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(54) Title: A TOUCH INTERFACE DEVICE AND METHOD FOR APPLYING CONTROLLABLE SHEAR FORCES TO A HUMAN APPENDAGE

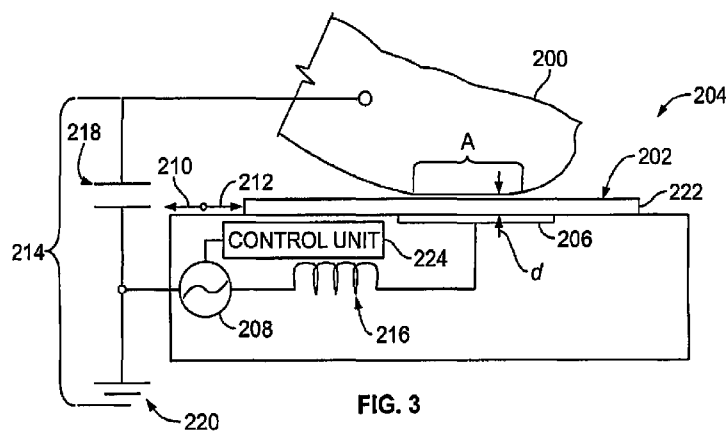


FIG. 3

(57) Abstract: A touch interface device includes a touch surface, an actuator, and an electrode. The actuator is coupled with the touch surface and is configured to move the touch surface in one or more directions. The electrode is coupled with the touch surface and is configured to impart a normal electrostatic force on one or more appendages of a human operator that engage the touch surface when an electric current is conveyed to the electrode. Movement of the touch surface by the actuator and the electrostatic force provided by the electrode are synchronized to control one or more of a magnitude or a direction of a shear force applied to the one or more appendages that engage the touch surface.

## INTERNATIONAL SEARCH REPORT

International application No.  
**PCT/US2012/037333****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; G08C 21/00; A63F 9/24; H02N 1/00; G06F 3/045

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) &amp; Keywords:touch,actuator,move,electrode,electrostatic,shear

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	US 2011-0079449 A1 (RADIVOJEVIC ZORAN) 07 April 2011 See paragraphs [0018]-[0046],[0057]-[0068], claims 1-4 and figures 1a,2,5,6.	21 1-20,22-24
Y A	US 2009-0036212 A1 (PROVANCHER WILLIAM R.) 05 February 2009 See paragraphs [0037]-[0043], claim 1 and figures 1,2a,10.	21 1-20,22-24
A	US 6351054 B1 (CABUZ; CLEOPATRA et al.) 26 February 2002 See column 6, lines 23-53, claim 9 and figure 8.	1-24
A	US 2008-0129705 A1 (KIM SEONG HYUN et al.) 05 June 2008 See paragraphs [0022]-[0025], claim 1 and figures 1-2b.	1-24

 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

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

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"&amp;" document member of the same patent family

Date of the actual completion of the international search

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**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/US2012/037333**

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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US 2008-0129705 A1	05.06.2008	EP 1930800 A1 JP 04-926927 B2 JP 2008-146649 A KR 10-0900310 B1 US 8212783 B2	11.06.2008 17.02.2012 26.06.2008 02.06.2009 03.07.2012