような情報を入力しようとしているかが不明な場合に、２種類の文字認識処理を実行することとしたが、３種類以上の文字認識処理を実行することとしてもよい。

【０１０９】

また、上記の実施形態では、第１の文字認識処理の認識対象の文字が第２の文字認識処理の認識対象の文字に含まれる関係にあることを前提としたが、第１の文字認識処理の認識対象の文字と、第２の文字認識処理の認識対象の文字とに包含関係がない場合にも、本発明は適用できる。第１の文字認識処理の認識対象の文字と、第２の文字認識処理の認識対象の文字とに包含関係がない場合とは、例えば、第１の文字認識処理が数字を認識対象とし、第２の文字認識処理が英字を認識対象とする場合である。

【０１１０】

第１の文字認識処理の認識対象の文字と、第２の文字認識処理の認識対象の文字とに包含関係がない場合、図１１に示した入力制御処理の処理手順を図１２のように変形すればよい。

【０１１１】

図１２は、利用者がどのような情報を入力しようとしているかが不明な場合に入力制御部１０Ｂによって実行される入力制御処理の処理手順の変形例を示すフロー図である。入力制御部１０Ｂは、タッチパネル２において手書き文字入力のための接触が新たに検出されるたびに、図１２に示す処理手順を実行する。

【０１１２】

図１２に示すように、ステップＳ３０１として、タッチパネル２において新たな接触が検出されると、入力制御部１０Ｂは、ステップＳ３０２として、第１の文字認識処理が有効であるかを判定する。そして、第１の文字認識処理が有効である場合（ステップＳ３０２，Ｙｅｓ）、入力制御部１０Ｂは、ステップＳ３０３として、文字認識処理部１０Ａに対して、第１の文字認識処理による文字認識の実施を指示する。この指示に応じて、文字認識処理部１０Ａは、第１の文字認識処理による文字認識の実施のために、図１０に示した文字認識実施処理を実行する。第１の文字認識処理が無効となっている場合（ステップＳ３０２，Ｎｏ）、入力制御部１０Ｂは、第１の文字認識処理による文字認識の実施を指示しない。

【０１１３】

続いて、入力制御部１０Ｂは、ステップＳ３０４として、第２の文字認識処理が有効であるかを判定する。そして、第２の文字認識処理が有効である場合（ステップＳ３０４，Ｙｅｓ）、入力制御部１０Ｂは、ステップＳ３０５として、文字認識処理部１０Ａに対して、第２の文字認識処理による文字認識の実施を指示する。この指示に応じて、文字認識処理部１０Ａは、第２の文字認識処理による文字認識の実施のために、図１０に示した文字認識実施処理を実行する。第２の文字認識処理が無効となっている場合（ステップＳ３０４，Ｎｏ）、入力制御部１０Ｂは、第２の文字認識処理による文字認識の実施を指示しない。

【０１１４】

そして、入力制御部１０Ｂは、ステップＳ３０６として、文字認識実施処理の実行にともなって、第１バッファ１１Ａと第２バッファ１１Ｂの少なくとも一方が更新されたかを判定する。ここで、第１バッファ１１Ａと第２バッファ１１Ｂの少なくとも一方が更新されたということは、新たに文字が認識されたことを意味する。第１バッファ１１Ａと第２バッファ１１Ｂがいずれも更新されていない場合（ステップＳ３０６，Ｎｏ）、入力制御

部１０Ｂは、入力制御処理を終了させる。

【０１１５】

第１バッファ１１Ａと第２バッファ１１Ｂの少なくとも一方が更新されていた場合（ステップＳ３０６，Ｙｅｓ）、入力制御部１０Ｂは、ステップＳ３０７として、第１の文字認識処理と第２の文字認識処理とがいずれも有効であるかを判定する。ここで、第１の文字認識処理と第２の文字認識処理とがいずれも有効であるということは、利用者がどのような情報を入力しようとしているかが依然として不明であることを意味する。

【０１１６】

そして、第１の文字認識処理と第２の文字認識処理のいずれかが無効となっている場合、すなわち、利用者がどのような情報を入力しようとしているかが判別され、利用者が入力しようとしている情報に適応した文字認識処理と入力画面が選択済みである場合（ステップＳ３０７，Ｎｏ）、入力制御部１０Ｂは、ステップＳ３１３として、第１バッファ１１Ａと第２バッファ１１Ｂのうち、タッチパネル２に表示されている入力画面に対応するバッファの内容を入力画面に出力して、入力制御処理を終了させる。

【０１１７】

一方、第１の文字認識処理と第２の文字認識処理とがいずれも有効である場合（ステップＳ３０７，Ｙｅｓ）、入力制御部１０Ｂは、以下のようにして、利用者がどのような情報を入力しようとしているかの判定を試みる。

【０１１８】

入力制御部１０Ｂは、まず、ステップＳ３０８として、第１の文字認識処理の確度と第２の文字認識処理の確度との差が予め定められた閾値よりも大きいかを判定する。ここで用いられる閾値は、第１の文字認識処理の認識対象の文字と、第２の文字認識処理の認識対象の文字とのどちらを利用者が入力したのかを明確に判別できる程度に大きい値である。また、文字認識処理の確度は、対応するバッファに格納された各文字に対応付けられた確度の代表値（例えば、平均値や最小値）、または、累計値であることが好ましい。なお、キーボード１３Ａから入力された文字については、確度の評価に反映させないことが好ましい。

【０１１９】

確度の差が閾値よりも大きい場合（ステップＳ３０８，Ｙｅｓ）、入力制御部１０Ｂは、ステップＳ３０９として、タッチパネル２に、確度が高い方の文字認識処理に対応する入力画面を表示させる。さらに、入力制御部１０Ｂは、ステップＳ３１０として、キーボード１３Ａを確度が高い文字認識処理に対応するモードへ切り替える。

【０１２０】

続いて、入力制御部１０Ｂは、ステップＳ３１１として、認識された文字数が所定数よりも多いかを判定する。ここでいう認識された文字数は、確度が高い文字認識処理に対応するバッファに格納された文字数を意味する。そして、認識された文字数が所定数よりも多い場合（ステップＳ３１１，Ｙｅｓ）、入力制御部１０Ｂは、ステップＳ３１２として、確度が低い文字認識処理を無効とする。認識された文字数が所定数以下の場合（ステップＳ３１１，Ｎｏ）、入力制御部１０Ｂは、確度が低い文字認識処理を有効なままにしておく。

【０１２１】

そして、入力制御部１０Ｂは、ステップＳ３１３として、第１バッファ１１Ａと第２バッファ１１Ｂのうち、タッチパネル２に表示されている入力画面に対応するバッファの内容を入力画面に出力して、入力制御処理を終了させる。

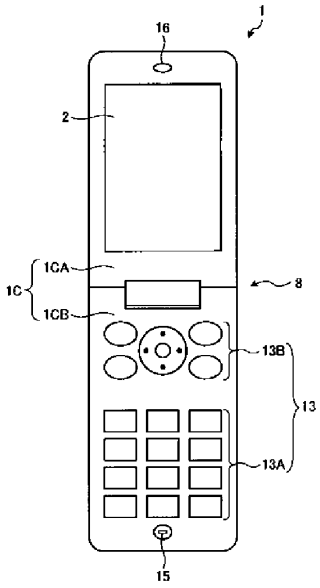
【０１２２】

また、確度の差が閾値よりも小さい場合（ステップＳ３０８，Ｎｏ）、入力制御部１０Ｂは、ステップＳ３１４として、タッチパネル２に、第１の文字認識処理に対応する入力画面と第２の文字認識処理に対応する入力画面の両方を表示させる。そして、入力制御部１０Ｂは、ステップＳ３１３として、タッチパネル２に表示されている各入力画面に対応するバッファの内容を対応する入力画面に出力して、入力制御処理を終了させる。

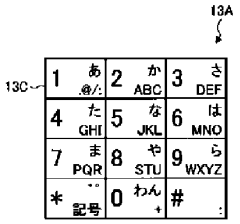
【０１２３】
また、他の変形例として、入力された文字の候補をタッチパネル２に表示し、利用者がどの候補を選択したかに基づいて、利用者がどのような情報を入力しようとしているかを判定することとしてもよい。
【０１２４】
図１３は、候補の選択に基づいて、利用者がどのような情報を入力しようとしているかを判定する場合の携帯電話端末１の動作を示す図である。なお、ステップＳ３１およびステップＳ３２は、図５で説明した状態と同様であるので説明を省略する。
【０１２５】
ステップＳ３２において、縦長の線が手書き入力された結果、第２の文字認識処理においては、英字の「Ｉ」と、平仮名の「し」とが同程度の確度で認識されたものとする。また、第１の文字認識処理においては、数字の「１」が中程度の確度で認識されたものとする。この場合、入力制御部１０Ｂは、ステップＳ３４では、タッチパネル２上の入力文字候補表示領域２０Ｃに、手書き入力された文字の候補として、「Ｉ」、「し」および「１」を表示する。
【０１２６】
ここで、「Ｉ」または「し」の表示領域へのタップがタッチパネル２によって検出された場合、入力制御部１０Ｂは、第２の文字認識処理の認識対象の文字を利用者が入力しようとしていると判定する。そして、入力制御部１０Ｂは、タップされた領域に表示されている文字をメモデータ画面２０Ｂに追加して、発信番号入力画面２０Ａを消去する。
【０１２７】
一方、「１」の表示領域へのタップがタッチパネル２によって検出された場合、入力制御部１０Ｂは、第１の文字認識処理の認識対象の文字を利用者が入力しようとしていると判定する。そして、入力制御部１０Ｂは、タップされた領域に表示されている文字を発信番号入力画面２０Ａに追加して、メモデータ画面２０Ｂを消去する。
【０１２８】
このように、手書き入力された文字の候補を表示して利用者に選択させることにより、入力された文字を正しく認識することが可能になるとともに、選択された候補がどの文字認識処理によって認識されたものであるかに基づいて、利用者がどのような情報を入力しようとしているかを判定することができる。
【０１２９】
なお、図１３に示した例では、第１の文字認識処理の認識結果と、第２の文字認識処理の認識結果との両方を入力文字候補表示領域２０Ｃに表示しているが、一方の文字認識処理の認識結果のみを入力文字候補表示領域２０Ｃに表示することとしてもよい。また、第１の文字認識処理の認識結果と、第２の文字認識処理の認識結果とを別々の領域に表示することとしてもよい。また、第１の文字認識処理の認識結果と、第２の文字認識処理の認識結果とに同じ文字が含まれ、利用者によってその文字が選択された場合は、認識対象の文字が少ない方の文字認識処理の認識対象の文字を利用者が入力しているとみなしてもよい。
【０１３０】
また、第１の文字認識処理に対応する入力画面と第２の文字認識処理に対応する入力画面の両方を表示させている場合に、次に認識された文字（２番目に認識された文字）に基づいて、いずか一方の入力画面のみを表示するようにしてもよい。
【産業上の利用可能性】
【０１３１】
以上のように、本発明に係る文字入力装置、文字入力方法および文字入力プログラムは、文字の入力に有用であり、特に、手書き方式での文字の入力に適している。
【符号の説明】
【０１３２】
１　携帯電話端末

１Ｃ　筐体
１ＣＡ　第１筐体
１ＣＢ　第２筐体
２　タッチパネル
２Ａ　タッチセンサ
２Ｂ　表示部
８　ヒンジ機構
１０　主制御部
１０Ａ　文字認識処理部
１０Ｂ　入力制御部
１１　ＲＡＭ
１１Ａ　第１バッファ
１１Ｂ　第２バッファ
１２　記憶部
１２Ａ　発信プログラム
１２Ｂ　メモプログラム
１２Ｃ　文字入力プログラム
１３　入力部
１３Ａ　キーボード
１３Ｂ　機能キー
１３Ｃ　キー
１４　通信部
１５　マイク
１６　レシーバ
２０Ａ　発信番号入力画面
２０Ｂ　メモデータ画面
２０Ｃ　入力文字候補表示領域

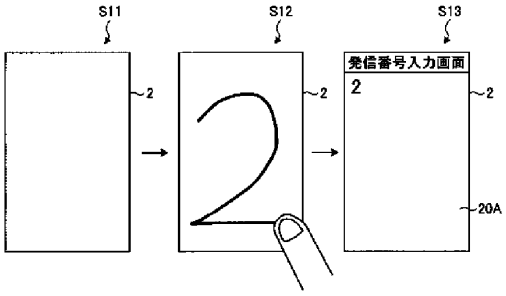
【図１】


1
16
2
1C
1CA
1CB
8
13B
13
13A
15

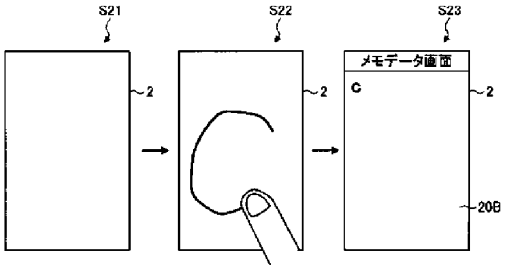
【図２】


13A
13C
1 あ .@/:
2 か ABC
3 さ DEF
4 た GHI
5 な JKL
6 は MNO
7 ま PQR
8 や STU
9 ら WXYZ
* 記号
0 わん +
#

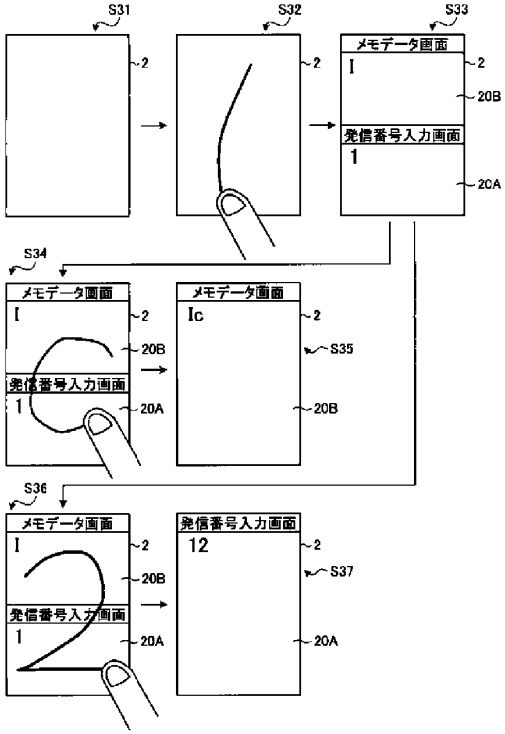
【図３】


S11
S12
S13
2
発信番号入力画面
2
20A

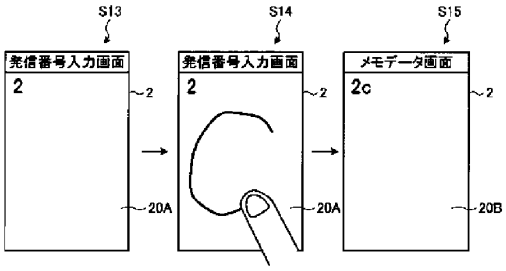
【図４】


S21
S22
S23
2
メモデータ画面
c
20B

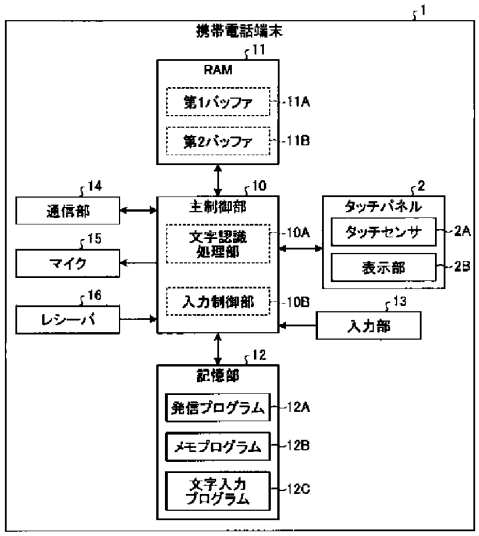
【図５】


S31
S32
S33
2
メモデータ画面
I
20B
発信番号入力画面
1
20A
S34
メモデータ画面
Ic
S35
S36
発信番号入力画面
12
S37

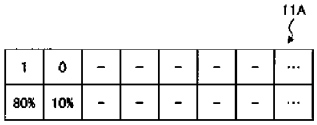
【図６】



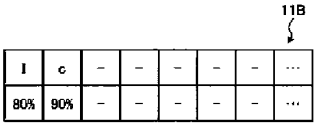
【図７】



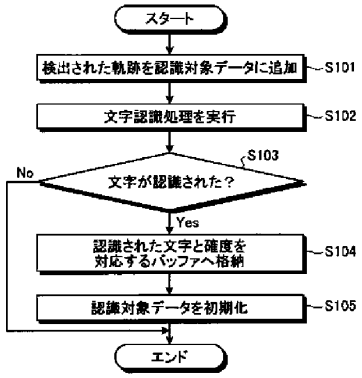
【図８】



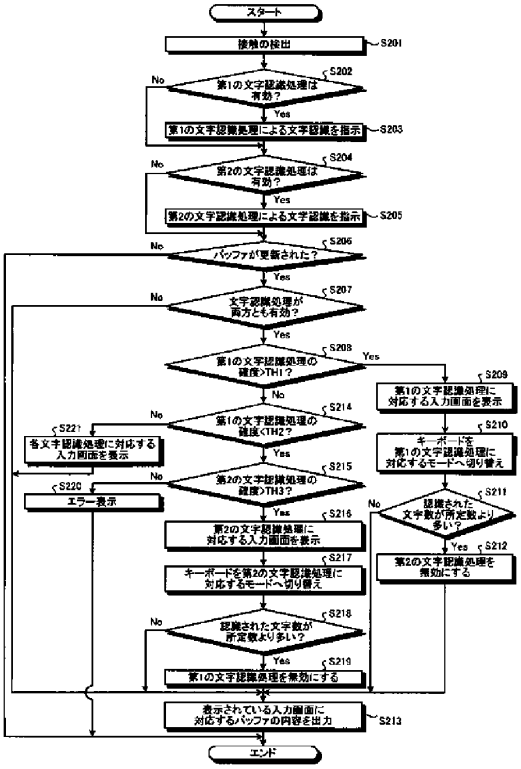
【図９】



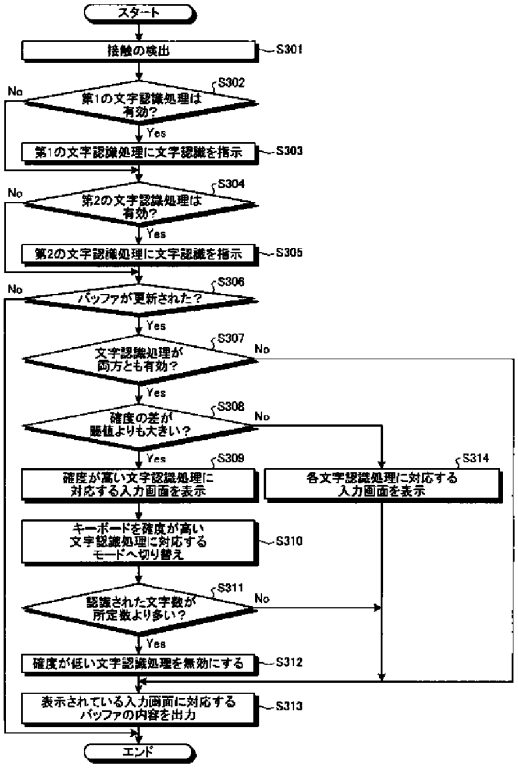
【図１０】



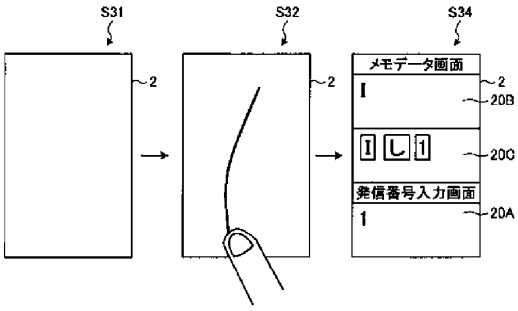
【図１１】


スタート
接触の検出
S201
第1の文字認識処理は有効？
S202
No
Yes
第1の文字認識処理による文字認識を指示
S203
第2の文字認識処理は有効？
S204
第2の文字認識処理による文字認識を指示
S205
バッファが更新された？
S206
文字認識処理が両方とも有効？
S207
第1の文字認識処理の確度>TH1？
S208
第1の文字認識処理に対応する入力画面を表示
S209
第1の文字認識処理の確度<TH2？
S214
各文字認識処理に対応する入力画面を表示
S221
キーボードを第1の文字認識処理に対応するモードへ切り替え
S210
第2の文字認識処理の確度>TH3？
S215
エラー表示
S220
認識された文字数が所定数より多い？
S211
第2の文字認識処理に対応する入力画面を表示
S216
第2の文字認識処理を有効にする
S212
キーボードを第2の文字認識処理に対応するモードへ切り替え
S217
認識された文字数が所定数より多い？
S218
第1の文字認識処理を無効にする
S219
表示されている入力画面に対応するバッファの内容を出力
S213
エンド

【図１２】


スタート
接触の検出
S301
第1の文字認識処理は有効？
S302
No
Yes
第1の文字認識処理に文字認識を指示
S303
第2の文字認識処理は有効？
S304
第2の文字認識処理に文字認識を指示
S305
バッファが更新された？
S306
文字認識処理が両方とも有効？
S307
No
確度の差が閾値よりも大きい？
S308
確度が高い文字認識処理に対応する入力画面を表示
S309
各文字認識処理に対応する入力画面を表示
S314
キーボードを確度が高い文字認識処理に対応するモードへ切り替え
S310
認識された文字数が所定数より多い？
S311
確度が低い文字認識処理を無効にする
S312
表示されている入力画面に対応するバッファの内容を出力
S313
エンド

【図１３】


S31
S32
S34
2
2
メモデータ画面
2
20B
20C
発信番号入力画面
20A

フロントページの続き

Fターム(参考) 5E501 AA04 AC37 BA05 CB05 FA06 FA13
5K127 AA11 BA03 CA08 CA23 CB02 FA02 KA04

Espacenet

Bibliographic data: JP2007316931 (A) — 2007-12-06

HANDWRITTEN CHARACTER INPUT DEVICE

Inventor(s): NAKASHIBA TAKAAKI ± (NAKASHIBA TAKAAKI)

Applicant(s): MITSUBISHI ELECTRIC CORP ± (MITSUBISHI ELECTRIC CORP)

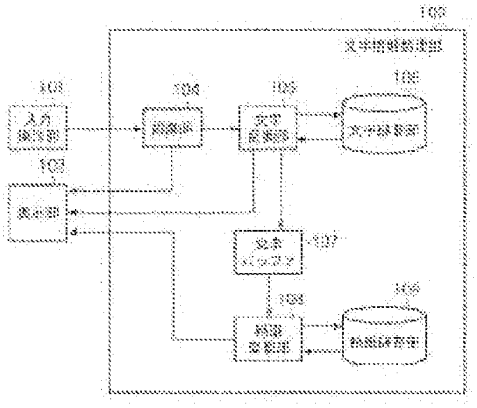
Classification: **- international:** ***G06K9/03; G06K9/62; G06K9/72***
- cooperative:

Application number: JP20060145643 20060525

Priority number(s): JP20060145643 20060525

Abstract of JP2007316931 (A)

PROBLEM TO BE SOLVED: To make input operation simplified and fast so as to enhance its usability without requiring acquisition of special operation. ; SOLUTION: The device includes an input operation part for sequentially and continuously outputting a plurality of handwritten patterns input by handwriting; a recognition part for obtaining a recognized character pattern from the handwritten pattern; a character dictionary part for storing a part of a radical of kanji and its character component as the character data other than a single character; a character conversion part for extracting a plurality of the character candidates including the recognized character pattern in their configurations; a character buffer for holding a plurality of the extracted character candidates and outputting, in a butch, each of the character candidates when there are a plurality of the recognized character



patterns; an idiom conversion part for extracting, from the idiom dictionary part, idiom candidates matching a combination of a plurality of the character candidates given from the character buffer; a display part for displaying the handwriting pattern, the character candidates the idiom candidates the character data fixed in the conversion and the idiom data fixed in the conversion. ; COPYRIGHT: (C)2008,JPO&INPIT

(19)日本国特許庁(JP)　(12)公開特許公報(A)　(11)特許出願公開番号
特開2007-316931
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(51)Int.Cl.			F I			テーマコード（参考）
G06K	9/03	(2006.01)	G06K	9/03	B	5B064
G06K	9/62	(2006.01)	G06K	9/62	G	
G06K	9/72	(2006.01)	G06K	9/72	A	
			G06K	9/72	B	
			G06K	9/03	J	

審査請求 未請求　請求項の数 7　ＯＬ　（全 11 頁）

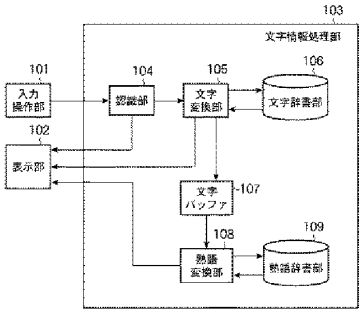
(21)出願番号　特願2006-145643 (P2006-145643)
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Ｆターム(参考)　5B064 AB04 AB16 BA06 DD06 DD18 EA12 EA16 EA19 FA04 FA05 FA13

(54)【発明の名称】手書き文字入力装置

(57)【要約】
【課題】入力操作を簡易に、かつ高速化し、特殊な操作の習得を要しない利用性のよいものとする。
【解決手段】手書き入力された複数の手書きパターンを順次連続して出力する入力操作部と、手書きパターンから認識文字パターンを得る認識部と、単文字以外に文字データとして漢字の部首やその文字構成要素の一部を格納する文字辞書部と、認識文字パターンを構成に含む文字候補を複数抽出する文字変換部と、抽出された複数の文字候補を保持し、認識文字パターンが複数の場合のそれぞれの文字候補をまとめて出力する文字バッファと、文字バッファから与えられる複数の文字候補の組み合わせに一致した熟語候補を熟語辞書部から抽出する熟語変換部と、手書きパターン、文字候補、熟語候補、変換確定した文字データおよび変換確定した熟語データを表示する表示部を備える。
【選択図】図1



【特許請求の範囲】
【請求項1】
入力された手書き文字を認識して所定の形式の文字データに変換する手書き文字入力装置において、
手書き文字入力手段を複数個有し、複数の手書き入力文字に対して複数の手書きパターンを順次連続して出力すると共に、当該手書きパターンを変換した文字候補および熟語候補に対する選択および確定を入力する入力操作部と、
前記入力操作部から出力された手書きパターンを認識して認識文字パターンを得る認識部と、
ひらがな、カタカナ、漢字、漢字の部首、部首以外の文字構成要素および部首以外の文字構成要素の一部のそれぞれを表す文字データを登録格納する文字辞書部と、
前記認識部で得られた認識文字パターンを前記文字辞書部に登録された文字データと照合して、当該認識文字パターンを構成に含む文字データを文字候補として複数抽出する文字変換部と、
前記文字変換部で抽出された複数の文字候補を保持し、前記認識文字パターンが複数の場合に対応したそれぞれの文字候補をまとめて出力する文字バッファと、
前記文字辞書部が持つ文字データの複数を組み合わせて構成した熟語データを登録格納する熟語辞書部と、
前記文字バッファから与えられる複数の文字候補の組み合わせを作り、各組み合わせを前記熟語辞書部に登録された熟語データと照合し、文字候補の組み合わせに一致する熟語データを熟語候補として抽出する熟語変換部と、
手書きパターン、文字候補、熟語候補、変換確定した文字データおよび変換確定した熟語データを確認画面に表示する表示部を備えたことを特徴とする手書き文字入力装置。
【請求項2】
表示部は、手書きパターンに対して変換部から得られる複数の文字候補または熟語変換部から得られる複数の熟語候補を提示する候補リストを有し、
入力操作部は、複数の手書き文字を連続入力するための互いに隣接した複数の文字入力領域と、前記候補リストに提示された文字候補または熟語候補の中から任意の文字データまたは任意の熟語データを選択する手段を有することを特徴とする請求項１記載の手書き文字入力装置。
【請求項3】
入力操作部および表示部は、タッチパネルで一体化された入出力画面で構成されたことを特徴とする請求項２記載の手書き文字入力装置。
【請求項4】
文字変換部は、手書き入力文字の文字入力領域枠内の位置情報に基づいて認識文字パターンを文字候補に変換することを特徴とする請求項２または請求項３記載の手書き文字入力装置。
【請求項5】
文字入力領域枠は、手書き入力された際、認識部で認識された対応する手書きパターンを表示することを特徴とする請求項２から請求項４のうちのいずれか１項記載の手書き文字入力装置。
【請求項6】
文字変換部および熟語変換部は、候補リストに熟語候補が提示された状態において、既入力の手書きパターンを表示している文字入力領域枠内に、求めるべき文字の部首、部首以外の構成要素または部首以外の構成要素の一部が追記された場合に、追記結果の手書きパターンを基に再度文字変換および熟語変換を行って熟語候補を出力することを特徴とする請求項５記載の手書き文字入力装置。
【請求項7】
複数の熟語候補が候補リストに表示されている場合、当該熟語候補に対応する手書きパ

ターンの入力を表示する連続した複数の文字入力領域枠から一つ飛ばした文字入力領域枠に任意の手書きパターンを入力することにより、熟語変換の確定操作とするようにしたこ
と【発明の詳細な説明】に５記載の手書き文字入力装置。
【技術分野】
【0001】
　この発明は、手書きにより入力された文字を認識して予め設定された形式の文字データに変換する手書き文字入力装置に関するものである。
【背景技術】
【0002】
　携帯端末機に適用する文字入力手段の一つとして、携帯端末機に搭載された、タッチパネル等を用いた手書き文字入力装置がある。利用者は、このような装置の入力画面に対して手書き入力を行う場合、スタイラスペン等を用いて１文字ずつの入力を行うことになる。日本語の場合、漢字が多く用いられるが、漢字は１文字あたりの入力画数が多いため、手書き入力は入力時間がかかるという問題がある。また、小型の携帯端末機においては、必然的に文字入力・表示画面の領域が狭くなるため、画数の多い漢字の適切な入力および利用者に選択させるための文字候補の複数表示が困難となる。
【0003】
　これらの問題を解決する方法として、熟語を入力する際に熟語を構成する漢字のうちのいくつかを手書き入力し、残りの文字をハイフンなどの省略記号として入力する方法がある（例えば特許文献１参照）。
　また、別の方法として、手書き入力で部首を入力した後、○、×、△などの特定の入力省略用記号を入力することにより、画数の多い漢字を入力する方法がある（例えば特許文献２参照）。この方法の場合、入力省略記号に対して漢字がマッピングされているため、利用者は入力省略記号およびそれに対する漢字マッピングを習得しなければならないという問題がある。
【0004】
【特許文献1】特開平０９－１２８４８６号公報
【特許文献2】特開平１１－２５００４６号公報
【発明の開示】
【発明が解決しようとする課題】
【0005】
　従来の手書き文字の入力方法には、以上のようなものがあるが、次のような問題がある。特許文献１に記載された方法の場合、文字数の多い熟語や固有名詞に対しては有効な手順であるが、最も一般的な熟語である漢字２文字の熟語においては漢字１つと省略記号の組合せでは候補が大量になってしまい、利用者の入力負荷を十分に減らすことができないという問題がある。
　また、特許文献２に記載された方法の場合、入力省略記号に対して漢字がマッピングされているため、利用者は入力省略記号およびそれに対する漢字マッピングを習得しなければならないという特殊な操作が要求されるという問題がある。
　上記のように、従来技術によれば、手書き入力による画数の多い漢字の高速入力を、利用しやすい一般的な操作で実現するものではない。
【0006】
　この発明は、上記問題点を解決するためになされたもので、入力操作を簡易に、かつ高速化し、特殊な操作の習得を要しない利用性のよいものとする手書き文字入力装置を得ることを目的とする。
【課題を解決するための手段】
【0007】
　この発明に係る手書き文字入力装置は、入力された手書き文字を認識して所定の形式の文字データに変換する手書き文字入力装置において、手書き文字入力手段を複数個有し、複数の手書き入力文字に対して複数の手書きパターンを順次連続して出力すると共に、当

該手書きパターンを変換した文字候補および熟語候補に対する選択および確定を入力する入力操作部と、入力操作部から出力された手書きパターンを認識して認識文字パターンを得る認識部と、ひらがな、カタカナ、漢字、漢字の部首、部首以外の文字構成要素および部首以外の文字構成要素の一部のそれぞれを表す文字データを登録格納する文字辞書部と、認識部で得られた認識文字パターンを文字辞書部に登録された文字データと照合して、認識文字パターンを構成に含む文字データを文字候補として複数抽出する文字変換部と、文字変換部で抽出された複数の文字候補を保持し、認識文字パターンが複数の場合のそれぞれの文字候補をまとめて出力する文字バッファと、文字辞書部が持つ文字データの複数を組み合わせて構成した熟語データを登録格納する熟語辞書部と、文字バッファから与えられる複数の文字候補の組み合わせを作り、各組み合わせを熟語辞書部に登録された熟語データと照合し、文字候補の組み合わせに一致した熟語データを熟語候補として抽出する熟語変換部と、手書きパターン、文字候補、熟語候補、変換確定した文字データおよび変換確定した熟語データを確認画面に表示する表示部を備えたものである。

【発明の効果】

【0008】

この発明によれば、漢字の手書き入力に対しては完全な文字を入力しなくても、文字構成要素の一部のみを入力すれば文字変換を行うことができるため、入力操作を容易にする。また、手書きした複数文字を連続して入力した場合に、複雑な漢字を含む文字列を入力する必要も無く熟語変換できるため、入力操作を容易にし、かつ高速化できる。さらに、表示された文字候補、熟語候補の中から選択、変換確定の操作を行うようにしているので、利用者は特殊な操作を要求されることなく、画面を見ながら直感的に操作することが可能である。

【発明を実施するための最良の形態】

【0009】

実施の形態１.

図１はこの発明の実施の形態１による手書き文字入力装置の機能構成を示すブロック図である。

手書き文字入力装置は、入力操作部１０１、表示部１０２および文字情報処理部１０３を備えている。文字情報処理部１０３は、認識部１０４、文字変換部１０５、文字辞書部１０６、文字バッファ１０７、熟語変換部１０８および熟語変換部１０９を備えている。各部の構成や機能について次に説明する。

文字情報処理部１０３は、ＣＰＵ（Central Processing Unit：中央演算装置）と記憶手段で構成することができる。ＣＰＵは、その演算処理により、認識部１０４、文字変換部１０５および熟語変換部１０８の各機能、文字情報処理部１０３内の各部のデータの入出力機能、また入力操作部１０１、表示部１０２に対するデータの入出力機能を実行する。記憶手段としては、ＲＡＭ（Random Access Memory）、ＲＯＭ（ReadOnly Memory）、その他の記憶装置等が用いられる。例えば、入力された手書きパターンを文字データに変換するための、認識部１０４、文字変換部１０５および熟語変換部１０８の処理プログラムをＲＯＭ内に格納し、文字変換する際に用いる文字辞書部１０６および熟語辞書部１０９をＲＡＭに格納することになる。また、文字変換部１０５より得られる文字データを保持するための文字バッファ１０７をＲＡＭ内に持つようにする。

【0010】

入力操作部１０１は、手書き文字入力手段を複数個有し、複数の手書き入力文字に対して複数の手書きパターンを順次連続して文字情報処理部１０３に出力する手段である。また、入力操作部１０１は、手書きパターンを変換した文字データおよび熟語データに対する選択および確定を入力する手段としても使用される。

表示部１０２は、利用者が文字を視認可能にする機能を有し、手書きパターン、文字情報処理部１０３から与えられる文字候補、熟語候補および変換確定等の文字データおよび熟語データを確認画面に表示する手段である。入力操作部１０１と表示部１０２は、例えばタッチパネルのように物理的に一体化された構成である場合と、入力操作部１０１をタ

ブレットとし、表示部２をディスプレイとする別々の装置からなる場合がある。

【0011】

入力操作部１０１と表示部１０２がタッチパネルで一体化された入出力画面で構成された例を図２に示す。これは携帯端末機への搭載に適しており、タッチパネル２０１には、手書き入力するための文字入力領域枠２０を具備している。文字入力領域枠２０３は、手書き文字を連続して入力できるようにするため、複数個を互いに隣接させて設けている。漢字を入力する場合、一般には漢字そのものを文字入力領域枠２０３に入力することになるが、この発明では部首などの漢字の文字構成要素の一部のみの入力でも済むようにしていることを特徴としている。また、各文字入力領域枠２０３の上部には、それぞれに対応して設けられた変換キー２０７、文字入力領域枠２０３の配列の横に設けられたＥｎｔｅｒキーとＣｌｅａｒキー２０６を備えている。また、表示部１０２として、入力操作部１０１の領域の上部に、文字入力結果表示面２０５を備えている。さらに、手書きパターンに対して得られる文字候補、熟語候補を提示する候補リスト２０４がポップアップ表示されるようになっている。

入力操作部１０１に対する操作は、スタイラスペン２０２を用いて行われる。文字入力領域枠２０３に対する操作であれば手書き文字入力となり、タッチパネル２０１上に表示されたキー２０６，２０７および候補リスト２０４への操作のであればそれ以外の入力操作となる。なお、文字入力領域枠２０３は、入力した筆跡（手書きパターン）の表示にも使用されるが、図４（Ｃ）で後述するように、熟語候補の絞込み時の文字表示に使用される場合もある。

【0012】

個別文字の入力変換の場合は、スタイラスペン２０２により文字入力領域枠２０３の少なくとも一つに手書き入力すると、入力画、筆跡（手書きパターン）に応じて変換された複数の文字候補が候補リスト２０４に表示される。次に候補リスト２０４内の表記候補の一つに、例えばスタイラスペン２０２を接触させることで文字の選択を行い、手書き入力を行った文字入力領域枠の上の変換キー２０７をスタイラスペン２０２で押すことにより選択した文字の文字変換確定を実行することができる。その確定した文字は文字入力結果表示面２０５の文字列に加えられ表示される。変換キー２０７による変換操作では、入力されている手書き文字入力をひらがな、カタカナおよび漢字に変換するだけではなく、漢字の部首、部首以外の文字構成要素あるいは部首以外の文字構成要素の一部に変換して文字候補とすることができる。

一方、熟語の入力変換の場合には、スタイラスペン２０２により複数の文字入力領域枠２０３のそれぞれの面に順次手書き入力を行っていくと、文字入力領域枠２０３それぞれの画、筆跡（手書きパターン）から想定される文字の組み合わせによる複数の熟語候補が候補リスト２０４で表示される。候補リスト２０４内の表記候補の一つに、例えばスタイラスペン２０２を接触させることで熟語の選択を行い、その後スタイラスペン２０２でＥｎｔｅｒキーを押すことにより熟語変換確定を実行することができる。

なお、文字候補や熟語候補の選択などの操作については、スタイラスペン２０２を用いず、携帯端末機に具備された十字方向に入力可能なＣｕｒｓｏｒキーまたはＥｎｔｅｒキーを用いるようにしてもよい。

【0013】

認識部１０４は、入力操作部１０１から出力される手書きパターンを認識して認識文字パターンを得る手段である。入力操作部１０１において手書き文字が入力され、その手書き文字に対して変換操作が行われると、データ認識部１０４では、その手書きパターンを、文字辞書部１０６の文字データと同じ形式の認識文字パターンにして文字変換部１０５に与える。熟語変換の場合は、連続して入力される複数の手書きデータを順次それぞれの認識文字パターンにして出力する。手書きパターンおよび認識文字パターンには、例えば画数やそれぞれの画での入力位置情報といった、入力文字の図形情報以外のデータも含まれる。また、データ認識部１０４は、利用者の操作により文字候補、熟語候補の選択および変換確定がなされた場合はそれらを検知する機能を持っている。さらに、認識部１０４

は、認識した手書きパターンを表示部１０２に表示する機能を持っている。図２の例の場合、手書き入力された字入力領域枠２０３そのものが手書きパターンを表示することになる。

【0014】

文字辞書部１０６は、単一手書き文字向けの辞書データとして、ひらがな、カタカナ、漢字、漢字の部首、部首以外の文字構成要素および部首以外の文字構成要素の一部のそれぞれを表す文字データを登録格納している。この発明では、漢字の部首、部首以外の文字構成要素および部首以外の文字構成要素の一部も辞書データにしている点を特徴としている。また、文字辞書部１０６は、外部により新たに取得した辞書データを追加登録することが可能なものとする。

文字変換部１０５は、認識部１０４からの認識文字パターンを文字辞書部１０６に登録された文字データと照合して、認識文字パターンを構成に含む文字データを文字候補として複数抽出し、文字バッファ１０７に出力すると共に、表示部１０２に出力して表示する。また、表示部１０２で表示された文字候補に対して選択操作が行われたことを認識部２０４で検知した場合、選択された文字候補のみを表示部１０２へ出力し表示する。

【0015】

文字バッファ１０７は、文字変換部１０５で抽出された複数の文字候補を保持し、認識文字パターンが複数の場合に対応したそれぞれの文字候補をまとめて熟語変換部１０８に出力する手段である。また、文字バッファ１０７で保持していた文字候補は、変換対象となった認識文字パターンに対する文字変換あるいは熟語変換が確定された時点で削除される。

熟語辞書部１０９は、文字辞書部１０６が持つ文字データの複数を組み合わせて構成した熟語データを登録格納している。この場合の文字データも、ひらがな、カタカナおよび漢字といった文字だけではなく、部首、部首以外の文字構成要素および部首以外の文字構成要素の一部を意味する。熟語辞書部１０９は、熟語変換部１０８からの問合せに応じて熟語データを返すが、返す熟語データは、漢字熟語だけではなく、送りがなつきの漢字も含む場合もある。また、熟語辞書部１０９は、外部により新たに取得した熟語データを追加登録することが可能なものとする。

【0016】

熟語変換部１０８は、文字バッファ１０７から与えられる認識文字パターンが複数の場合の対応するそれぞれの文字候補を組み合わせ、各組み合わせを熟語辞書部１０９に登録された熟語データと照合し、文字候補の組み合わせに一致した熟語データを熟語候補として抽出して表示部１０２に出力する。文字候補（文字データ）は複数存在するので、熟語候補も複数存在することになる。表示された複数の熟語候補に対して選択操作が行われたことを検知した場合、選択された熟語候補のみを表示部１０２へ出力し表示する。

【0017】

この実施の形態１に係る熟語変換方法の処理例を図３に示し、次に説明する。

文字変換部１０５では、手書き文字１文字ごとの文字変換を行い複数の文字候補を得る。図３（Ａ）の手書きパターンに対して文字変換を行った場合、図３（Ｂ）の表３０３の文字候補が得られるが、文字変換部１０５はこれら候補に対して重み付けを行う。この重み付けは、認識部１０４で得られた認識文字パターンに含まれる文字の画数と各画のペンの動き、および文字入力領域枠２０３内の位置情報を基に計算される。図３（Ａ）を見ると、１文字目となる文字入力領域枠３０１内の手書きパターンは３画であり、右斜め下、右斜め下、右斜め上という筆跡順となっている。また、文字入力領域枠の左上と左下の領域に入力されていることから、筆跡が偏を表している可能性が高いと判定される。その結果、図３（Ｂ）の表３０３の文字候補には、さんずい偏の方が片仮名の「シ」よりも大きく重み付けられる。一方、図３（Ａ）の２文字目となる文字入力領域枠３０２内の手書きパターンに対しては図３（Ｂ）の表３０４の文字候補が得られるが、手書き文字が左上と右上に入力されていることから、冠である可能性が高いとされ、ウ冠、山冠、片仮名の「ウ」の順に重み付けられる。

【0018】
熟語変換部１０８では、複数の手書きパターンに対して文字変換部１０５から出力された文字候補を組み合わせて、その組み合わせに基づいて熟語候補を得るが、この場合、それぞれ組み合わせにおいて文字候補の重み付けの和を求め、その値が大きい組み合わせ順に熟語候補を選定する。図３（Ａ）の場合、表３０３の第一候補さんずいと表３０４の第一候補ウ冠の重みの総和が１３０で最大となるため、一つ目の文字がさんずいを持ち、二つ目の文字がウ冠を持つ熟語データを熟語辞書１０９から抽出して熟語候補とする。熟語辞書１０９には、同一条件での熟語候補の重み付けが熟語の使用頻度および品詞種別により予め設定されている。同様の手順で２番目に重みの和が高い組み合わせ、すなわち１つ目の文字がさんずいを持ち、２つ目の文字が山冠を持つ熟語を熟語辞書１０９の熟語データから抽出して熟語候補に加える。以上のような処理を繰り返すことにより、図３（Ｃ）の表３０５に示すような熟語候補を取得する。熟語変換部１０８は、各文字候補の全ての組み合わせに対する熟語候補を取得した場合、あるいは熟語候補の取得数が規定数に達した場合に熟語変換処理を終了し、取得した熟語候補を表示部１０２へ出力して利用者に提示する。

【0019】
熟語変換部１０８で取得した複数の熟語候補は表示部１０２に出力され候補リストに表示されるが、利用者はこの中から求めるべき熟語の絞り込みを行う。
熟語候補の絞込み方法の一例を図４に示す。まず、入出力画面図４（ａ）において、単文字変換キー４０２を選択して押すことで２文字目を絞り込む。変換キー４０２が押されると、文字データ絞込み画面が図４（ｂ）のように表示される。この画面では文字データが選択リスト４０４に表示される。次に選択リスト４０４にある文字データ候補のうちの一つを選択すると、文字入力絞込み結果が画面図４（ｃ）として表示される。この例では山冠を選択したので、文字入力絞込み結果として画面図４（ｃ）の２つ目の文字入力領域枠４０６に山冠が表示され、候補リスト４０７には２つ目の文字が山冠となる熟語候補のみが表示される。
また、熟語候補の絞込み方法の他の例を図５に示す。図５（イ）の熟語候補が提示された入出力画面に対して、入力済みの文字入力領域枠４０９に、部首、部首以外の構成要素または部首以外の構成要素の一部を手書き入力で追記する。図５（ロ）の画面において、例えば文字入力領域枠４１１のウ冠に、手書きで文字構成要素の書きを加えて「定」の文字を形成する。この追記結果の手書きパターンを基に再度文字変換および熟語変換を行って熟語候補を出力する。結果として、図５（ハ）のように、候補リスト４１３には2文字目が「定」もしくは文字の一部が「定」で構成される熟語候補のみが表示される。

【0020】
次に、熟語変換の確定方法の例を図６に示す。熟語変換確定の操作は、入出力画面上の文字入力領域枠５０１と文字入力領域枠５０２に手書きパターンが入力されている状態において、候補リスト５０６内の熟語候補の１つを選択することにより行われる。また、熟語変換の確定は、Ｅｎｔｅｒキー５０５を選択する操作によっても可能である。さらに、図６において、文字入力領域枠５０１と文字入力領域枠５０２に最初の手書きパターンが入力された状態で、文字入力領域枠５０３を飛ばした次の文字入力領域枠５０４に任意の手書きデータを入力することにより、文字入力領域枠５０１，５０２の手書きパターン対する熟語候補の一つ「明日」を熟語変換確定の操作とするようにしてもよい。

【0021】
図７はこの実施の形態２に係る熟語変換処理例の手順を示すフローチャートであり、図２乃至図５における例に関連して説明する。
まず、利用者により入力操作部１０１の入出力画面に対して手書き入力されると、認識部１０４でこの手書きパターンを認識し、認識文字パターンを文字変換部１０５に入力する（ステップＳＴ６０１）。手書き入力の最初に、例えばさんずいの１画目が文字入力領域枠に入力されたとすると、文字変換部１０５ではその文字変換処理を実行する（ステップＳＴ６０２）。文字変換処理により文字候補を算出すると、文字バッファ１０７に１文

字分の文字候補を入力して保持する（ステップＳＴ６０３）。文字バッファ１０７には、１文字分の候補しか入っていないため（ステップＳＴ６０４）、入出力画面にはその１文字に対応した文字候補が表示される（ステップＳＴ６０５）。次に、さんずいの２画目が入力されると、この操作は変換確定操作ではないため（ステップＳＴ６０６）、手書き入力の続きとして受け付ける（ステップＳＴ６０１）。２画目の入力に対しても１画目と同様に文字変換処理が実行され、文字候補が算出される（ステップＳＴ６０２）。同じ文字に対する入力であるため、既に文字バッファ１０７に保持されている１文字目の文字候補は、２画目の文字変換処理によって算出された文字候補に置き換えられる（ステップＳＴ６０３）。以降は１画目と同等の処理フロー（ステップＳＴ６０４，ＳＴ６０５，ＳＴ６０６，ＳＴ６０１）となり、さんずいの３画目までが入力され、さんずいの筆跡に対応した文字候補が文字バッファ１０７に保持される。なお、この例では１画追加するごとにステップＳＴ６０２で文字変換処理を実行しているが、装置の処理性能が低い場合は文字変換処理を１画ごとには行わないようにしてもよい。その場合には、利用者による文字入力確定の操作または既定時間利用者が無操作であることを検知してから文字変換処理を実行することになる。

【0022】

さんずいの入力後、次の文字入力領域枠にウ冠の１画目が手書き入力されると（ステップＳＴ６０１）。この入力に対して前述の処理フロー同様な文字変換処理が実行される（ステップＳＴ６０３）。新たな手書き文字に対する文字変換処理がなされたので、文字バッファ６０４の更新では、既に入力されている１文字目の文字データを保持したまま、２文字目の文字候補を追加保持する（ステップＳＴ６０３）。このとき文字バッファ１０７には２文字以上に対応した文字候補が存在するため、熟語変換部１０８において、これら文字候補の組み合わせに対して図３（Ｃ）で説明した熟語変換処理が実行される（ステップＳＴ６０８）。熟語変換処理により生成された熟語候補は入出力画面に表示され、利用者による熟語候補の絞込みの操作を待つ（ステップＳＴ６０９）。

【0023】

ステップＳＴ６０９において、利用者が２文字目のウ冠の文字データの絞り込みを行うために手書きパターンに対応した単文字変換キーを押した場合、文字変換部１０５はこの操作が変換確定操作ではなく（ステップＳＴ６１０）、文字変換操作であると判断し（ステップＳＴ６１１）、ウ冠の手書きパターンに対応する文字候補を画面に表示し、利用者の操作を待つ（ステップＳＴ６１２）。このときの画面には、図３（Ｂ）に示したようにウ冠、山冠、カタカナの「ウ」が表示される。次の操作でウ冠が選択されると、単文字の変換確定操作となり（ステップＳＴ６１３）、２文字目がウ冠と確定される。この結果、２文字目をウ冠に固定した熟語変換処理が熟語変換部１０８で実行され（ステップＳＴ６０８）、取得した熟語候補が画面に表示される（ステップＳＴ６０９）。

【0024】

次に、ステップＳＴ６０９において、利用者が、例えば図６で説明したように、Ｅｎｔｅｒボタンの押下を行った場合、文字変換部１０５は熟語変換確定操作と判断し（ステップＳＴ６１０）、入力文字の確定処理を行う（ステップＳＴ６０７）。熟語変換が確定されたため、文字列バッファ１０７がクリアされ、利用者の手書き入力待ち状態に戻る（ステップＳＴ６０１）。

【0025】

以上は熟語変換処理の手順について説明したが、手書き入力の１文字のみ、すなわち個別文字の文字変換処理について図７のフローを用いて説明する。

利用者が手書きで１文字のみを入力すると、上記のフローと同様に手書きパターンを受け取って文字候補を算出して入出力画面に表示する（ステップＳＴ６０１、ＳＴ６０２、ＳＴ６０３、ＳＴ６０４、ＳＴ６０５）。次に、利用者が表示された候補リスト上の文字候補の中の一つを選択すると（ステップＳＴ６０６）、その選択された候補を文字列入力として確定し、文字バッファ１０７に入れて保持していた文字候補をクリアする（ステップＳＴ６０７）。その後、利用者による次の手書き入力の待ち状態に戻る（ステップＳＴ

６０１）。

【0026】

以上のように、この実施の形態１によれば、文字辞書部に、ひらがな、カタカナ、漢字の他に、漢字の部首、部首以外の文字構成要素および部首以外の文字構成要素の一部を文字データとして登録しておき、文字変換部により、手書き入力に対する認識文字パターンを構成に含む文字データ（文字候補）に変換するようにしているので、漢字の手書き入力に対しては完全な文字を入力しなくても、文字構成要素の一部のみを入力すれば文字変換を行うことができるため、入力操作を容易にすることができる。加えて、熟語辞書部に、文字辞書部が持つ文字データの複数を組み合わせて構成した熟語データを登録しておき、手書きした複数文字を連続して入力した場合に、熟語変換部により、上記のように文字変換されたそれぞれの文字データ（文字候補）を組み合わせ、これらの組み合わせに対応する熟語を算出するようにしているので、特に複雑な漢字を含む文字列を入力する必要も無く熟語変換を行うことができるため、入力操作を容易にし、かつ高速化できる。

また、漢字の文字構成要素の一部と仮名を連続入力することにより、送り仮名つきの漢字に対しても容易に入力可能となる。

また、表示部に変換した文字候補、熟語候補を表示させ、これらの候補の中から、選択、変換確定の操作を行うようにしているので、利用者は特殊な操作を要求されることなく、画面を見ながら直感的に操作することができる。

さらに、入力操作部と表示部をタッチパネルで一体化した入出力画面で構成し、スタイラスペンを用いて入力するようにした場合、操作パネルをコンパクトに構成できるので、小型の携帯端末機への使用に適する。

【図面の簡単な説明】

【0027】

【図1】この発明の実施の形態１による手書入力装置の機能構成を示すブロック図である。

【図2】この発明の実施の形態１に係る入力操作部と出力部の入出力画面の例を示す説明図である。

【図3】この発明の実施の形態１に係る熟語変換処理方法の例を示す説明図である。

【図4】この発明の実施の形態１に係る熟語候補絞込み方法の例を示す説明図である。

【図5】この発明の実施の形態１に係る熟語候補絞込み方法の他の例を示す説明図である。

【図6】この発明の実施の形態１に係る熟語候補の確定方法の例を示す説明図である。

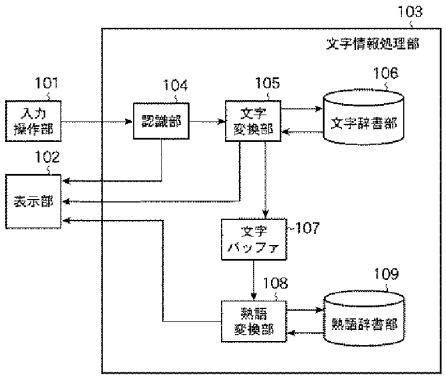
【図7】この発明の実施の形態１に係る変換処理および熟語変換処理の手順を示すフローチャートである。

【符号の説明】

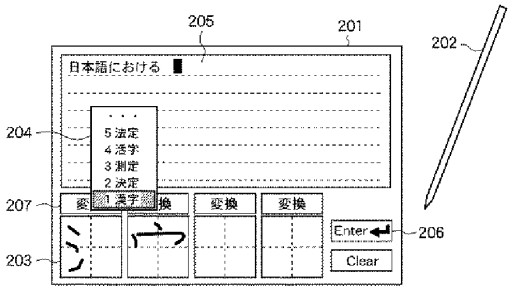
【0028】

１０１　入力操作部、１０２　表示部、１０３　文字情報処理部、１０４　認識部、１０５　文字変換部、１０６　文字辞書部、１０７　文字バッファ、１０８　熟語変換部、１０９　熟語変換部。

【図1】

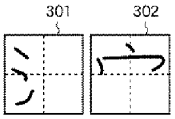


【図2】



【図3】

（A）



（B）

303

文字候補	重み
氵	70
シ	15
ツ	10
冫	5

304

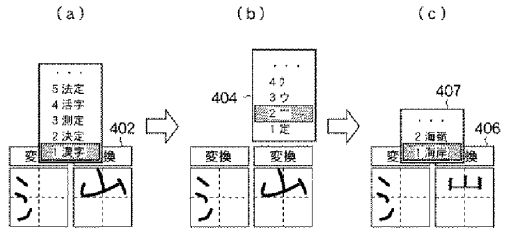
文字候補	重み
宀	60
灬	30
ウ	10

（C）

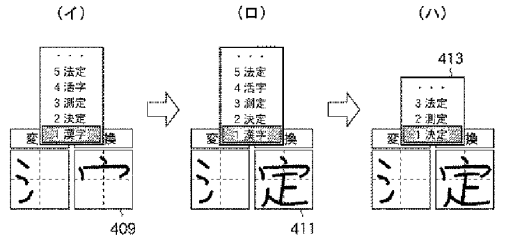
305

組み合わせ	重み	熟語候補	候補順位
氵 宀	130	漢字	1
		決定	2
		測定	3
		活字	4
		法定	5
氵 灬	100	海岸	6
		海嶺	7
氵 ウ	80	–	–

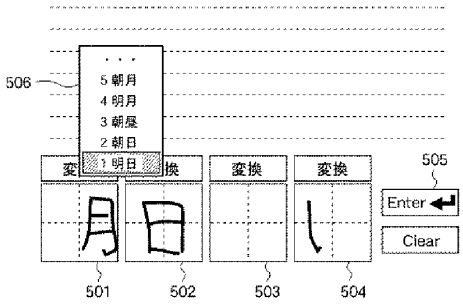
【図4】



【図5】



【図6】



【図7】

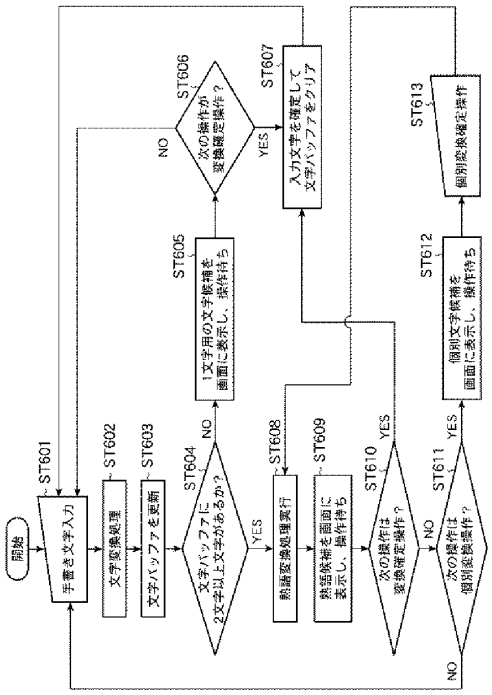


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Electronic Acknowledgement Receipt

EFS ID:	19853855
Application Number:	13652222
International Application Number:	
Confirmation Number:	4390
Title of Invention:	TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES
First Named Inventor/Applicant Name:	Jakob Sternby
Customer Number:	105412
Filer:	Ryan M. Bello/Erica Tollefson
Filer Authorized By:	Ryan M. Bello
Attorney Docket Number:	710078061US
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1		8061US_PPH_Request.PDF	1115571 aeee2007bb42aae2abd26b2a96950eb577fbcfc2	yes	21

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	Transmittal Letter	18	19		
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Warnings:					
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2	Non Patent Literature	NPL_ISR.pdf	1903390 ea10c461934325ab4db74ec113410f3440369561	no	9
Warnings:					
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Information:					
5	Foreign Reference	FOR_JP2000123114.PDF	1975985 70f467ea5b44de7c09049d578db428c4c72bfb3e	no	20
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Information:					
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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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

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

Office of Petitions: Routing Sheet



Application No. 13/652,222

This application is being forwarded to your office for further processing. A decision has been rendered on a petition filed in this application.

[X] **GRANTED**

[ ] **DISMISSED**

[ ] **DENIED**

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/652,222	10/15/2012	Jakob Sternby	710078061US	4390

105412 7590 12/03/2014

Perkins Cole LLP- Nuance
P.O. Box 1247
Seattle, WA 98111-1247

EXAMINER	
SPOONER, LAMONT M	

ART UNIT	PAPER NUMBER
2657	

NOTIFICATION DATE	DELIVERY MODE
12/03/2014	ELECTRONIC

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

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

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

ip.inbox@nuance.com
patentprocurement@perkinscoie.com

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

In re Application of	:
Jakob Sternby, et. al.	: DECISION ON REQUEST TO
Application No.: 13/652,222	: PARTICIPATE IN THE PATENT
Filed: October 15, 2012	: PROSECUTION HIGHWAY
Attorney Docket No.: 710078061US	: PROGRAM AND PETITION
For: TEXT/CHARACTER INPUT	: TO MAKE SPECIAL UNDER
SYSTEM, SUCH AS FOR USE WITH…	: 37 CFR 1.102(a)

This is a decision on the request to participate in the Patent Prosecution Highway (PPH) program and the petition under 37 CFR 1.102(a), filed August 13, 2014, to make the above-identified application special.

The request and petition are **GRANTED**.

DISCUSSION

A grantable request to participate in the PPH pilot program and petition to make special require:

1. The U.S. application for which participation in the Global/IP5 PPH pilot program is requested must have the same earliest date, whether this is the priority date or filing date, as that of a corresponding national or regional application filed with another Global/IP5 PPH participating office or a corresponding PCT international application for which one of the Global/IP5 PPH participating offices was the International Searching Authority (ISA) or the International Preliminary Examining Authority (IPEA).

2. Applicant must:
    a. Ensure all the claims in the U.S. application must sufficiently correspond or be amended to sufficiently correspond to the allowable/patentable claim(s) in the corresponding Office of Earlier Examination (OEE) application and
    b. Submit a claims correspondence table in English;

3. Examination of the U.S. application has not begun;

4. Applicant must submit:
    a. Documentation of prior office action:
        i. a copy of the office action(s) just prior to the "Decision to Grant a Patent" from each of the Global/IP5 PPH participating office application(s) containing the allowable/patentable claim(s) or

ii. if the allowable/patentable claims(s) are from a "Notification of Reasons for Refusal" then the Notification of Reasons for Refusal or
iii. if the Global/IP5 PPH participating office application is a first action allowance then no office action from the Global/IP5 PPH participating office is necessary should be indicated on the request/petition form or
iv. the latest work product in the international phase of the OEE PCT application;

b. An English language translation of the Global/IP5 PPH participating office action or work product from (4)(a)(i)-(ii) or (iv) above;

5. Applicant must submit:
   a. An IDS listing the documents cited by the Global/IP5 PPH participating office examiner in the Global/IP5 PPH participating office action or work product (unless already submitted in this application)
   b. Copies of the documents except U.S. patents or U.S. patent application publications (unless already submitted in this application);

The request to participate in the PPH pilot program and petition comply with the above requirements. Accordingly, the above-identified application has been accorded "special" status.

This application will be forwarded to the examiner for action on the merits commensurate with this decision.

Telephone inquiries concerning this decision should be directed to the undersigned at (571) 272-3226. All other inquiries concerning the examination or status of the application is accessible in the PAIR system at http://www.uspto.gov/ebc.index.html.

/Andrea Smith/
Andrea Smith
Paralegal Specialist
Office of Petitions

Office of Petitions: Decision Count Sheet

Mailing Month 11

Application No. 13652222

13652222

For US serial numbers: enter number only, no slashes or commas. Ex: 10123456
For PCT: enter "51+single digit of year of filing+last 5 numbers", Ex. for PCT/US05/12345, enter 51512345

Deciding Official: SMITH, ANDREA

Count (1) - Palm Credit 13/652,222

Decision: GRANT

FINANCE WORK NEEDED
☐ Select Check Box for YES

GRANT

Decision Type: 652 - Petition to make special-PPH

652

Notes:

Count (2)

Decision: n/a

FINANCE WORK NEEDED
☐ Select Check Box for YES

Decision Type: NONE

Notes:

Count (3)

Decision: n/a

FINANCE WORK NEEDED
☐ Select Check Box for YES

Decision Type: NONE

Notes:

Initials of Approving Official (if required)

If more than 3 decisions, attach 2nd count sheet & mark this box ☐

Printed on: *11/28/2014*

Office of Petitions Internal Document - Ver. 5.0

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

105412 7590 12/17/2014

Perkins Cole LLP- Nuance
P.O. Box 1247
Seattle, WA 98111-1247

EXAMINER
SPOONER, LAMONT M

ART UNIT	PAPER NUMBER
2657	

DATE MAILED: 12/17/2014

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/652,222	10/15/2012	Jakob Sternby	710078061US	4390

TITLE OF INVENTION: TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	03/17/2015

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

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

HOW TO REPLY TO THIS NOTICE:

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

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

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

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

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

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

IMPORTANT REMINDER: 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.

PTOL-85 (Rev. 02/11)

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)

105412 7590 12/17/2014
Perkins Cole LLP- Nuance
P.O. Box 1247
Seattle, WA 98111-1247

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

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

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/652,222	10/15/2012	Jakob Sternby	710078061US	4390

TITLE OF INVENTION: TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	03/17/2015

EXAMINER	ART UNIT	CLASS-SUBCLASS
SPOONER, LAMONT M	2657	704-009000

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

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

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

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

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

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

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

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

5. **Change in Entity Status** (from status indicated above)
❑ Applicant certifying micro entity status. See 37 CFR 1.29
NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
❑ Applicant asserting small entity status. See 37 CFR 1.27
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
❑ Applicant changing to regular undiscounted fee status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

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

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/652,222	10/15/2012	Jakob Sternby	710078061US	4390

105412 7590 12/17/2014

Perkins Cole LLP- Nuance
P.O. Box 1247
Seattle, WA 98111-1247

EXAMINER	
SPOONER, LAMONT M	
ART UNIT	PAPER NUMBER
2657	

DATE MAILED: 12/17/2014

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

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

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

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

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

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

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 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.

Privacy Act Statement

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

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

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

Notice of Allowability	Application No. 13/652,222	Applicant(s) STERNBY ET AL.	
	Examiner LAMONT SPOONER	Art Unit 2657	AIA (First Inventor to File) Status No

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

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

1. ☒ This communication is responsive to *applicant's claims filed 10/15/2012*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *1-20*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

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

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

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

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

/LAMONT SPOONER/ Primary Examiner, Art Unit 2657	12/9/14

DETAILED ACTION

Introduction

1. This office action is in response to applicant's claims filed 10/15/2012. Claims 1-20 are currently pending and have been examined. Applicant's IDS have been considered. There is no claim to foreign priority is acknowledged. The Examiner notes the granted Patent Prosecution Highway request and petition to make special as granted 12/3/2014.

2. The present application is being examined under the pre-AIA first to invent provisions.

EXAMINER'S AMENDMENT

3. 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.

Authorization for this examiner's amendment was given in a telephone interview with Ryan Bello on 12/9/2014.

- In **claim 1**, lines 22-25, replace "input-

(i) editing the first candidate sequence, or

(ii) representing a space character or,

(iii) selecting a word; and"

with - -input editing the first candidate sequence, representing a space character, or selecting a word; and- -.

- In **claim 7** line 1, replace "thedictionaries of words" with - -the dictionaries of words- -.
- In **claim 9** line 1, replace "one computer-readable" with - -one non-transitory computer-readable- -.
- In **claim 14**, line 8, replace "to –" with - -to:- -

Allowable Subject Matter

4. Claims 1-20 are allowed.

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

The instant application is deemed to be directed to a non-obvious improvement over the invention patented in Yaeger et al. (Yaeger, US 7,894,641), Goldstein (US 2007/0286486), Williamson et al. (Williamson, US 7,457,466), Qui et al. (Qui, US 7,974,979), Kwok et al. (Kwok, US 2002/0150295), Wang et al. (Wang, US 2009/02289273).

Yaeger teaches employing a word segmentation model to characters as they are inputted or received by a mobile device, notification to an

application the existence of a phrase and forwarding the phrase, if requested. Yaeger further teaches sending a first sequence portion to an application based on a termination event, wherein the termination event is one of, time based, space input, start of a new word, wherein this type of recognition is deemed, "on the fly." Goldstein teaches a selected word, validated and sent to an application based upon validation. Williamson teaches a particular selected word is recognized, based upon selection, then an automatic process of recognition and generating a new word list, “without requiring any user input that specifically selects the new word by placing a cursor on the new word”. Qui teaches inquiry-oriented user input, including handwriting recognition. Kwok teaches word recognition using adaptive learning based on user edit. Wang teaches word recognition, based on user input on a mobile device and selection thereof. However, Neither Yaeger, Goldstein, Willimanson, Qui, Kwok or Wang teach alone or in obvious combination:

Regarding **claim 1**, “A method for data input on a touchscreen of a mobile device, the method comprising: receiving a first user input, wherein the first user input is **handwritten input received on the touchscreen of the mobile device**; determining **a first recognized sequence** based on

the first user input; wherein the first recognized sequence is a best match of the first user input; **writing the first recognized sequence to a memory storage buffer of the mobile device**; generating a first candidate sequence, wherein the first candidate sequence is a best match of one or more recognized sequences; **presenting the first candidate sequence to the user, wherein the presenting includes displaying the first candidate sequence to the user and allowing the user to edit the first candidate sequence**; **identifying at least a first sequence portion of the first candidate sequence wherein the identifying is at least partially based on one or more rules or dictionaries of words** accessible to the mobile device; **removing the first sequence portion from the memory storage buffer**, **wherein the removing is performed in the absence of receiving user input editing the first candidate sequence, representing a space character, or selecting a word**; and **sending the first sequence portion to an application running on the mobile device**."

Regarding **claim 9**, "At least one non-transitory computer-readable storage medium storing instructions for data input, wherein the data input is performed at a wireless device having a processor and a memory,

comprising: **receiving a first user input and at least a second user input**; **wherein the first and second user input are handwritten input** received on a handwriting input area of the wireless device; determining **a first sequence based on a best match of the first and second user inputs**, wherein the first sequence includes at least the first input; **storing the first sequence to a memory of the mobile device**; **automatically determining that at least a portion of the sequence matches a word or phrase in a database of acceptable words and/or phrases without the user inputting a space or selecting a word**; and **sending the first sequence to an application or service** running on, or accessible by, the wireless device, wherein the sending comprises **removing the first sequence from the memory storage buffer**, **and wherein the sending is performed in the absence of user editing of the first sequence**."

Regarding **claim 14**, "A data processing apparatus, comprising: at least one processor; at least one memory coupled to the processor; data input and data output components coupled to the processor, wherein the data output component includes a visual display device; and wherein the data input component includes at least an area for receiving hand written character input; wherein the data processing apparatus is configured to:

receive first character data representing **a first handwritten character input to the data input component**; determine a likely first displayable character associated with the first character data; store the likely first character data in the memory; **receive second character data representing a second handwritten character input to the data input component**; determine a likely second displayable character associated with the second character data; store the likely second character data in the memory; **receive third character data representing a third handwritten character input to the data input component**; determine a likely third displayable character associated with the third character data; store the likely third character data in the memory; **determine a final value for at least the likely first character based on the likely first, likely second and likely third character data stored in the memory, wherein determining the final value is performed without the user inputting a space gesture or selecting a button to accept the likely first character**, and wherein determining the final value is performed by comparing the likely first, second and third characters to a linguistic database; and, **remove the likely first data character from the memory after determining the final value for at least the first character**."

Dependent claims 2-8, 10-13 and 15-20 are allowed, as they depend from their respective allowed parent claims.

5. 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.”

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure (See PTO-892).

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAMONT SPOONER whose telephone number is (571)272-7613. The examiner can normally be reached on 8:00 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, David Hudspeth can be reached on 571/272-7843. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/LAMONT SPOONER/
Primary Examiner, Art Unit 2657

lms
12/9/14

Notice of References Cited	Application/Control No. 13/652,222	Applicant(s)/Patent Under Reexamination STERNBY ET AL.	
	Examiner LAMONT SPOONER	Art Unit 2657	Page 1 of 2

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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
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	Q					
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	S					
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Notice of References Cited	Application/Control No. 13/652,222	Applicant(s)/Patent Under Reexamination STERNBY ET AL.	
	Examiner LAMONT SPOONER	Art Unit 2657	Page 2 of 2

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*	C	US-7,894,641 B2	02-2011	Yaeger et al.	382/119
*	D	US-7,974,979 B2	07-2011	Qiu et al.	707/748
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	H	US-			
	I	US-			
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	L	US-			
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Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Camera **phone** based motion sensing: interaction techniques, applications and performance study

J Wang, S Zhai, J Canny - Proceedings of the 19th annual ACM ..., 2006 - dl.acm.org

... Instead of restrict- ing gesture/**handwriting** to be single stroke or setting a timeout threshold to **...** size of the recognizer is around 800KB including both the code and the **recognition** library. **...** On the Motorola v710 **phone**, it takes 15- 20ms to recognize a **handwritten** Roman **character ...**

Cited by 141 Related articles All 15 versions Import into BibTeX Save More

Shorthand writing on stylus keyboard

S Zhai, PO Kristensson - Proceedings of the SIGCHI conference on ..., 2003 - dl.acm.org

... Many pattern **recognition** techniques have been previously invented for "online" **handwriting recognition**, including template matching **...** the shortest distance to the sample is returned as the **recognized** word. **...** Note that since the **recognition** is online (real time), the system takes the **...**

Cited by 201 Related articles All 19 versions Import into BibTeX Save More

Forty years of research in **character** and document **recognition**—an industrial perspective

H Fujisawa - Pattern **Recognition**, 2008 - Elsevier

... People are re-evaluating the importance of **handwriting** and trying to integrate it into the **...** States, Europe, and Japan to develop address readers that could recognize freely **handwritten** and printed **...** The **recognition** task was to identify an exact delivery point by **recognizing** the full **...**

Cited by 97 Related articles All 5 versions Import into BibTeX Save More

A system for spoken query information retrieval on **mobile devices**

E Chang, F Seide, HM Meng, Z Chen... - Speech and Audio ..., 2002 - ieeexplore.ieee.org

... character output after five iterations are used as our **recognized Chinese** string for **...** using speech on **mobile devices** com- pared to using **handwriting recognition** or the **...** AND ITS BASE-SYLLABLE' S REPRESENTATIONS GIVEN THE **RECOGNITION CHARACTER** ERROR RATE **...**

Cited by 68 Related articles All 11 versions Import into BibTeX Save More

Chinese character handwriting recognition system

MR Longe, B Palmer - US Patent 6,970,599, 2005 - Google Patents

... FIG. 2 is a flow diagram illustrating a method for inputting **handwritten Chinese characters** in a predictive **...** 4O illustrates the Stroke **Recognition** Interface when a third desired **character** is selected without **...** In a typical embodiment, the stroke entry means is a **handwriting** input area **...**

Cited by 29 Related articles All 4 versions Import into BibTeX Save More

Multiple pen stroke **character** set and **handwriting recognition** system with immediate response

JC Hawkins, JK Sipher, MII Ron - US Patent 6,493,464, 2002 - Google Patents

... The present invention provides such a **handwritten** text **recognition** system. **...** or stylus as an input **device** to a pen-based computer **handwriting recognition** system capable **...** The invention teaches a system which provides true immediate **character recognition**, yet allows **characters ...**

Cited by 70 Related articles All 3 versions Import into BibTeX Save More

Method, **device** and computer program for **recognition** of a **handwritten character**

A Holtsberg - 2002 - Google Patents

... [0002] There is an increasing need for **recognition** of **handwriting**. **...** Thus, the size of the **handwritten character** is not crucial for **recognition**. **...** corresponding position features of the reference **characters** are easily related to the position features of the **handwritten character** to which **...**

Cited by 34 Related articles All 4 versions Import into BibTeX Save More

Keyboard for personal information **device**

CD Ai, MMY Tsai, W Wang - US Patent 5,661,476, 1997 - Google Patents

... on a computationally intensive mechanism, like the voice or **handwriting recognition** techniques discussed **...** the English alphabet, this method is applicable to selecting **Chinese characters**, and **characters ...** key of the two-keystroke sequence is received and **recognized**, the letters **...**

Cited by 39 Related articles All 2 versions Import into BibTeX Save More

Emerging technologies: **Mobile** apps for **language** learning

R Godwin-Jones - **Language** Learning & Technology, 2011 - llt.msu.edu

... functionality through a large number of paid add-ons such as specialized dictionaries, enhanced **handwriting recognition**, and optical **character recognition**. **...** keyboard's text input system, making it possible on the iPhone, for example, to enter **Chinese characters** by drawing **...**

Cited by 102 Related articles All 6 versions Import into BibTeX Save More

Pop-up keyboard system for entering **handwritten** data into computer generated forms

AC Lamb Jr - US Patent 5,276,794, 1994 - Google Patents

... System and method for identifying form type in a **handwriting recognition** based form ... Method of combining data entry of **handwritten symbols** with displayed **character** data. ... and methods for spacing, storing and **recognizing** electronic representations of **handwriting**, printing and ...
Cited by 75 Related articles All 2 versions Import into BibTeX Save More

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CONFIRMATION NO. 4390

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
13/652,222	10/15/2012	704	2657	710078061US

APPLICANTS
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INVENTORS
Jakob Sternby, Lund, SWEDEN;
Lars Jonas Morwing, Malmo, SWEDEN;
Jonas Andersson, Malmo, SWEDEN;
Christer Friberg, Lund, SWEDEN;

**** CONTINUING DATA ************************** NONE /LS/

**** FOREIGN APPLICATIONS ************************** NONE /LS/

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10/31/2012

Foreign Priority claimed ☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☑ No Verified and Acknowledged /LAMONT M SPOONER/ Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		SWEDEN	12	20	3

ADDRESS
Perkins Cole LLP- Nuance
P.O. Box 1247
Seattle, WA 98111-1247
UNITED STATES

TITLE
TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
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	13652222	STERNBY ET AL.
	Examiner	Art Unit
	LAMONT SPOONER	2657

CPC- SEARCHED		
Symbol	Date	Examiner
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CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
704	1, 9, 10	12/9/14	LS
707	706-708	12/9/14	LS
382	186, 187	12/9/14	LS

SEARCH NOTES		
Search Notes	Date	Examiner
East	12/9/14	LS
Google Scholar	12/9/14	LS

INTERFERENCE SEARCH			
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 2

Complete if Known	
Application Number	13/652,222-Conf. #4390
Filing Date	October 15, 2012
First Named Inventor	Jakob Sternby
Art Unit	2657
Examiner Name	L. M. Spooner
Attorney Docket Number	0710078061US

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

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Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]
	BA	JP-2000123114-A	04-28-2000	Casio Computer Co Ltd		
	BB	JP-2000200143-A	07-18-2000	Casio Computer Co Ltd		
	BC	JP-2007316931-A	12-06-2007	Mitsubishi Electric Corp		
	BD	JP-2012048589-A	03-08-2012	Kyocera, Corp		
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Examiner Signature	/Lamont Spooner/	Date Considered	12/09/2014

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Sheet 2 of 2

Complete if Known	
Application Number	13/652,222-Conf. #4390
Filing Date	October 15, 2012
First Named Inventor	Jakob Sternby
Art Unit	2657
Examiner Name	L. M. Spooner
Attorney Docket Number	0710078061US

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
	CA	International Search Report and Written Opinion for International Application No. PCT/US2013/064717, mailing date 1/22/2014, 9 pages.	

Examiner Signature	/Lamont Spooner/	Date Considered	12/09/2014

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

[1]Applicant's unique citation designation number (optional). [2]Applicant is to place a check mark here if English language Translation is attached.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /L.S./

PTO/SB/08a (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
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Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 2

Complete if Known	
Application Number	13/652,222-Conf. #4390
Filing Date	October 15, 2012
First Named Inventor	Jakob Sternby
Art Unit	2658
Examiner Name	Not Yet Assigned
Attorney Docket Number	710078061US

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-20060274051-A1	12-07-2006	Longe et al.	
		US-20080244446	10-02-2008	LeFevre et al.	
		US-20100121870	05-13-2010	Unruh et al.	
		US-6,307,549	10-23-2001	King et al.	
		US-7,177,473	02-13-2007	Aharonson	
		US-7,610,189	10-27-2009	Mackie	
		US-7,756,335	07-13-2010	Sternby	
		US-8,036,645	10-11-2011	Roundtree et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]
		WO-201113057	09-15-2011			

Examiner Signature	/Lamont Spooner/	Date Considered	12/09/2014

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. * CITE NO.: Those application(s) which are marked with an single asterisk (*) next to the Cite No. are not supplied (under 37 CFR 1.98(a)(2)(iii)) because that application was filed after June 30, 2003 or is available in the IFW. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

71007-8061/LEGAL26589033.1

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /L.S./

PTO/SB/08b (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 2 of 2

Complete if Known	
Application Number	13/652,222-Conf. #4390
Filing Date	October 15, 2012
First Named Inventor	Jakob Sternby
Art Unit	2658
Examiner Name	Not Yet Assigned
Attorney Docket Number	710078061US

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		Stroke (CJK character) [online], Wikipedia, [retrieved on 2012-03-08]. Retrieved from the Internet: URL: https://en.wikipedia.org/wiki/Stroke_(CJKV_character), 9 pages.	

Examiner Signature	/Lamont Spooner/	Date Considered	12/09/2014

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

[1]Applicant's unique citation designation number (optional). [2]Applicant is to place a check mark here if English language Translation is attached.

71007-8061/LEGAL26589033.1

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /L.S./

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13652222	STERNBY ET AL.
	Examiner	**Art Unit**
	LAMONT SPOONER	2657

CPC						
Symbol					**Type**	**Version**
G06F		17	/	2785	F	2013-01-01
G06F		17	/	242	I	2013-01-01
G06F		3	/	04883	I	2013-01-01
G06F		3	/	018	I	2013-01-01
G06F		3	/	0237	I	2013-01-01
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CPC Combination Sets							
Symbol				**Type**	**Set**	**Ranking**	**Version**
			/				
			/				

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	20	
/LAMONT SPOONER/ Primary Examiner.Art Unit 2657	12/9/14	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	2

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13652222	STERNBY ET AL.
	Examiner	**Art Unit**
	LAMONT SPOONER	2657

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED					
704	9	G	0	6	F	17 / 27 (2006.01.01)						

CROSS REFERENCE(S)					
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
704	1	10			
382	186	187			
707	706	707	708		

NONE		Total Claims Allowed: 20	
(Assistant Examiner)	(Date)		
/LAMONT SPOONER/ Primary Examiner.Art Unit 2657	12/9/14	O.G. Print Claim(s) 1	O.G. Print Figure 2
(Primary Examiner)	(Date)		

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13652222	STERNBY ET AL.
	Examiner	**Art Unit**
	LAMONT SPOONER	2657

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

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1		17												
	2		18												
	3		19												
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	9														
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	11														
	12														
	13														
	14														
	15														
	16														

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 20	
/LAMONT SPOONER/ Primary Examiner.Art Unit 2657 (Primary Examiner)	12/9/14 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 2

U.S. Patent and Trademark Office Part of Paper No. 20141209

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/652,222	10/15/2012	Jakob Sternby	710078061US	4390

105412 7590 01/22/2015

Perkins Cole LLP- Nuance
P.O. Box 1247
Seattle, WA 98111-1247

EXAMINER	
SPOONER, LAMONT M	

ART UNIT	PAPER NUMBER
2657	

NOTIFICATION DATE	DELIVERY MODE
01/22/2015	ELECTRONIC

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

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

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

ip.inbox@nuance.com
patentprocurement@perkinscoie.com

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

Application No. : 13652222
Applicant : Sternby
Filing Date : 10/15/2012
Date Mailed : 01/22/2015

NOTICE TO FILE CORRECTED APPLICATION PAPERS

Notice of Allowance Mailed

This application has been accorded an Allowance Date and is being prepared for issuance. The application, however, is incomplete for the reasons below.

Applicant is given two (2) months from the mail date of this Notice within which to respond. This time period for reply is extendable under 37 CFR 1.136(a) for only TWO additional MONTHS.

The informalities requiring correction are indicated in the attachment(s). If the informality pertains to the abstract, specification (including claims) or drawings, the informality must be corrected with an amendment in compliance with 37 CFR 1.121 (or, if the application is a reissue application, 37 CFR 1.173). Such an amendment may be filed after payment of the issue fee if limited to correction of informalities noted herein. See Waiver of 37 CFR 1.312 for Documents Required by the Office of Patent Publication, 1280 Off. Gaz. Patent Office 918 (March 23, 2004). In addition, if the informality is not corrected until after payment of the issue fee, for purposes of 35 U.S.C. 154(b)(1)(iv), "all outstanding requirements" will be considered to have been satisfied when the informality has been corrected. A failure to respond within the above-identified time period will result in the application being ABANDONED.

See attachment(s).

A copy of this notice MUST be returned with the reply. Please address response to "Mail Stop Issue Fee, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450".

/Anita Grimmage/
Publication Branch
Office of Data Management
(571) 272-4200

Application No. 13652222 **Drawings filed: 12/20/2012**

IDENTIFICATION OF DRAWING DEFICIENCIES

- [ ] There is a hole or the image thereof within the illustration. FIG(s)
- [ ] The illustration is penetrated or traversed by a solid or broken line that is not intended to be part of the drawing, such as a dark line caused by a flaw in the copying process. FIG(s)
- [ ] An ink stamp or the image thereof obscures part of the illustration. FIG(s)
- [ ] The drawing is marred by black smudges, obliterations, or fax/copier marks (for example, speckles or dots in a substantial portion of the drawing). FIG(s)
- [ ] Figure numbers are duplicated or missing. FIG(s)
- [ ] Drawing sheet or figure is missing. FIG(s)
- [ ] Numbers, letters, or reference characters in the drawing have been crossed out or are illegibly handwritten. FIG(s)
- [ ] The character of the lines, numbers, and letters is poor. FIG(s)
- [ ] The drawing's background shows that the original drawing was made on graph paper or other paper with a pattern or decoration. FIG(s)
- [ ] The FIG. number label is placed in a location that causes the drawing to be read upside down. FIG(s)
- [ ] Data, a reference number, or part of the drawing is truncated or missing, or a lead line has no reference number. FIG(s)
- [X] The drawing and/or the FIG. label contain(s) foreign language. FIG(s) 5a, 5b, 5c, 5d
- [ ] This utility application contains a photograph of a view that is capable of being illustrated as a line drawing. FIG(s)
- [ ] A petition under 37 CFR 1.84(a)(2) to accept color drawings has been granted, but the brief description of the drawings in the specification does not contain (or has not been amended to contain) the paragraph required by 37 CFR 1.84(a)(2)(iii).
- [ ] This reissue application contains amended drawings that are not labeled as "Amended" as required by 37 CFR 1.173(b)(3). FIG(s)
- [ ] OTHER:
- [ ] COMMENTS:

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)

105412
PERKINS COIE LLP
P.O. Box 1247
Seattle, Washington 98111-1247

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

Certificate of Mailing or Transmission

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

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/652,222	10/15/2012	Jakob Sternby	0710078061US	4390

TITLE OF INVENTION: TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960.00			$960.00	03/17/2015

EXAMINER	ART UNIT	CLASS-SUBCLASS
L. M. Spooner	2657	704-009

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

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

1 Perkins Coie LLP
2
3

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

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document 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: Nuance Communications, Inc.

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Burlington, Massachusetts

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

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

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- [ ] A check is enclosed.
- [X] Payment by credit card.
- [ ] The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number 50-0665 (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- [ ] Applicant certifying micro entity status. See 37 CFR 1.29 — NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- [ ] Applicant asserting small entity status. See 37 CFR 1.27 — NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- [ ] Applicant changing to regular undiscounted fee status. — NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

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

Authorized Signature /Ryan M. Bello/ Date March 16, 2015

Typed or printed name Ryan M. Bello Registration No. 67,556

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
Jakob Sternby et al.

Application No.: 13/652,222 Confirmation No.: 4390

Filed: October 15, 2012 Art Unit: 2626

For: TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES Examiner: Lamont M. Spooner

RESPONSE TO NOTICE TO FILE CORRECTED APPLICATION PAPERS

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

Dear Commissioner:

In response to the Notice to File Corrected Application Papers mailed January 22, 2015 ("The Notice"), the Applicant respectfully requests that the Publications Branch withdraw the Notice and allow the Drawings as amended on December 20, 2012, to issue with the patent.

In the Notice, the Publications Branch indicates that replacement sheets are required for FIGS. 5A-5D because the figures contain foreign language. The foreign language text shown in Figures 5A-5D is shown, however, for illustrative purposes only. FIGS. 5A-5D show examples of receiving one or more user inputs (e.g., character 514 in FIG. 5A) and displaying a corresponding candidate character sequence (e.g., character sequence 532 in FIG. 5A) that is generated based on the received user input. Changing the foreign language text shown in FIGS. 5A-5D (e.g., the character sequence 532 in FIG. 5A) to Roman alphabet characters would lead to confusion since

the received user inputs shown in these figures (e.g., the character 514 in FIG. 5A) generally correspond to foreign language characters. For more information, please refer to paragraphs [0049]-[0054] of the Applicant's Specification.

Accordingly, for at least the reasons above, the Applicant respectfully requests that the Notice to File Corrected Application Papers be withdrawn. If the Publications Branch or Examiner has any questions or believes a telephone conference would expedite prosecution of this application, he is encouraged to contact the undersigned at (206) 359-6847.

Please charge any underpayment or credit any overpayment to our Deposit Account No. 50-0665, under Order No. 071007-8061.US00, from which the undersigned is authorized to draw.

Dated: 16 March 2015

Respectfully submitted,

By /Ryan M. Bello/
Ryan M. Bello
Registration No.: 67,556

Perkins Coie LLP
P.O. Box 1247
Seattle, WA 98111-1247
Phone: (206) 359-6847
Fax: (206) 359-7198
Agent for Applicant

REVIEWED
By Adrienne Lenox at 9:08 am, Jan 23, 2015

071007-8061.US00
RMB/KS

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/652,222	10/15/2012	Jakob Stemby	710078061US	4390

105412 7590 01/22/2015

Perkins Cole LLP- Nuance
P.O. Box 1247
Seattle, WA 98111-1247

EXAMINER	
SPOONER, LAMONT M	

ART UNIT	PAPER NUMBER
2657	

NOTIFICATION DATE	DELIVERY MODE
01/22/2015	ELECTRONIC

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

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

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

ip.inbox@nuance.com
patentprocurement@perkinscoie.com

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

Application No. : 13652222
Applicant : Sternby
Filing Date : 10/15/2012
Date Mailed : 01/22/2015

NOTICE TO FILE CORRECTED APPLICATION PAPERS

Notice of Allowance Mailed

This application has been accorded an Allowance Date and is being prepared for issuance. The application, however, is incomplete for the reasons below.

Applicant is given two (2) months from the mail date of this Notice within which to respond. This time period for reply is extendable under 37 CFR 1.136(a) for only TWO additional MONTHS.

The informalities requiring correction are indicated in the attachment(s). If the informality pertains to the abstract, specification (including claims) or drawings, the informality must be corrected with an amendment in compliance with 37 CFR 1.121 (or, if the application is a reissue application, 37 CFR 1.173). Such an amendment may be filed after payment of the issue fee if limited to correction of informalities noted herein. See Waiver of 37 CFR 1.312 for Documents Required by the Office of Patent Publication, 1280 Off. Gaz. Patent Office 918 (March 23, 2004). In addition, if the informality is not corrected until after payment of the issue fee, for purposes of 35 U.S.C. 154(b)(1)(iv), "all outstanding requirements" will be considered to have been satisfied when the informality has been corrected. A failure to respond within the above-identified time period will result in the application being ABANDONED.

See attachment(s).

A copy of this notice MUST be returned with the reply. Please address response to "Mail Stop Issue Fee, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450".

/Anita Grimmage/
Publication Branch
Office of Data Management
(571) 272-4200

Application No. 13652222 **Drawings filed: 12/20/2012**

IDENTIFICATION OF DRAWING DEFICIENCIES

- [ ] There is a hole or the image thereof within the illustration. FIG(s)
- [ ] The illustration is penetrated or traversed by a solid or broken line that is not intended to be part of the drawing, such as a dark line caused by a flaw in the copying process. FIG(s)
- [ ] An ink stamp or the image thereof obscures part of the illustration. FIG(s)
- [ ] The drawing is marred by black smudges, obliterations, or fax/copier marks (for example, speckles or dots in a substantial portion of the drawing). FIG(s)
- [ ] Figure numbers are duplicated or missing. FIG(s)
- [ ] Drawing sheet or figure is missing. FIG(s)
- [ ] Numbers, letters, or reference characters in the drawing have been crossed out or are illegibly handwritten. FIG(s)
- [ ] The character of the lines, numbers, and letters is poor. FIG(s)
- [ ] The drawing's background shows that the original drawing was made on graph paper or other paper with a pattern or decoration. FIG(s)
- [ ] The FIG. number label is placed in a location that causes the drawing to be read upside down. FIG(s)
- [ ] Data, a reference number, or part of the drawing is truncated or missing, or a lead line has no reference number. FIG(s)
- [X] The drawing and/or the FIG. label contain(s) foreign language. FIG(s) 5a, 5b, 5c, 5d
- [ ] This utility application contains a photograph of a view that is capable of being illustrated as a line drawing. FIG(s)
- [ ] A petition under 37 CFR 1.84(a)(2) to accept color drawings has been granted, but the brief description of the drawings in the specification does not contain (or has not been amended to contain) the paragraph required by 37 CFR 1.84(a)(2)(iii).
- [ ] This reissue application contains amended drawings that are not labeled as "Amended" as required by 37 CFR 1.173(b)(3). FIG(s)
- [ ] OTHER:
- [ ] COMMENTS:

Docket No.: 0710078061US
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Sternby et al.

Application No.: 13/652,222 | Confirmation No.: 4390

Filed: October 15, 2012 | Art Unit: 2657

For: TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES | Examiner: L. M. Spooner

COMMENTS ON STATEMENT OF REASONS FOR ALLOWANCE

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

Madam:

In the Notice of Allowability mailed December 17, 2014, the Examiner allowed claims 1-20. Although applicant agrees with the Examiner's conclusion that these claims are allowable, applicant notes that the claims may be allowable for reasons other than those identified by the Examiner and does not concede that the Examiner's characterizations of the terms of the claims and the prior art are correct.

Dated: March 16, 2015

Respectfully submitted,

Electronic signature: /Ryan M. Bello/
Ryan M. Bello
Registration No.: 67,556
PERKINS COIE LLP
P.O. Box 1247
Seattle, Washington 98111-1247
(206) 359-8000
(206) 359-7198 (Fax)
Attorney for Applicant

71007-8061.US00/LEGAL125211792.1

Electronic Patent Application Fee Transmittal

Application Number:	13652222
Filing Date:	15-Oct-2012
Title of Invention:	TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES
First Named Inventor/Applicant Name:	Jakob Sternby
Filer:	Ryan M. Bello/Kristine Springer
Attorney Docket Number:	710078061US

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl Issue Fee	1501	1	960	960

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**960**

Electronic Acknowledgement Receipt	
EFS ID:	21783528
Application Number:	13652222
International Application Number:	
Confirmation Number:	4390
Title of Invention:	TEXT/CHARACTER INPUT SYSTEM, SUCH AS FOR USE WITH TOUCH SCREENS ON MOBILE PHONES
First Named Inventor/Applicant Name:	Jakob Sternby
Customer Number:	105412
Filer:	Ryan M. Bello/Kristine Springer
Filer Authorized By:	Ryan M. Bello
Attorney Docket Number:	710078061US
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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	0710078061US00_IssueFeeTransmittal.PDF	73496 446e032b0837b57b8621d9e452cb8578fcb60c82	no	1
Warnings:					
Information:					
2	Applicant Response to Pre-Exam Formalities Notice	0710078061US00_Response_NTFCAPwcopyofnotice.PDF	1929473 49b5b0d15d539bf7644d47fdd70d11d46d901884	no	5
Warnings:					
Information:					
3	Miscellaneous Incoming Letter	0710078061US00_Comments.PDF	55438 a75e7f06a48622684e48bbb7236bb046f758b006	no	1
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	30823 adc305f62c39041b566514c56981ccf1afa1b94b	no	2
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		Total Files Size (in bytes):	2089230		

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

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

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

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

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/652,222	10/15/2012	Jakob Sternby	710078061US	4390

105412 7590 04/06/2015

Perkins Cole LLP- Nuance
P.O. Box 1247
Seattle, WA 98111-1247

EXAMINER	
SPOONER, LAMONT M	

ART UNIT	PAPER NUMBER
2657	

NOTIFICATION DATE	DELIVERY MODE
04/06/2015	ELECTRONIC

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

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

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

ip.inbox@nuance.com
patentprocurement@perkinscoie.com

Supplemental Notice of Allowability	**Application No.** 13/652,222	**Applicant(s)** STERNBY ET AL.	
	Examiner LAMONT SPOONER	**Art Unit** 2657	**AIA (First Inventor to File) Status** No

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

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

1. ☒ This communication is responsive to *applicant's claims filed 10/15/2012*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *1-20*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

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

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

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

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

/LAMONT SPOONER/ Primary Examiner, Art Unit 2657	4/1/15

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APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR / PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
13/652,222	15 October, 2012	STERNBY ET AL.	710078061US

		EXAMINER	
Perkins Cole LLP- Nuance P.O. Box 1247 Seattle, WA 98111-1247		LAMONT SPOONER	
		ART UNIT	PAPER
		2657	20150401

DATE MAILED:

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

Commissioner for Patents

This supplemental notice of allowance is to correct minor claim punctuation.

4/1/15	/LAMONT SPOONER/ Primary Examiner, Art Unit 2657

PTO-90C (Rev.04-03)

DETAILED ACTION

Introduction

1. This office action is supplemental to the allowance office action dated 12/17/14. Claims 1-20 are currently pending and have been examined. Applicant's IDS have been considered. There is no claim to foreign priority is acknowledged. The Examiner notes the granted Patent Prosecution Highway request and petition to make special as granted 12/3/2014.

2. The present application is being examined under the pre-AIA first to invent provisions.

EXAMINER'S AMENDMENT

3. 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.

- In **claim 10**, line 4, replace "user;" with - -user.- -
- In **claim 12** line 4, replace "sequence" with - -sequence.- -

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAMONT SPOONER whose telephone number is (571)272-7613. The examiner can normally be reached on 8:00 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Hudspeth can be reached on 571/272-7843. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/LAMONT SPOONER/
Primary Examiner, Art Unit 2657

lms
4/1/25

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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/652,222	05/05/2015	9026428	710078061US	4390

105412 7590 04/15/2015

Perkins Cole LLP- Nuance
P.O. Box 1247
Seattle, WA 98111-1247

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 367 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

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

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

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

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

Jakob Sternby, Lund, SWEDEN;
Lars Jonas Morwing, Malmo, SWEDEN;
Jonas Andersson, Malmo, SWEDEN;
Christer Friberg, Lund, SWEDEN;
NUANCE COMMUNICATIONS, INC., Burlington, MA

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