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(54) Title: AREA INPUT DEVICE AND VIRTUAL KEYBOARD

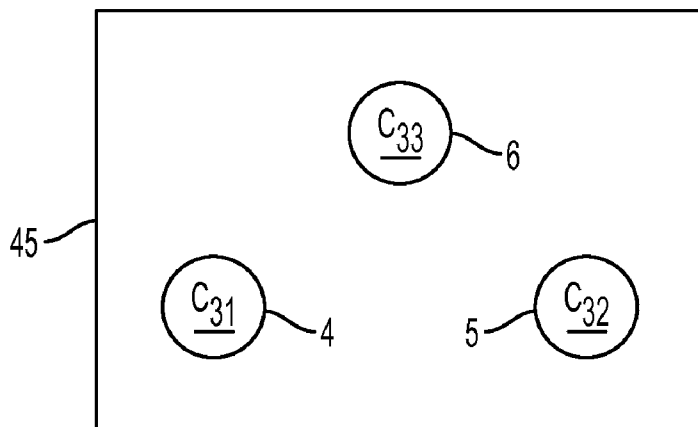


FIG. 6

(57) Abstract: The present invention relates to input devices and, in particular, devices for entering data within three-dimensional space and converting that data into one or more commands. An embodiment of a system for extracting hand distance and/or position across and/or above a surface is provided. The system includes a substrate, a power source, a processor, at least one capacitive plate, and circuitry configured to produce measurable change of a parameter as a function of capacitance of the at least one capacitive plate.



**INTERNATIONAL SEARCH REPORT**

International application No.  
PCT/US 15/31248

**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC(8) - G06F 3/044 (2015.01)  
 CPC - G06F 3/044, G06 F3/03, G06F 1/3231, G06F 2203/04108, G06F 3/017  
 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) - G06F3/044 (2015.01)  
 CPC - G06F3/044, G06F3/03, G06F 1/3231, G06F2203/04108, G06F3/017

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
 CPC - G06F3/044, G06F3/03, G06F 1/3231, G06F3/048, G06F2203/04108, G06F3/017, Y02B60/1289  
 IPC(8) - G06F3/044 (2015.01); USPC - 345/174

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
 Patbase; Google Patent/Web, FreePatentsonline  
 Search terms used: capacitive sensor gesture hand body proximity position non-contact pad plate electrode rotate hinge swing reposition angle aim tilt direction

**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 2004/0043696 A1 (SUZUKI) 04 March 2004 (04.03.2004), para [0006], [0021]-[0028]; Fig 1, 2; claim 1	1-3, 46 ----- 53
Y	US 6,323,846 B1 (WESTERMAN et al.) 27 November 2001 (27.11.2001), Fig 1, col 7, ln 45-51; col 13, ln 4-10	53
A	US 2013/0155010 A1 (CURTIS et al.) 20 June 2013 (20.06.2013), entire document	1-3, 46, 53
A	US 6,288,707 B1 (PHILIPP) 11 September 2001 (11.09.2001), entire document	1-3, 46, 53
A	US 2011/0298791 A1 (ADACHI et al.) 08 December 2011 (08.12.2011), entire document	1-3, 46, 53
A	US 2004/0178995 A1 (STERLING) 16 September 2004 (16.09.2004), entire document	1-3, 46, 53
A	US 2003/0222440 A1 (BASIR et al.) 04 December 2003 (04.12.2003), entire document	1-3, 46, 53

Further documents are listed in the continuation of Box C.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent but published on or after the international filing date	"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
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 13 October 2015 (13.10.2015)	Date of mailing of the international search report <b>05 NOV 2015</b>
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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. 571-273-8300	Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774
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# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 15/31248

**Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3.  Claims Nos.: 4-32, 34-45, 47-52, 54-67  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I: Claims 1-3, 46, 53, drawn to a system for extracting hand distance and/or position above a surface

Group II: Claims 33, drawn to method comprising transforming one path function of a hand through at least one dimensional space.

-- see extra sheet

1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2.  As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:  
1-3, 46, 53

**Remark on Protest**

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 15/31248

Continuation of Box No. III -- Observations where unity of invention is lacking

The inventions listed as Groups I through II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

#### Special Technical Features

Group I includes the special technical feature of circuitry configured to produce measurable change of a parameter as a function of capacitance of said at least one capacitive plate, not included in the other groups.

Group II includes the special technical feature of transforming one path function into at least one different path function, not included in the other groups.

#### Common Technical Features:

The only technical feature shared by Groups I and II that would otherwise unify the groups, determining a hand position in space. However, this shared technical feature does not represent a contribution over prior art, because the shared technical feature is disclosed by US 6,288,707 B1 (Philipp).

Philipp discloses determining a hand position in space (abstract; claim 1, measuring a position of an object adjacent a homogeneous resistive sensing layer).

As the technical feature was known in the art at the time of the invention, this cannot be considered a special technical feature that would otherwise unify the groups.

Therefore, Groups I-II lack unity under PCT Rule 13.

Note: Claims 4-32, 34-45, 47-52 and 54-67 are determined to be unsearchable because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a) and are, therefore, not included in any claim group.