Title of Invention

CHARACTER INPUT DEVICE USING BIO RADAR UNIT AND TILT SENSOR

Country : USA

Applicant

KOREA ADVANCED INSTITUTE OF SCIENCE AND TECHNOLOGY

PTO/SB/08a (05-07)
Approved for use through 11/30/2007. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	
Filing Date	2008-02-07
First Named Inventor	Kyu-Ho PARK
Art Unit	
Examiner Name	To be determined
Attorney Docket Number	P2239US00

U.S.PATENTS

Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	20030092175	KR		2003-12-06	Itemmore Co Ltd		☐
	2	1020070036458	KR		2007-04-03	Sung-Il Lee, et al.		☐
	3	2003039648	KR		2003-05-22	Kwon Shin		☐

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	2008-02-07
	First Named Inventor	Kyu-Ho PARK
	Art Unit	
	Examiner Name	To be determined
	Attorney Docket Number	P2239US00

If you wish to add additional Foreign Patent Document citation information please click the Add button [Add]

NON-PATENT LITERATURE DOCUMENTS [Remove]

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

If you wish to add additional non-patent literature document citation information please click the Add button [Add]

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

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

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	2008-02-07
	First Named Inventor	Kyu-Ho PARK
	Art Unit	
	Examiner Name	To be determined
	Attorney Docket Number	P2239US00

CERTIFICATION STATEMENT

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

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

OR

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

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

SIGNATURE

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

Signature	/hae-chan park/	Date (YYYY-MM-DD)	2008-02-07
Name/Print	Hae-Chan Park	Registration Number	50,114

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

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The 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 record s.

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.

TITLE : PORTABLE KEYBOARD

Abstract :

PURPOSE: A portable keyboard is provided to make a user easily hold the keyboard by replacing a conventional key with a small number of keys, to join with a mouse as a single body, and to input the key with one hand.

CONSTITUTION: The portable keyboard comprises a key matrix(220), a microcomputer(210), a pointing device(230), an LED(Light Emitting Diode) display, a beep generating part(250), and an interface(260). The controller scans the key matrix and generates a corresponding scan code. The interface transmits a key code value provided from the controller to a main body of a computer. The key matrix includes an input mode key and the keys generating more than two codes different with each other by the input mode key setting.

Electronic Acknowledgement Receipt

EFS ID:	2828214
Application Number:	12027585
International Application Number:	
Confirmation Number:	5138
Title of Invention:	CHARACTER INPUT DEVICE USING BIO RADAR UNIT AND TILT SENSOR
First Named Inventor/Applicant Name:	Kyu-Ho PARK
Customer Number:	58027
Filer:	Hae-Chan Park/Richard Schachner
Filer Authorized By:	Hae-Chan Park
Attorney Docket Number:	P2239US00
Receipt Date:	07-FEB-2008
Filing Date:	
Time Stamp:	15:42:33
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$435
RAM confirmation Number	949
Deposit Account	
Authorized User	

File Listing:

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

1	Application Data Sheet	P2239US00-ADS.pdf	1128521 8f2a79d23ce1f75bf845fee9d61268db1351947f	no	5
Warnings:					
Information:					
2		P2239US00-Specification.pdf	149289 d7ac0f189afec8db0a9f706f8eee09b4fe5bc05d	yes	14

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Specification	1	10
	Claims	11	13
	Abstract	14	14

Warnings:					
Information:					
3	Drawings-only black and white line drawings	P2239US00-Drawings.pdf	805653 880a10df595f3f67cf4588c4eefda9ced7fd9c13	no	7
Warnings:					
Information:					
4	Oath or Declaration filed	P2239US00-Declaration.pdf	296011 a093327aade2dfbb5565ca96dde25419ee9b5874	no	3
Warnings:					
Information:					
5	Power of Attorney	P2239US00-POA-373.pdf	445758 3313fd4ef5369ada29a4069d3919786245143899	no	4
Warnings:					
Information:					
6	Information Disclosure Statement (IDS) Filed	P2239US00-IDSTransmittal.pdf	771637 d01ff4c1dbb15407ebff6e76947bc9b3a25b8008	no	4
Warnings:					
Information:					

A U.S. Patent Number Citation or a U.S. Publication Number Citation is required in the Information Disclosure Statement (IDS) form for autoloading of data into USPTO systems. You may remove the form to add the required data in order to correct the Informational Message if you are citing U.S. References. If you chose not to include U.S. References, the image of the form will be processed and be made available within the Image File Wrapper (IFW) system. However, no data will be extracted from this form. Any additional data such as Foreign Patent Documents or Non Patent Literature will be manually reviewed and keyed into USPTO systems.

7	Foreign Reference	P2239US00-KR2003-00921 75.pdf	602593 11ec3a4d8f24903730ebaef3aad563f0e 93f9825	no	9
Warnings:					
Information:					
8	Foreign Reference	P2239US00-KR10-2007-003 6458.pdf	957741 027559c33ce5f9eca8156e9730856559 c35efaaf	no	21
Warnings:					
Information:					
9	Foreign Reference	P2239US00-KR2003-00396 48.pdf	410577 12337f3989a7bbfe96ac1a513945b583 44436f95	no	9
Warnings:					
Information:					
10	Fee Worksheet (PTO-06)	fee-info.pdf	8405 6a265c15c254ab16af7a9fe3b73ab26d b1216fa4	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	5576185	

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New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

PTO/SB/14 (07-07)
Approved for use through 06/30/2010. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	P2239US00
	Application Number	
Title of Invention	CHARACTER INPUT DEVICE USING BIO RADAR UNIT AND TILT SENSOR	

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.)

Applicant Information:

Applicant 1 Remove

Applicant Authority	◉ Inventor	○ Legal Representative under 35 U.S.C. 117	○ Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	Kyu-Ho		PARK	

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

City	Gongju	Country Of Residence[i]	KR
Citizenship under 37 CFR 1.41(b)[i]	KR		

Mailing Address of Applicant:

Address 1	314-98, Geumarm-Li, Jangi-Myun		
Address 2	Chung-nam		
City	Gongju	State/Province	
Postal Code	314-911	Country[i]	KR

Applicant 2 Remove

Applicant Authority	◉ Inventor	○ Legal Representative under 35 U.S.C. 117	○ Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	Ki-Woong		PARK	

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

City	Daejeon	Country Of Residence[i]	KR
Citizenship under 37 CFR 1.41(b)[i]	KR		

Mailing Address of Applicant:

Address 1	500-11, Wolkye-dong		
Address 2	Nowon-gu		
City	Seoul	State/Province	
Postal Code	139-847	Country[i]	KR

Applicant 3 Remove

Applicant Authority	◉ Inventor	○ Legal Representative under 35 U.S.C. 117	○ Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	Sung-Ahn		KO	

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

City	Daejeon	Country Of Residence[i]	KR

PTO/SB/14 (07-07)
Approved for use through 06/30/2010. OMB 0651-0032
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	P2239US00
	Application Number	
Title of Invention	CHARACTER INPUT DEVICE USING BIO RADAR UNIT AND TILT SENSOR	

Citizenship under 37 CFR 1.41(b) i	KR		
Mailing Address of Applicant:			
Address 1	603-129, Shinam-dong, Dong-gu		
Address 2	Teagu		
City	Taegu	**State/Province**	
Postal Code	701-819	**Country** i	KR

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	58027		
Email Address		Add Email	Remove Email

Application Information:

Title of the Invention	CHARACTER INPUT DEVICE USING BIO RADAR UNIT AND TILT SENSOR		
Attorney Docket Number	P2239US00	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)	7	Suggested Figure for Publication (if any)	

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

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

Representative Information:

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

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

PTO/SB/14 (07-07)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	P2239US00
	Application Number	
Title of Invention	CHARACTER INPUT DEVICE USING BIO RADAR UNIT AND TILT SENSOR	

Customer Number	58027

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(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.

Remove

Prior Application Status			
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. Add

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 [i]	Parent Filing Date (YYYY-MM-DD)	Priority Claimed
10-2007-0049091	KR	2007-05-21	(•) Yes ( ) No

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

Assignee Information:

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

Remove

Assignee 1

If the Assignee is an Organization check here. [X]

Organization Name	Korea Advanced Institute of Science & Technology		
Mailing Address Information:			
Address 1	305-701 Korea Advanced Institute of Science and		
Address 2	Technology, 373-1 Guseong-dong Yuseong-gu		
City	Daejeon	**State/Province**	
Country [i]	KR	Postal Code	
Phone Number		Fax Number	
Email Address			

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

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.

PTO/SB/14 (07-07)
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Title of Invention	CHARACTER INPUT DEVICE USING BIO RADAR UNIT AND TILT SENSOR	

Signature	/hae-chan park/			Date (YYYY-MM-DD)	2008-02-07
First Name	Hae-Chan	Last Name	Park	Registration Number	50114

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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).

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

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	CHARACTER INPUT DEVICE USING BIO RADAR UNIT AND TILT SENSOR
First Named Inventor/Applicant Name:	Kyu-Ho PARK
Filer:	Hae-Chan Park/Richard Schachner
Attorney Docket Number:	P2239US00
Filed as Small Entity	

Utility Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility filing Fee (Electronic filing)	4011	1	75	75
Utility Search Fee	2111	1	255	255
Utility Examination Fee	2311	1	105	105
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**435**

CHARACTER INPUT DEVICE USING BIO RADAR UNIT AND TILT SENSOR

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates generally to a character input device, and, more particularly, to a character input device for a mobile device or a wearable terminal, which does not require the use of a keyboard.

[0003] 2. Description of the Related Art

[0004] Generally, 'radar', which is an abbreviation for 'RAdio Detection And Ranging', is a system that was developed during World War II and has been used as auxiliary equipment for Air Traffic Control (ATC) and aircraft precision approach. Radar has been installed in airports by the U.S. Federal Aviation Administration (FAA) since the end of the 1940s, and has become major equipment for ATC nowadays.

[0005] Radar has an operating principle in which, when radio energy (a short pulse) is emitted from a directional antenna and collides against a target object, waves are reflected, that is, part of the energy returns, and the direction of the target object can be detected using a device for receiving and detecting a reflected waves. That is, radar is equipment for transmitting a radio wave to a target object, receiving the reflected waves of the energy of the radio waves, and measuring the position (direction and distance) of the target object using the round-trip time and the directional characteristics of an antenna based on the straightness and isochronism of a radio wave. Therefore, in the omni-directional emission/reception of a radio wave from/through a ground antenna, the time required for emission/reception is proportional

to distance, so that the position of a target object and the distance to the target object can be detected using the direction to the target object. This has been used for the operating principle of distance measurement equipment.

[0006] With the development of System On a Chip (SOC) technology, radar devices have become ultra small and use low power. Therefore, bio radar devices for sensing the pulse and breath of humans have been commercialized, and radar devices can be applied to mobile devices.

[0007] A keyboard is an input device through which a user can input commands and data into a computer. When characters to be used in a computer are defined in the ROM of a keyboard and a user presses a key, the keyboard transmits the value of the corresponding key to the computer. The keyboard is classified as a QWERTY keyboard or a Dvorak keyboard based on the arrangement of input keys. The QWERTY keyboard is the most commonly used keyboard, and takes its name from the first six letters seen in the keyboard's top first row of letters, that is, 'Q,W,E,R,T, and Y'.

[0008] FIG. 1 is a view showing the construction of a keyboard 100 used for a general computer 101 and a connection 102 between the keyboard 100 and the computer 101. The conventional keyboard 100 is manufactured on the basis of the desktop computer 101, so that the keyboard 100 includes at least 80 keys. Therefore, there are problems in that the keyboard is large and inconvenient to carry. As shown in FIG. 1, the conventional character input device 100 includes a keyboard for receiving characters from a user 103, and a microprocessor 104 provided inside the keyboard to sense a character input by the hand of the user and transmit information about the character to the computer 101. The information about a character is transmitted to the computer 101 in a Universal Serial Bus (USB) or Personal System 2 (PS/2)

manner (refer to reference numeral 105). The PS/2 or USB port of the computer, which has received the information about the character, generates an interrupt whenever data is received from the keyboard 100, and informs the computer 101 of the presence of input information. The above-described character input device 100 is suitable for a fixed computer environment. However, when the character input device 100 is applied to a mobile device or a wearable device, which requires the user 103 to perform an input operation while moving, there is a disadvantage in that the usefulness of the character input device 100 is decreased by the low portability of the character input device. Further, there is a disadvantage in that the portability of the character input device is decreased because a user must always carry a character input device 100.

[0009] In order to overcome the above-described problems, various character input devices have been developed. FIG. 2 is a view showing an input device according to a prior invention.

[0010] Referring to FIG. 2, in order to solve the problem of the poor portability of the existing character input device, Korean Unexamined Patent Publication No. 10-2003-0092175 (entitled "Portable Keyboard") discloses a portable keyboard 200, which substitutes a small number of keys for the existing keys, thereby being easily carried, and which is integrated with a mouse, thereby enabling an input operation to be performed with one hand. However, there are disadvantages in that a user must always hold the character input device 200, so that the degree of freedom of the hand holding the character input device deteriorates, and a large amount of learning is required to learn the input method of the corresponding keyboard 200.

[0011] Further, in order to solve the problems of the portability and usefulness of a keyboard, Korean Unexamined Patent Publication No. 10-2007-0036458 (entitled "Data Input

Device using Gloves") and Korean Unexamined Patent Publication No. 10-2003-0039648 (entitled "Wearable Glove-type Character Input Device") disclose gloves that are configured such that, when a terminal, such as a mobile device or a wearable device, is used, a user wears a glove-type key input device 201 having a plurality of contacts, instead of using a keyboard mounted in a device, and inputs data required to execute a program via a wired/wireless connection 202. However, there is a disadvantage in that it is bothersome to input characters because a user must put on the gloves 201 in order to input characters, and there is a defect in that the degree of freedom of both hands deteriorates because sensors 203 are attached to the joints of fingers and both hands are connected via a wired connection 204.

SUMMARY OF THE INVENTION

[0012] Accordingly, the present invention has been made keeping in mind the above problems occurring in the prior art, and an object of the present invention is to provide a character input device, which detects character information, input by a user, using a bio radar unit, so that characters can be rapidly and accurately input in the same manner as the existing keyboard, and which enables special keys, such as directional keys, frequently used by a user, to be intuitively activated using a tilt sensor, thus being suitable for a mobile device or a wearable computing device.

[0013] In order to accomplish the above object, the present invention provides a character input device for a mobile device or a wearable terminal, including a bio radar unit for sensing the positions of the fingers of a user; a tilt sensor for sensing the tilt of the hands of the user; a microprocessor for calculating the final input information of the user by processing signals received from the bio radar unit and the tilt sensor; and a wireless communication

module for transmitting the final input information to the mobile device or the wearable terminal of the user.

[0014] Here, the character input device is formed to be wearable on the wrist of the user.

[0015] Further, the character input device further includes a speaker device for outputting a feedback sound corresponding to the final input information of the user.

[0016] Furthermore, the bio radar unit transmits a signal, measures the distance between the character input device and a finger by measuring the strength of a reflected wave reflected from the finger with which the signal collides, and measures the angle of the finger used for activation.

BREIF DESCRIPTION OF THE DRAWINGS

[0017] The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

[0018] FIG. 1 is a view showing the construction of a keyboard used for a general computer and a connection between the keyboard and the computer;

[0019] FIG. 2 is a view showing an input device according to a prior invention;

[0020] FIG. 3 is a view showing the construction of a character input device according to the present invention;

[0021] FIG. 4 is a view showing the internal construction and connection of the character input device according to the present invention;

[0022] FIG. 5 is a view showing a method of detecting a final input character using a

bio radar unit in the character input device according to the present invention; and

[0023] FIGS. 6 and 7 are views showing a process of obtaining character input information from a user according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0024] Reference now should be made to the drawings, in which the same reference numerals are used throughout the different drawings to designate the same or similar components.

[0025] Embodiments of the present invention will be described in detail with reference to the attached drawings below.

[0026] FIG. 3 is a view showing the construction of a character input device according to the present invention.

[0027] Referring to FIG. 3, the construction related to the present invention includes a mobile device or a wearable terminal 300, and an input device 302 for sensing a final input character intended to be input by the user by sensing the position of the user's hand, input information, and the tilt of the user's hand, and transmitting the final input character to the mobile device or the wearable terminal 300 via a wireless connection 301.

[0028] The input device 302 emits a radar signal 304 through the internal antenna of the input device 302, measures the strength of a reflected wave 305 generated when the radar signal 304 collides with one of the ten fingers 303 of the user for inputting a character, and measures the distance between the input device 302 and the finger 303. The angle θ' 306 of the finger used to perform an input operation is measured by the following Equation 1:

$$\theta' = \frac{\theta \bullet T'}{T} \qquad (1)$$

[0029] Meanwhile, in order to enable the input of special keys, such as directional keys, to be easily performed, it is characterized in that the input device 302 detects special keys through a tilt sensor 307 when a user does not perform an input operation but tilts the hand, as shown in the following Table 1.

Table 1

Left Hand		Right Hand	
Tilt	Special Key	Tilt	Special Key
↑	Home	↑	Up
↓	End	↓	Down
←	Back Space	←	Left
→	Space	→	Right
Both Left and Right Hands ↑		Page Up	
Both Left and Right Hands ↓		Page Down	

[0030] In the above table, the upper directional arrow indicates the case in which a fingertip is raised above a wrist, and the down directional arrow indicates the case in which a fingertip is tilted below a wrist.

[0031] The cases of the right and left direction arrows are also determined based on a wrist. The reason for this is that the input device 302 is worn on the wrist, so that the input of special keys is determined based on the input device 302.

[0032] Meanwhile, if both the left hand and the right hand are raised, it is determined that a 'Page Up' key is input. If both the left hand and the right hand are lowered, it is

determined that a 'Page Down' key is activated.

[0033] The detailed construction of the above-described input device 302 is shown in FIG. 4. Referring to FIG. 4, the input device 302 includes a bio radar unit 400 for detecting the position of the finger of a user and input information, a tilt sensor 401 for enabling a user to activate special keys, a microprocessor 402 for detecting the final input information of the user by analyzing signals received from the tilt sensor 401 and the bio radar unit 400, and a wireless communication module 404 for transmitting the final input information to the mobile device or the wearable terminal 406 of the user via a wireless connection 405.

[0034] The input device 302 may further include a speaker device 403 for providing the feedback of an input character to the user.

[0035] First, the bio radar unit 400 measures a reflected wave signal 407 reflected from a finger, and transmits numerical values, related to the strength of the reflected wave and the angle of the finger, to the microprocessor 402.

[0036] When no information is input through the bio radar unit 400 but the tilt of a fingertip is sensed, the tilt sensor 401 transmits the value of a corresponding special key, shown in Table 1, to the microprocessor 402.

[0037] The microprocessor 402 determines the value of a character or a special key corresponding to the movement of a fingertip or a hand by analyzing data received from the bio radar unit 400 and the tilt sensor 401, and transmits the determined value of the character to the wireless communication module 404.

[0038] The wireless communication module 404 transmits data, received from the microprocessor 402, to the mobile device or the wearable terminal 406 via the wireless connection 405.

[0039] The speaker device 403 outputs a corresponding effect sound based on final input information obtained through the analysis of the microprocessor 402, or outputs the sound of a corresponding character, thereby enabling a user to confirm the input character.

[0040] FIG. 5 is a view showing a method of detecting a final input character using the bio radar unit in the character input device. Referring to FIG. 5, a user places fingers on corresponding positions based on the standard of a QWERTY keyboard so as to use the input device 500, and the bio radar unit obtains the value of the initial set position 501 of each of the fingers through scanning. In the process of obtaining the value of the initial set position 501, the input device 500 performs mapping between an initial range value 502 based on the position of a user finger and the coordinates 501 of an actual keyboard, and stores fingertip thickness information 503 when a finger is placed on each of the keys. Theses pieces of information are called 'reference information'. The initially set reference information is stored in the microprocessor or a separate memory device provided in the input device.

[0041] FIGS. 6 is a view showing a process of obtaining character input information using the value of the initial set position 501 of the finger, which is acquired, as shown in FIG. 5. A measured value Y' 602 is obtained by obtaining Y-axis value 601 using the strength of a reflected wave 600 corresponding to a signal emitted from the bio radar unit, and an angle θ' 603 can be obtained using the ratio of a detected time period T' to a total period T, as shown in the Equation 1.

[0042] The microprocessor calculates the coordinates of input information using the obtained Y' 602 and θ' 603, and compares the calculated coordinates with the initially set reference information, thereby determining the character that is desired to be input.

[0043] FIG. 7 is a view showing a method of detecting a finger in the case in which two

or more fingers of a user are detected to be used for input. If three or more fingers are detected, this case is processed as a character input error and the detection of input is not performed. If two fingers are detected, a single finger that is actually intended to be used for input by the user should be detected. Therefore, the fingertip thickness information 503 of the respective fingers, stored as the initially set value obtained, as shown in FIG. 5, is compared with fingertip thickness information of the two input fingers 702 and 703, and thus the input character is detected using the following Equation.

[0044] It is assumed that reference fingertip thickness information for the two fingers is 'a' and 'b', and currently detected fingertip thickness information is α 700 and β 701. If $\frac{\alpha}{a} \geq \frac{\beta}{b}$, a finger corresponding to 'a' is detected as final input information. If $\frac{\alpha}{a} < \frac{\beta}{b}$, a finger corresponding to 'b' is detected as finally input information.

[0045] Although the character input device according to the present invention has been described in conjunction with the illustrative drawings, the present invention is not limited thereto, but variations and modifications can be made without departing from the scope and technical spirit of the invention.

[0046] The character input device constructed as described above according to the present invention removes the limitation in which the existing hardware keyboard and the hands of a person who performs an input operation should be placed on a support surface, so that characters can be input using the same method as those of the existing keyboard in motion. Further, special keys, such as directional keys, which are frequently used by a user, can be intuitively input using a tilt sensor so that a character input device suitable for a mobile device or a wearable computing device can be implemented.

WHAT IS CLAIMED IS:

1. A character input device for a mobile device or a wearable terminal, comprising:

a bio radar unit for sensing positions of fingers of a user;

a tilt sensor for sensing a tilt of hands of the user;

a microprocessor for calculating final input information of the user by processing signals received from the bio radar unit and the tilt sensor; and

a wireless communication module for transmitting the final input information to the mobile device or the wearable terminal of the user.

2. The character input device as set forth in claim 1, wherein the character input device is formed to be wearable on a wrist of the user.

3. The character input device as set forth in claim 1, further comprising a speaker device for outputting a feedback sound corresponding to the final input information of the user.

4. The character input device as set forth in claim 1, wherein the bio radar unit transmits a signal, measures a distance between the character input device and a finger by measuring a strength of a reflected wave reflected from the finger with which the signal collides, and measures an angle of the finger related to activation.

5. The character input device as set forth in claim 1, wherein the microprocessor calculates a position of the finger based on a direction of the finger using a ratio of a detected

time period to a total scan period, and calculates a distance between the finger and the character input device using a strength of the reflected wave signal based on a radar Doppler effect, thereby detecting input information.

6. The character input device as set forth in claim 1, wherein the microprocessor, when no input activation is performed by a finger, senses input of a special key corresponding to the tilt based on the following table by measuring the tilt of hands using the tilt sensor:

Left Hand		Right Hand	
Tilt	Special Key	Tilt	Special Key
↑	Home	↑	Up
↓	End	↓	Down
←	Back Space	←	Left
→	Space	→	Right
Both Left and Right Hands ↑		Page Up	
Both Left and Right Hands ↓		Page Down	

7. The character input device as set forth in claim 5, wherein the microprocessor previously stores reference information, including coordinate values corresponding to respective positions of keys on a virtual keyboard, initial range values detectable based on positions of fingers of the user, and fingertip thickness information obtainable when fingers are placed at the respective positions of the keys on the keyboard, and determines an input character by comparing the stored reference information with the detected input information.

8. The character input device as set forth in claim 7, wherein the microprocessor, when three or more fingers of the user are detected as input, processes this case as a character input error, and does not perform detection of input.

9. The character input device as set forth in claim 8, wherein the microprocessor, when two fingers of the user are detected to be used for input, detects fingertip thickness information of each of the fingers, and obtains final input information by comparing a ratio of a value of the detected fingertip thickness information to a value of fingertip thickness information of the reference information for one of the two fingers with a ratio of a value of the detected fingertip thickness information to a value of fingertip thickness information of the reference information for a remaining finger.

ABSTRACT

Disclosed herein is a character input device for a mobile device or a wearable terminal. A bio radar unit senses the positions of the fingers of a user. A tilt sensor senses the tilt of the hands of the user. A microprocessor calculates the final input information of the user by processing signals received from the bio radar unit and the tilt sensor. A wireless communication module transmits the final input information to the mobile device or the wearable terminal of the user. A speaker device outputs a feedback sound corresponding to the final input information of the user. The character input device is wearable on a wrist of the user. The bio radar unit transmits a signal, measures the distance between the character input device and a finger by measuring the strength of a reflected wave reflected from the finger with which the signal collides, and measures the angle of the finger related to activation.

FIG. 1

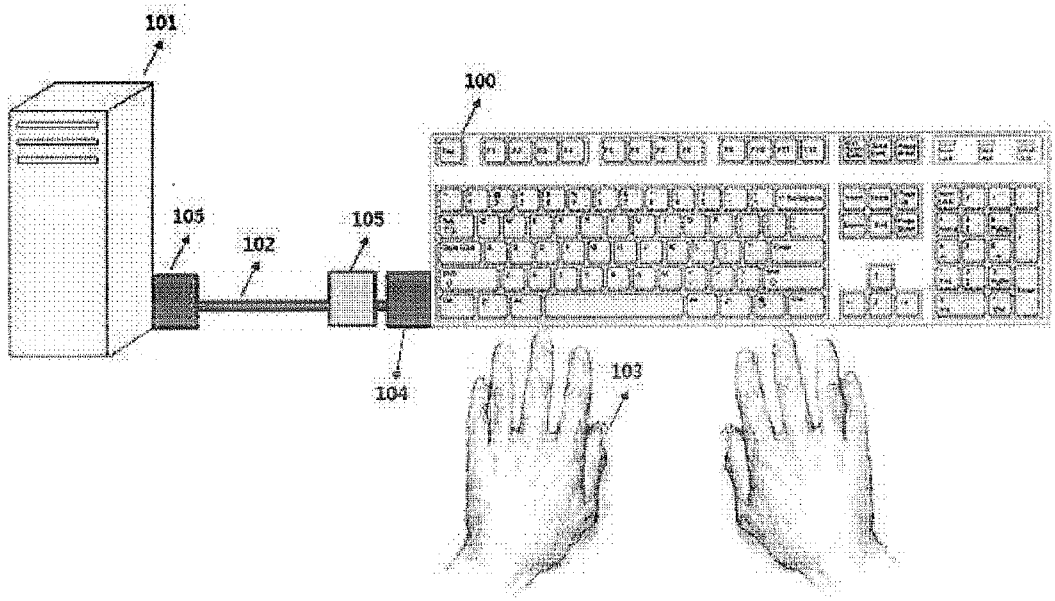


FIG. 2

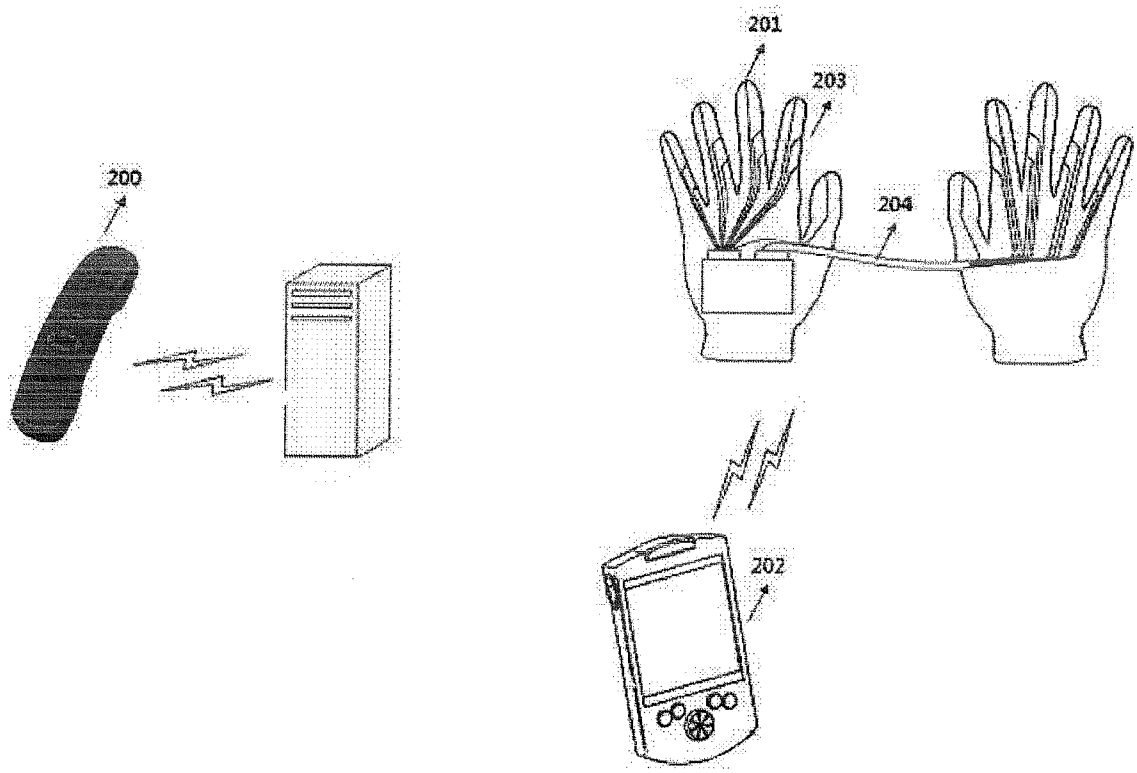


FIG. 3

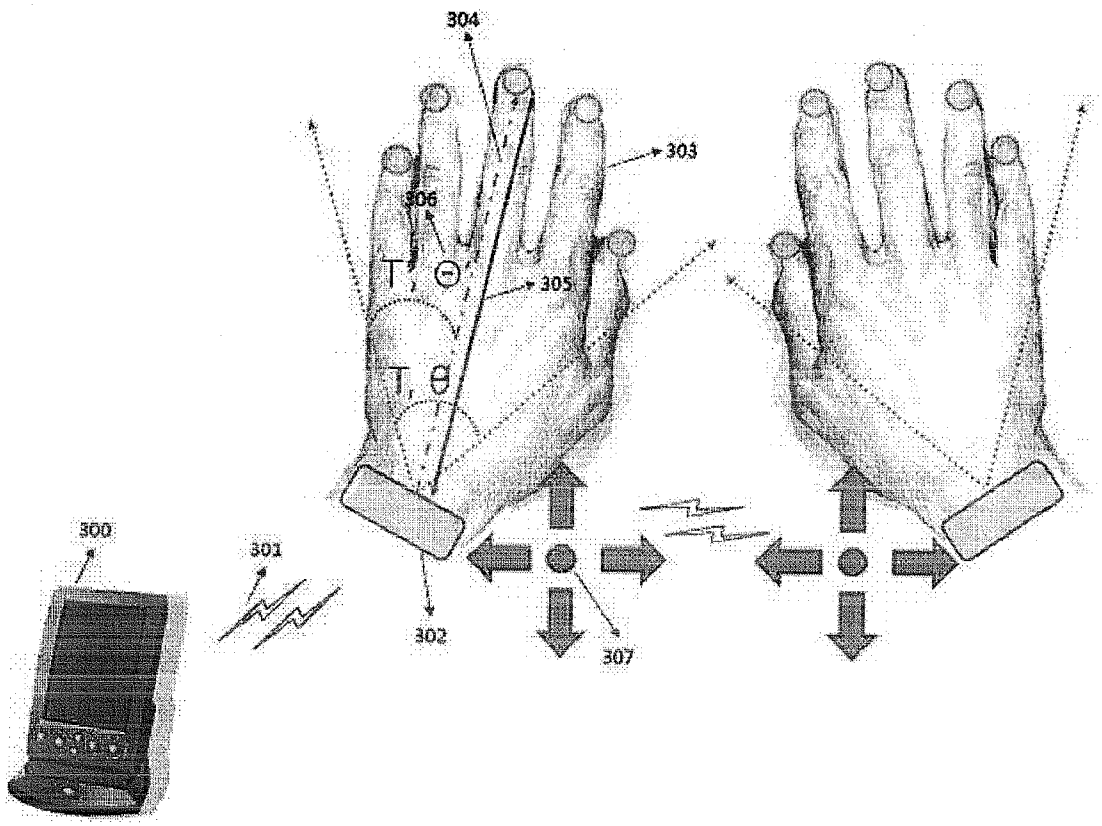


FIG. 4

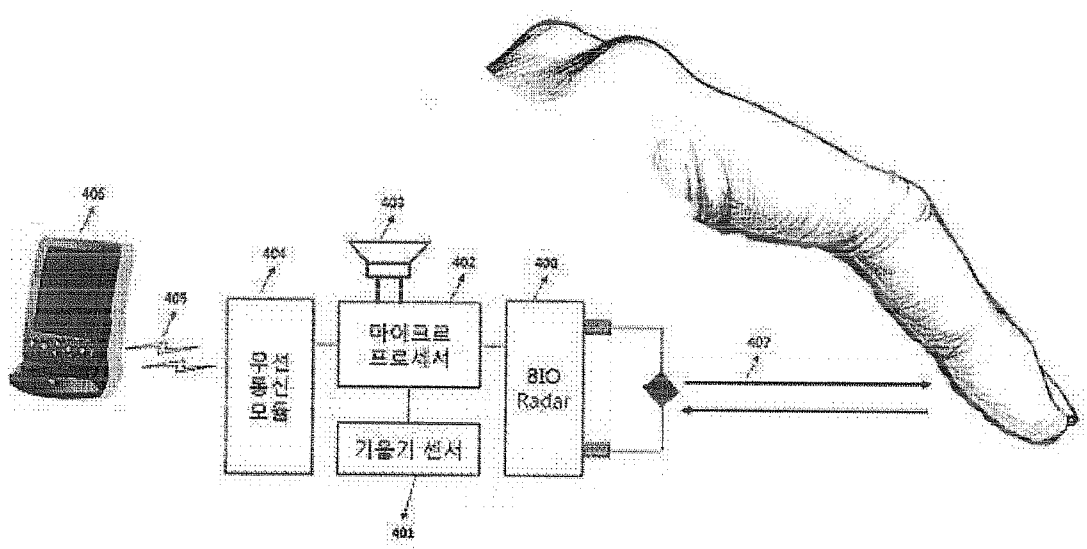


FIG. 5

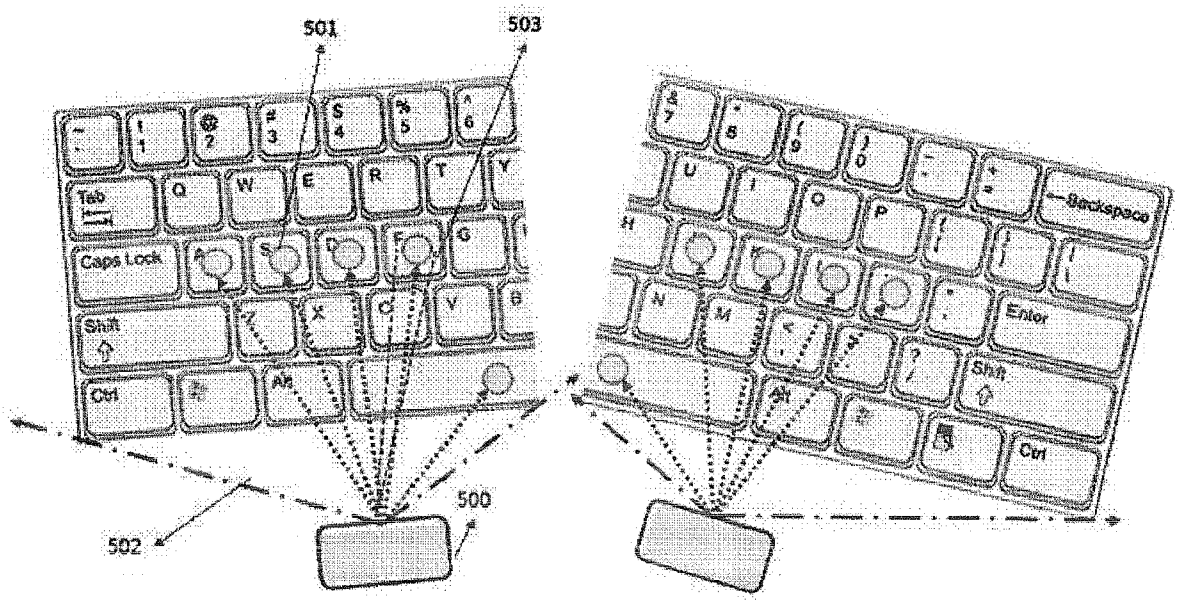

501
503
Tab
Caps Lock
Shift
Ctrl
Alt
Backspace
Enter
Shift
Ctrl
500
502

FIG. 6

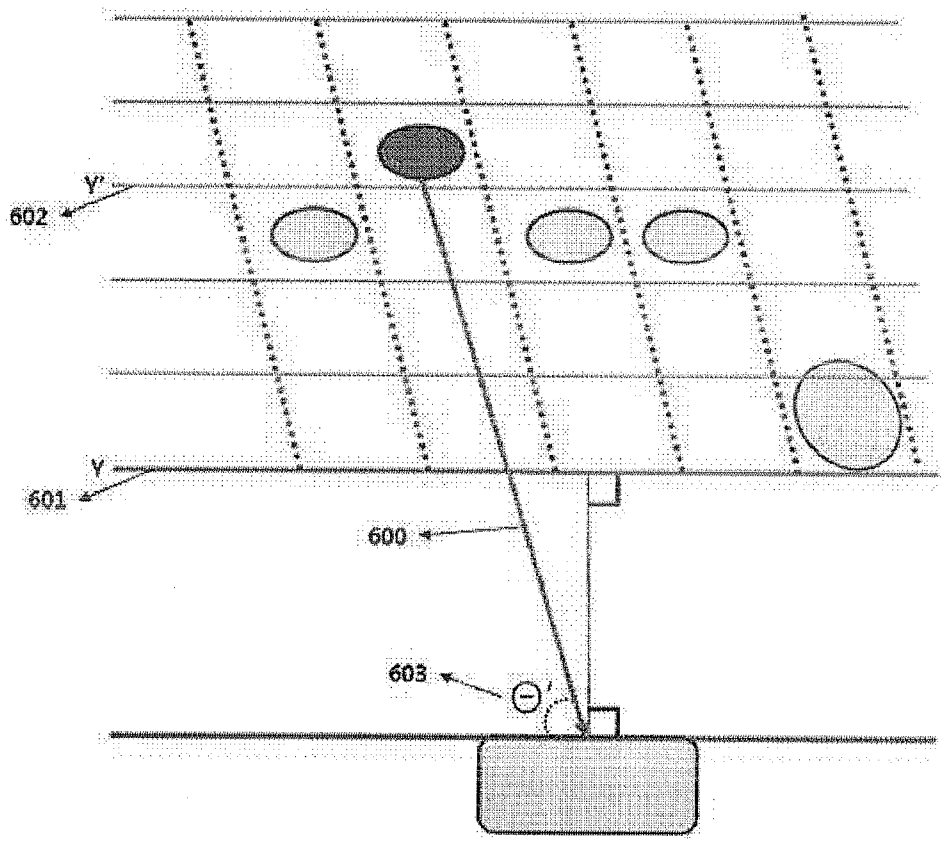
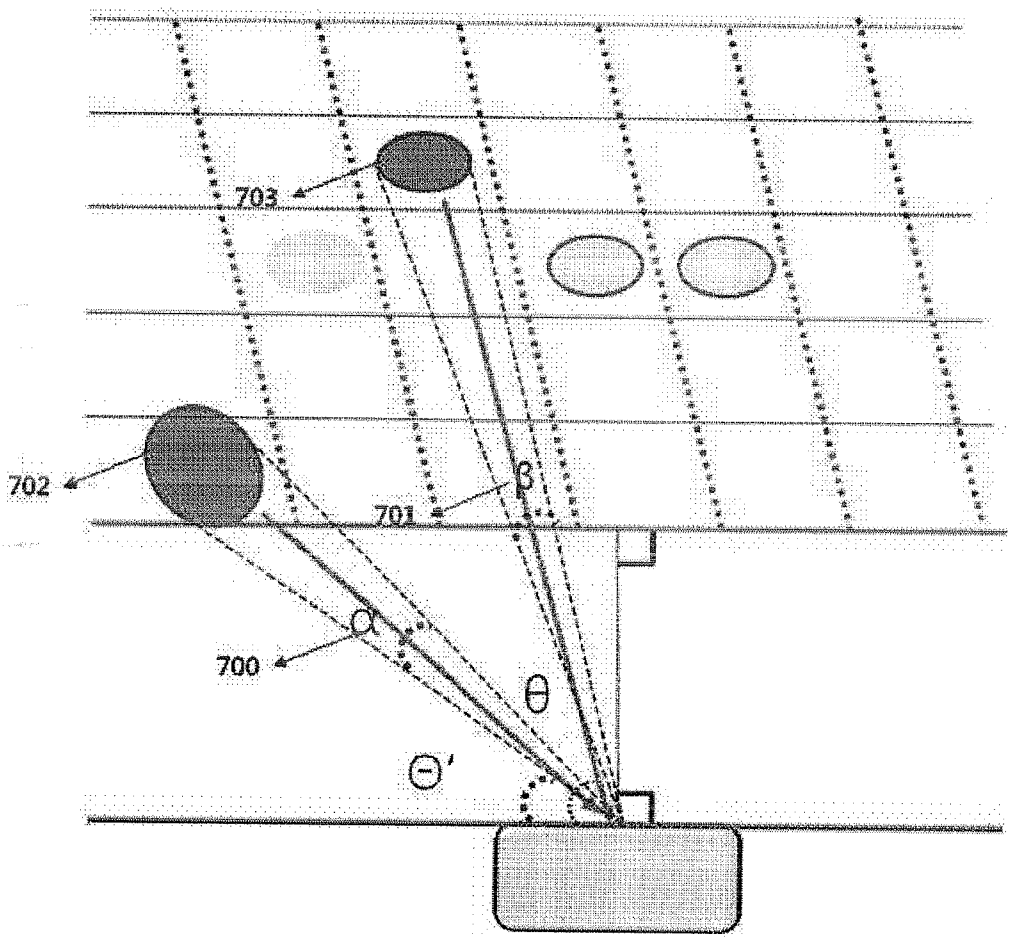


FIG. 7



DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63)			Attorney Docket Number	To be determined
			First Named Inventor	Park, Kyu-Ho
			COMPLETE IF KNOWN	
			Application Number	To be determined
☒ Declaration Subimitted With Initial Filing	OR	☐ Declaration Subimitted after Initial Filing (surcharge (37 CFR 1.116 (e)) required)	Filing Date	To be determined
			Art Unit	To be determined
			Examiner Name	To be determined

I hereby declare that:

Each inventor's residence, mailing address, and citizenship are as stated below next to their name.

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

CHARACTER INPUT DEVICE USING BIO RADAR UNIT AND TILT SENSOR

the specification of which *(Title of the Invention)*

☒ is attached hereto

OR

☐ was filed on (MM/DD/YYYY) _____ as United States Application Number or PCT International Application Number _____ and was amended on (MM/DD/YYYY) _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

PRIORITY CLAIMS
Foreign and Provisional Applications

I hereby claim foreign priority benefits under Title 35, United States Code § 119(a)-(d) or (f) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365 (a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or of any PCT international application having a filing date before that of the application on which priority is claimed. I hereby also claim the benefit under Title 35, United States Code § 119(e) of any United States provisional application(s) listed below.

Prior Foreign and/or Provisional Application Number(s)	Country and/or Provisional	Foreign Filing Date (MM/DD/YYYY)	Priority NOT Claimed	Certified Copy Attached? YES	Certified Copy Attached? NO
10-2007-0049091	Republic of Korea	May 21, 2007	☐	☒	☐
			☐	☐	☐
			☐	☐	☐
			☐	☐	☐
			☐	☐	☐
			☐	☐	☐
			☐	☐	☐

☐ Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto: