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- (81) **Designated States** (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

[Continued on next page]

- (54) **Title:** THREE-DIMENSIONAL ENVIRONMENT RECONSTRUCTION

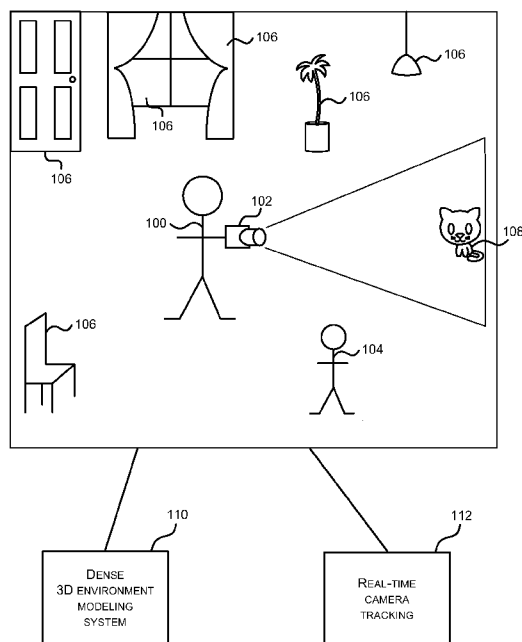


Fig.1

(57) **Abstract:** Three-dimensional environment reconstruction is described. In an example, a 3D model of a real-world environment is generated in a 3D volume made up of voxels stored on a memory device. The model is built from data describing a camera location and orientation, and a depth image with pixels indicating a distance from the camera to a point in the environment. A separate execution thread is assigned to each voxel in a plane of the volume. Each thread uses the camera location and orientation to determine a corresponding depth image location for its associated voxel, determines a factor relating to distance between the associated voxel and the point in the environment at the corresponding location, and updates a stored value at the associated voxel using the factor. Each thread iterates through an equivalent voxel in the remaining planes of the volume, repeating the process to update the stored value.



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, QA, RO, RS, RU, RW, 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.

SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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- *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))*

Published:

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- *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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18 October 2012

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/020686**A. CLASSIFICATION OF SUBJECT MATTER****G06T 17/00(2006.01)i, H04N 13/02(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)

G06T 17/00; G09G 5/02; G09G 5/14; G06T 15/00; G06K 9/40; G06K 9/00

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: mesh, voxel, distance, 3D

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 7034818 B2 (RONALD N. PERRY et al.) 25 April 2006	1,2,3,5,8
A	See abstract; column 5 line 65 - column 6 line 20; claims 1-3; figures 1,9,10,11.	4,6,7,9,10
Y	US 7583275 B2 (NEUMANN ULRICH et al.) 01 September 2009	1,2,3,5,8
A	See abstract; column 13 line 62 - column 15 line 42; claims 1-3; figures 14,15.	4,6,7,9,10
A	US 2010-0098328 A1 (SE SHUEN YAN STEPHEN et al.) 22 April 2010	1-10
	See abstract; paragraphs [0047]-[0092]; claims 37-39, 41-44; figure 3.	

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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"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

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Date of the actual completion of the international search

17 AUGUST 2012 (17.08.2012)

Date of mailing of the international search report

22 AUGUST 2012 (22.08.2012)

Name and mailing address of the ISA/KR

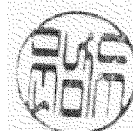
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/020686

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 7034818 B2	25.04.2006	EP 1241624 A2 JP 2002-334346 A US 2002-0130854 A1	18.09.2002 22.11.2002 19.09.2002
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