(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
7 October 2010 (07.10.2010)

PCT

(10) International Publication Number
WO 2010/115131 A3

(51) International Patent Classification:
G06F 3/041 (2006.01) *G06F 3/044* (2006.01)

(21) International Application Number:
PCT/US2010/029823

(22) International Filing Date:
2 April 2010 (02.04.2010)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
12/418,433 3 April 2009 (03.04.2009) US

(71) Applicant *(for all designated States except US)*: **SYNAPTICS INCORPORATED** [—/US]; 3120 Scott Blvd., Suite 130, Santa Clara, California 95054 (US).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **BOLENDER, Robert, J.** [US/US]; 151 Summerfield Drive, Guelph, Ontario N1L 1L1 (CA).

(74) Agents: **KUPANOFF, Mark, A.** et al.; INGRASSIA, FISHER & LORENZ, P.C., 7010 E. Cochise Road, Scottsdale, Arizona 85253 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

(88) Date of publication of the international search report:
20 January 2011

(54) Title: INPUT DEVICE WITH CAPACITIVE FORCE SENSOR AND METHOD FOR CONSTRUCTING THE SAME

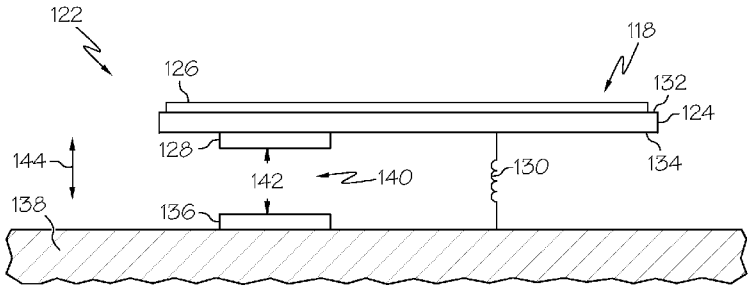

FIG. 2

(57) Abstract: Input devices including a capacitive force sensor, along with methods of making and using such, are provided. The input devices include a structural component having first and second substantially opposing sides, a plurality of sensor electrodes located on the first side of the structural component, the plurality of sensor electrodes configured to capacitively sense positional information associated with user input in a sensing region, a first capacitive electrode located on the second side of the structural component, the first capacitive electrode being configured to capacitively couple to a second capacitive electrode that is separated from the first capacitive electrode by a gas and moveable relative to the first capacitive electrode, and a biasing member configured to be physically coupled to the structural component such that a force associated with the user input causes a change in a separation distance between the first and second capacitive electrodes based on the force.

WO 2010/115131 A3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2010/029823

A. CLASSIFICATION OF SUBJECT MATTER

G06F 3/041(2006.01)i, G06F 3/044(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; G01L 1/00; G09G 5/00

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: touch,force

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2005-0061082 A1 (WILLAIM, DAVID DALLENBACH et al.) 24 March 2005 See abstract, claim 1, figs.2-4 and the related explantion	1-25
Y	JP 2009-009249 A (NISSHA PRINTING CO LTD) 15 January 2009 See abstract, claim 10, and fig.20	1-25
A	US 2004-0227736 A1 (KAMRATH ROBERT F. et al.) 18 November 2004 See claim 1, paragraphs [0020]-[0023], and figs.1-2	1-25
A	US 2002-0180710 A1 (JERRY B. ROBERTS) 05 December 2002 See abstract, claim 1, paragraphs [0036]-[0038], and figs.2 and 9a	1-25

☐ 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 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
16 NOVEMBER 2010 (16.11.2010)	**19 NOVEMBER 2010 (19.11.2010)**

Name and mailing address of the ISA/KR	Authorized officer
Korean Intellectual Property Office Government Complex-Daejeon, 139 Seonsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea	LEE, Cheol Soo
Facsimile No. 82-42-472-7140	Telephone No. 82-42-481-8525

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2010/029823

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2005-0061082 A1	24.03.2005	US 2006-0096384 A1	11.05.2006
		US 2009-259413 A1	15.10.2009
		US 7047818 B2	23.05.2006
		US 7353713 B2	08.04.2008
JP 2009-009249 A	15.01.2009	None	
US 2004-0227736 A1	18.11.2004	AU 2004-242072 A1	02.12.2004
		CN 1791788 A	21.06.2006
		CN 1791788 C0	21.06.2006
		EP 1625370 A1	15.02.2006
		JP 2007-503003 A	15.02.2007
		JP 2007-503003 T	15.02.2007
		KR 10-2006-0012292 A	07.02.2006
		US 7148882 B2	12.12.2006
		WO 2004-104537 A1	02.12.2004
US 2002-0180710 A1	05.12.2002	AU 2002-245555 A8	28.10.2002
		CN 1502090 A	02.06.2004
		CN 1502090 C0	16.08.2006
		CN 1502091 A	02.06.2004
		CN 1502091 C0	16.08.2006
		CN 1527933 A	08.09.2004
		CN 1527933 C0	17.05.2006
		CN 1582452 A	16.02.2005
		CN 1582452 C0	16.02.2005
		EP 1380007 A2	14.01.2004
		EP 1382007 A2	21.01.2004
		EP 1390908 A1	25.02.2004
		EP 1428004 A2	16.06.2004
		JP 2004-527847 A	09.09.2004
		JP 2004-531716 A	14.10.2004
		JP 2004-531716 T	14.10.2004
		JP 2005-502103 A	20.01.2005
		JP 2005-508533 A	31.03.2005
		KR 10-2003-0088061 A	15.11.2003
		KR 10-2003-0088137 A	17.11.2003
		KR 10-2003-0090732 A	28.11.2003
		KR 10-2004-0060849 A	06.07.2004
		US 2002-0149571 A1	17.10.2002
		US 2002-0163509 A1	07.11.2002
		US 2002-0175836 A1	28.11.2002
		US 7183948 B2	27.02.2007
		US 7190350 B2	13.03.2007
		US 7196694 B2	27.03.2007
		WO 02-084244 A2	24.10.2002
		WO 02-084244 A3	24.10.2002
		WO 02-084578 A2	24.10.2002
		WO 02-084578 A3	24.10.2002

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2010/029823

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		WO 02-084579 A2	24.10.2002
		WO 02-084579 A3	24.10.2002
		WO 02-084580 A1	24.10.2002
		WO 0208-4244 A3	01.04.2004