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(71) Applicant: **KONINKLIJKE PHILIPS N.V.** [NL/NL]; High Tech Campus 5, NL-5656 AE Eindhoven (NL).

(72) Inventors: **PARTHASARATHY, Vijay**; c/o High Tech Campus, Building 5, NL-5656 AE Eindhoven (NL). **JAIN, Ameet, Kumar**; c/o High Tech Campus, Building 5, NL-5656 AE Eindhoven (NL). **XIE, Hua**; c/o High Tech Campus, Building 5, NL-5656 AE Eindhoven (NL). **VIGNON, Francois, Guy, Gerard, Marie**; c/o High Tech Campus, Building 5, NL-5656 AE Eindhoven (NL). **HALL, Christopher, Stephen**; c/o High Tech Campus, Building 5, NL-5656 AE Eindhoven (NL).

(74) Agents: **STEFFEN, Thomas** et al.; High Tech Campus Building 5, NL-5656 AE Eindhoven (NL).

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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: ACCURATE AND RAPID MAPPING OF POINTS FROM ULTRASOUND IMAGES TO TRACKING SYSTEMS

(57) Abstract: A method for mapping coordinates between images and tracking systems includes providing (702) a calibration tool having a fixed geometric shape. The calibration tool includes first sensors associated with an imaging mode and second sensors associated with a tracking mode. The first and second sensors are distributed and mounted at known locations on the fixed geometric shape. The first sensors are located (708) in a field of view of an imaging system to determine a position of the calibration tool in image space. The second sensors are tracked (716) to determine a same position of the calibration tool in tracking space. The image space and the tracking space are mapped (722) in a common coordinate system based on artifacts of the calibration tool.

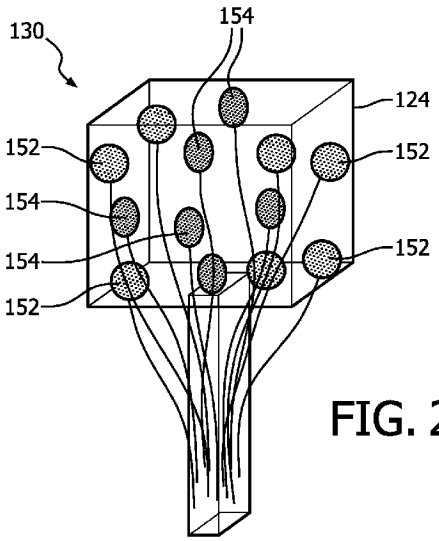


FIG. 2

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— *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))*

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A. CLASSIFICATION OF SUBJECT MATTER
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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A61B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

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 6 775 404 B1 (PAGOULATOS NIKO [US] ET AL) 10 August 2004 (2004-08-10) column 8, line 30 - column 10, line 50 figures 1,11(a), 11(b), 12 -----	1-8,10, 11,13-15 9,12
Y	WO 2009/063360 A1 (KONINKL PHILIPS ELECTRONICS NV [NL]; XU SHENG [US]; KRUECKER JOCHEN [U) 22 May 2009 (2009-05-22) paragraphs [0017] - [0020] figure 1 -----	9,12

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

☒ See patent family annex.

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"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
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Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Willig, Hendrik

INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6775404 B1	10-08-2004	NONE	
WO 2009063360 A1	22-05-2009	CN 101861526 A	13-10-2010
		EP 2223150 A1	01-09-2010
		JP 2011511652 A	14-04-2011
		RU 2010123952 A	20-12-2011
		US 2010249595 A1	30-09-2010
		WO 2009063360 A1	22-05-2009