(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
12 December 2013 (12.12.2013)

WIPO | PCT

(10) International Publication Number
WO 2013/184493 A3

(51) International Patent Classification:
G01S 5/02 (2010.01) *G01S 19/19* (2010.01)
G01S 19/40 (2010.01)

(21) International Application Number:
PCT/US2013/043540

(22) International Filing Date:
31 May 2013 (31.05.2013)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

61/657,557	8 June 2012 (08.06.2012)	US
61/670,522	11 July 2012 (11.07.2012)	US
13/797,651	12 March 2013 (12.03.2013)	US

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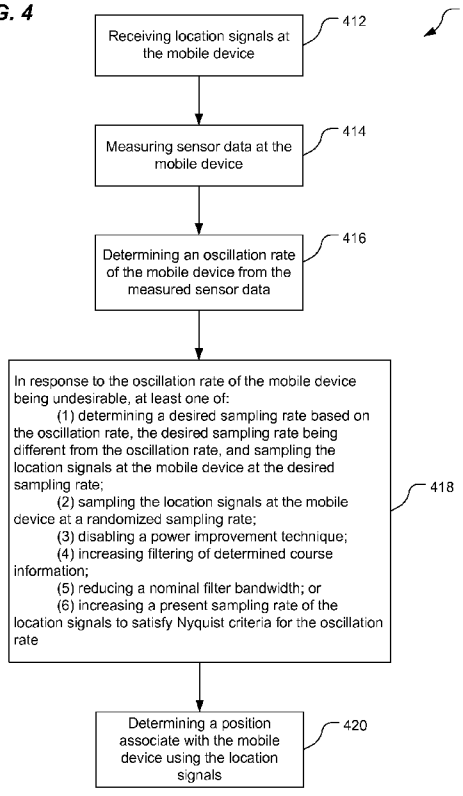
(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, 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, PA, 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.

(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, SZ, TZ,

[Continued on next page]

(54) Title: OSCILLATING MOBILE DEVICE POSITION DETERMINATION

FIG. 4



(57) Abstract: A method in a mobile device includes: receiving location signals at the mobile device; measuring sensor data at the mobile device; determining an oscillation rate of the mobile device from the sensor data; in response to the oscillation rate of the mobile device being undesirable, at least one of: (1) determining a desired sampling rate based on the oscillation rate, the desired sampling rate being different from the oscillation rate; and sampling the location signals at the mobile device at the desired sampling rate; (2) sampling the location signals at the mobile device at a randomized sampling rate; (3) disabling a power improvement technique; (4) increasing filtering of determined course information; (5) reducing a nominal filter bandwidth; or (6) increasing a present sampling rate of the location signals to satisfy Nyquist criteria for the oscillation rate; and determining the position associated with the mobile device using the location signals.

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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).

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:
15 May 2014

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2013/043540

A. CLASSIFICATION OF SUBJECT MATTER
INV. G01S5/02 G01S19/40 G01S19/19
ADD.

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)
G01S

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	US 6 285 314 B1 (NAGATSUMA HIDEAKI [JP] ET AL) 4 September 2001 (2001-09-04) figures 2,4,6 column 2, line 64 - column 3, line 63 column 5, line 24 - line 43 column 6, line 1 - line 65 column 7, line 25 - line 40 -----	1-27
X	US 5 926 131 A (SAKUMOTO KAZUMI [JP] ET AL) 20 July 1999 (1999-07-20) figures 1,4,6 column 1, line 59 - column 2, line 34 column 4, line 34 - line 64 column 5, line 45 - line 64 column 6, line 16 - column 7, line 36 ----- -/--	1,8,15, 22

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

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"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

"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
24 March 2014	01/04/2014

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	Hekmat, Taymoor

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Form PCT/ISA/210 (second sheet) (April 2005)

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 532 432 B1 (NAGATSUMA HIDEAKI [JP] ET AL) 11 March 2003 (2003-03-11) figures 4,5 column 2, line 49 - column 3, line 12 column 7, line 35 - column 8, line 30 column 8, line 51 - line 62 column 9, line 54 - column 10, line 36	1,8,15, 22
A	GB 2 352 348 A (SEIKO INSTR INC [JP]) 24 January 2001 (2001-01-24) the whole document	1-27

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/043540

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:

see additional 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 an 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.:

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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 2-7, 9-14, 16-21, 23-27(completely); 1, 8, 15, 22(partially)

   Method for preventing aliasing effects due to oscillating motions of a mobile positioning device by means of adapting the sampling rate of positioning process.

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2. claims: 1, 8, 15, 22(all partially)

   Method for preventing aliasing effects due to oscillating motions of a mobile positioning device by means of controlling the power management function of the receiver.

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3. claims: 1, 8, 15, 22(all partially)

   Method for preventing aliasing effects due to oscillating motions of a mobile positioning device by means of filtering adaptions.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2013/043540

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6285314 B1	04-09-2001	JP 3167693 B2	21-05-2001
		JP 2000292199 A	20-10-2000
		US 6285314 B1	04-09-2001
US 5926131 A	20-07-1999	JP 3256472 B2	12-02-2002
		JP H10325736 A	08-12-1998
		US 5926131 A	20-07-1999
US 6532432 B1	11-03-2003	JP 2000193482 A	14-07-2000
		US 6532432 B1	11-03-2003
GB 2352348 A	24-01-2001	GB 2352348 A	24-01-2001
		JP 2001027545 A	30-01-2001