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(54) **CALIBRATION OF WI-FI LOCALIZATION FROM VIDEO LOCALIZATION**

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G01S 5/00 (2006.01)

(52) **U.S. Cl.**
CPC ***G01S 5/00*** (2013.01)

(58) **Field of Classification Search**
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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2005/0093976 A1 5/2005 Valleriano et al.
2008/0113672 A1* 5/2008 Karr et al. 455/456.1
2008/0303901 A1 12/2008 Variyath et al.
2009/0092113 A1* 4/2009 Doshi H04W 24/04 370/338
2009/0219209 A1* 9/2009 Bush et al. 342/450
2009/0265105 A1* 10/2009 Davis et al. 701/300
2009/0280824 A1 11/2009 Rautiainen
2010/0103173 A1 4/2010 Lee et al.
2010/0150404 A1 6/2010 Marks et al.
2010/0166260 A1* 7/2010 Huang et al. 382/103
2011/0013836 A1* 1/2011 Gefen et al. 382/171
2011/0065451 A1 3/2011 Danado et al.
2011/0135149 A1* 6/2011 Gefen 382/103
2011/0285851 A1* 11/2011 Plocher et al. 348/152
2013/0107057 A1* 5/2013 Zhou et al. 348/169

FOREIGN PATENT DOCUMENTS

KR 10-2010-0025338 3/2010
KR 10-2010-0026776 3/2010

OTHER PUBLICATIONS

International Search Report and the Written Opinion of the International Searching Authority dated Apr. 9, 2012 for Application No. PCT/US2011/048294.
International Preliminary Report on Patentability for International Patent Application No. PCT/US2011/048294, filed Aug. 18, 2011.

* cited by examiner

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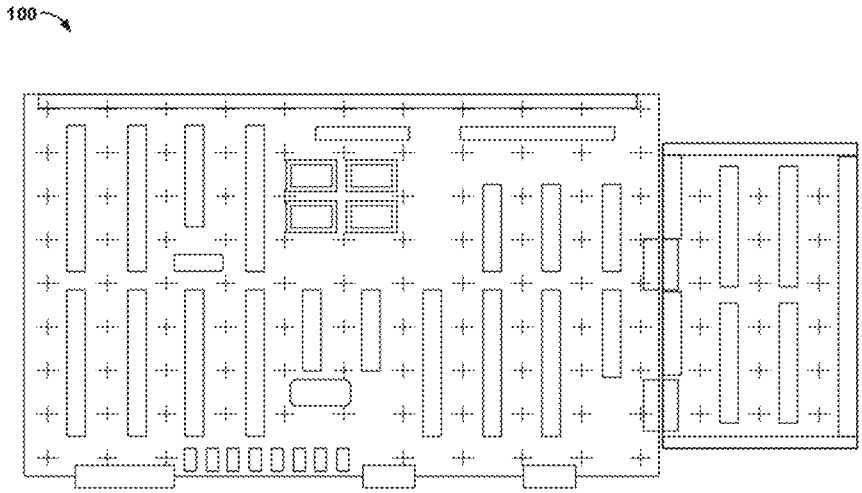
(57) **ABSTRACT**

In some implementations, video camera networks can be used to track people or objects and determine their locations. In some implementations, location accuracy better than one meter can be achieved using video cameras. According to some implementations, Wi-Fi localization and video localization systems can be fused together to perform calibration. In some implementations, by using the video network to continuously update the Wi-Fi localization calibration database, Wi-Fi location accuracy can be improved.

21 Claims, 13 Drawing Sheets