



(51) International Patent Classification:

G01C 11/06 (2006.01) G01S 13/86 (2006.01)  
G06K 9/00 (2006.01) G01S 17/46 (2006.01)

(21) International Application Number:

PCT/IB2018/058959

(22) International Filing Date:

14 November 2018 (14.11.2018)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

62/585,566 14 November 2017 (14.11.2017) US

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(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, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, 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, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, 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, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

(54) Title: METHOD AND SYSTEM FOR ENHANCED SENSING CAPABILITIES FOR VEHICLES

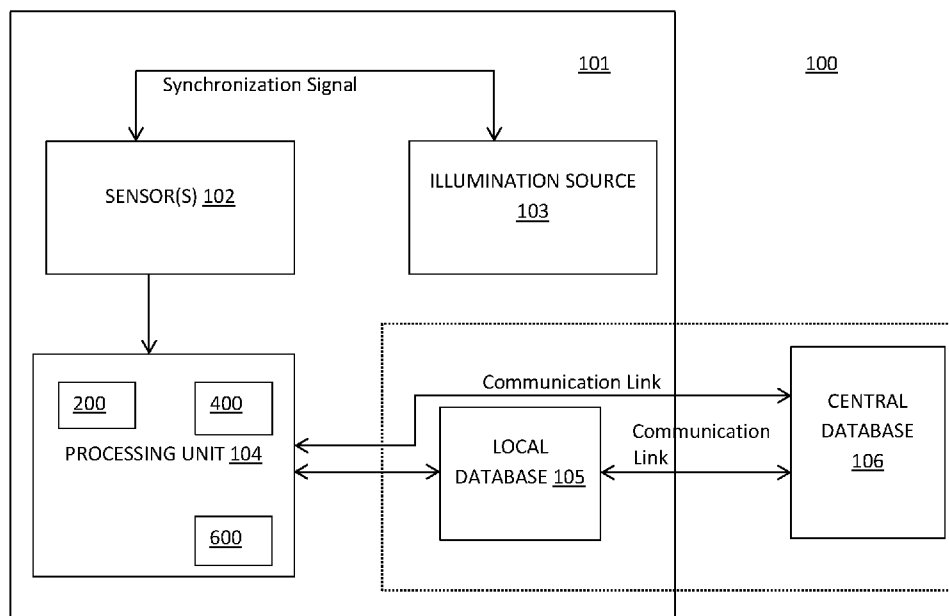


FIG. 1

(57) Abstract: Methods and systems for accurately determining positions of the system itself, or a vehicle, in which the system is used, operate by obtaining a plurality of first patterns, each of the first patterns associated with a position; establishing a system position; acquiring at least one second pattern proximate to the position of the system; and, matching the at least one second pattern to at least one of first patterns, to determine a subsequent system position.



**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:**

27 June 2019 (27.06.2019)

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/IB18/58959

## A. CLASSIFICATION OF SUBJECT MATTER

IPC - G01C 11/06; G06K 9/00; G01S 13/86, 17/46 (2019.01)

CPC - G01C 11/06; G06K 9/00536, 9/00789; G01S 13/86, 13/865, 13/867, 17/46

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)

See Search History document

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

See Search History document

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

See Search History document

## 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 2008/0226130 A1 (KANSAL, A et al) 18 September 2008, paragraphs [0002], [0018]-[0019], [0023]-[0029], [0033]-[0035], [0039], [0054]	1-5, 7-9, 11-16, 18, 21-24 ----- 6, 10, 17, 19
Y	US 2007/0127779 A1 (MIYAHARA, S) 07 June 2007, paragraph [0009]	6
Y	US 2009/0154793 A1 (SHIN, S et al) 18 June 2009, abstract	10
Y	JP 5556274 B2 (TOPPAN PRINTING CO) 23 July 2014, see machine translation	17
Y	WO 2016/163492 A1 (NEC CORP) 13 October 2006, see machine translation	19

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

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	"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
"E" earlier application or patent but published on or after the international filing date	"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
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"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	

Date of the actual completion of the international search

20 February 2019 (20.02.2019)

Date of mailing of the international search report

09 MAY 2019

Name and mailing address of the ISA/

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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/IB18/58959

**Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3.  Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

\*\*\* Continued in Extra Sheet \*\*\*

1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2.  As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:  
1-19 and 21-24

**Remark on Protest**

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IB18/58959

\*\*\*-Continued from Box III \*\*\*-

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fee must be paid.

Group I: Claims 1-19 and 21-24 are directed towards a method system and medium for matching patterns to determine a subsequent position.

Group II: Claims 20 and 25 are directed towards a method and medium for creating a three dimensional map of an area covered by an image.

The inventions listed as Groups I-II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

The special technical features of Group I include at least establishing the position of a system comprising: obtaining a plurality of first patterns, each of the first patterns associated with a position; establishing a system position; acquiring at least one second pattern proximate to the position of the system; and, matching the at least one second pattern to at least one of first patterns, to determine a subsequent system position, which are not present in Group II.

The special technical features of Group II include at least creating a three dimensional map of an area covered by an image comprising: calculating the relative position of at least two frames of an image based on a pattern analysis; and, applying the calculated relative positions of each of the at least two frames to extract a three dimensional map, which are not present in Group I.

The common technical features shared by Groups I-II are a pattern; an image. However, these common features are previously disclosed by US 2008/0226130 A1 to KANSAL, A et al (hereinafter "Kansal"). Kansal discloses a pattern (pattern, paragraph [0064]); an image (image, paragraph [0064]).

Since the common technical features are previously disclosed by the Kansal reference, these common features are not special and so Groups I-II lack unity.