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Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

[Continued on next page]

(54) Title: PROJECTORS AND DEPTH CAMERAS FOR DEVICELESS AUGMENTED REALITY AND INTERACTION

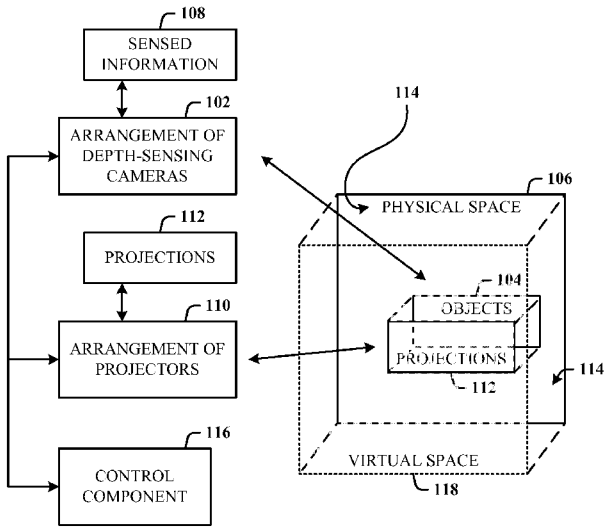

FIG. 1

(57) Abstract: Architecture that combines multiple depth cameras and multiple projectors to cover a specified space (e.g., a room).The cameras and projectors are calibrated, allowing the development of a multi-dimensional (e.g., 3D) model of the objects in the space, as well as the ability to project graphics in a controlled fashion on the same objects. The architecture incorporates the depth data from all depth cameras, as well as color information, into a unified multi-dimensional model in combination with calibrated projectors. In order to provide visual continuity when transferring objects between different locations in the space, the user's body can provide a canvas on which to project this interaction. As the user moves body parts in the space, without any other object, the body parts can serve as temporary "screens" for "in-transit" data.

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A. CLASSIFICATION OF SUBJECT MATTER

H04N 13/00(2006.01)i, G03B 21/00(2006.01)i

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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

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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

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS (KIPO internal) & Keywords: "projector, depth camera, multi-dimensional, modeling, sense, interactive"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 7348963 B2 (BELL MATTHEW) 25 March 2008 See abstract, column 10-11, Fig. 8 and claims	1-10
A	US 7576727 B2 (BELL MATTHEW) 18 August 2009 See abstract, column 4-5, Fig. 1 and claims	1-10
A	KR 10-0811015 B1 (CANESTA INC.) 11 March 2008 See abstract, <37>, <38>, and Fig. 1 and claims	1-10
A	KR 10-2002-0040773 A (PETER MCDUFFIE WHITE) 30 May 2002 See abstract, page 8, Fig. 1 and claims	1-10

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2011/024925

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 7348963 B2	25.03.2008	CA 2449300 A1	12.12.2002
		CN 102033608 A	27.04.2011
		CN 1582567 A	16.02.2005
		CN 1582567 B	13.10.2010
		CN 1918532 A	21.02.2007
		CN 1926497 A	07.03.2007
		EP 1393549 A2	03.03.2004
		EP 1393549 B1	16.08.2006
		EP 1689172 A1	09.08.2006
		EP 1695196 A2	30.08.2006
		EP 1695197 A2	30.08.2006
		JP 04-077787 B2	23.04.2008
		JP 2005-500719 A	06.01.2005
		JP 2007-514241 A	31.05.2007
		JP 2007-514242 A	31.05.2007
		KR 10-0847795 B1	23.07.2008
		KR 10-2006-0127861 A	13.12.2006
		US 2002-0186221 A1	12.12.2002
		US 2005-0089194 A1	28.04.2005
		US 2005-0110964 A1	26.05.2005
		US 2005-0122308 A1	09.06.2005
		US 2005-0162381 A1	28.07.2005
		US 2006-0132432 A1	22.06.2006
		US 2006-0139314 A1	29.06.2006
		US 2008-0062123 A1	13.03.2008
		US 2008-0150890 A1	26.06.2008
		US 2008-0150913 A1	26.06.2008
		US 2009-0225196 A1	10.09.2009
		US 7170492 B2	30.01.2007
		US 7259747 B2	21.08.2007
		US 7536032 B2	19.05.2009
		US 7710391 B2	04.05.2010
		US 7809167 B2	05.10.2010
		US 7834846 B1	16.11.2010
		US 8035612 B2	11.10.2011
		US 8035614 B2	11.10.2011
		US 8035624 B2	11.10.2011
		WO 02-100094 A2	12.12.2002
		WO 02-100094 A3	12.12.2002
		WO 2005-041579 A2	06.05.2005
		WO 2005-041579 A3	06.05.2005
		WO 2005-057398 A2	23.06.2005
		WO 2005-057398 A3	23.06.2005
		WO 2005-057399 A2	23.06.2005
		WO 2005-057399 A3	23.06.2005
		WO 2005-057921 A2	23.06.2005
		WO 2005-057921 A3	23.06.2005
		WO 2005-091651 A2	29.09.2005
		WO 2005-091651 A3	29.09.2005

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2011/024925

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		WO 2007-019443 A1	15.02.2007
US 7576727 B2	18.08.2009	AU 2003-301043 A1	09.07.2004
		US 2004-0183775 A1	23.09.2004
		US 2010-0026624 A1	04.02.2010
		WO 2004-055776 A1	01.07.2004
KR 10-0811015 B1	11.03.2008	AU 2001-40189 A1	24.04.2001
		AU 2001-61818 A1	20.08.2001
		AU 2002-11439 A1	15.04.2002
		AU 2002-326992 A1	12.12.2003
		AU 2002-335827 A1	10.06.2003
		AU 2002-359625 A1	23.06.2003
		AU 2003-213068 A1	09.09.2003
		CN 1232943 C0	21.12.2005
		CN 1439151 A	27.08.2003
		EP 1218692 A1	03.07.2002
		EP 1218692 A4	04.12.2002
		EP 1332488 A2	06.08.2003
		EP 1332488 B1	15.09.2010
		JP 2003-510561 A	18.03.2003
		JP 2004-500657 A	08.01.2004
		KR 10-2002-0067032 A	21.08.2002
		US 2002-0021287 A1	21.02.2002
		US 2002-0167862 A1	14.11.2002
		US 2003-0021032 A1	30.01.2003
		US 2003-0063775 A1	03.04.2003
		US 2003-0132921 A1	17.07.2003
		US 2003-0132950 A1	17.07.2003
		US 2003-0174125 A1	18.09.2003
		US 2003-0218760 A1	27.11.2003
		US 2003-0218761 A1	27.11.2003
		US 2004-0046744 A1	11.03.2004
		US 2005-0024324 A1	03.02.2005
		US 6323942 B1	27.11.2001
		US 6512838 B1	28.01.2003
		US 6522395 B1	18.02.2003
		US 6614422 B1	02.09.2003
		US 6674895 B2	06.01.2004
		US 6690618 B2	10.02.2004
		US 6710770 B2	23.03.2004
		US 7006236 B2	28.02.2006
		US 7050177 B2	23.05.2006
		WO 01-22033 A1	29.03.2001
		WO 01-59975 A2	16.08.2001
		WO 01-59975 A3	16.08.2001
		WO 02-057714 A1	25.07.2002
		WO 02-29711 A2	11.04.2002
		WO 02-29711 A3	11.04.2002
		WO 03-046706 A1	05.06.2003

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2011/024925

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		WO 03-050795 A1	19.06.2003
		WO 03-071411 A1	28.08.2003
		WO 03-100593 A1	04.12.2003
KR 10-2002-0040773 A	30.05.2002	AU 2000-61712 A1	05.03.2001
		CA 2381087 A1	15.02.2001
		CN 1197372 C0	13.04.2005
		CN 1378741 A0	06.11.2002
		EP 1203489 A1	08.05.2002
		EP 1203489 B1	09.07.2008
		GB 2353429 A	21.02.2001
		JP 2003-506973 A	18.02.2003
		US 7136090 B1	14.11.2006
		WO 01-11880 A1	15.02.2001