



(51) International Patent Classification:

G01S 7/481 (2006.01) *G01S 5/16* (2006.01)
G01S 17/46 (2006.01) *G01S 7/48* (2006.01)
G01S 3/783 (2006.01) *G01S 11/12* (2006.01)

17195398.7 09 October 2017 (09.10.2017) EP
 17195427.4 09 October 2017 (09.10.2017) EP

(21) International Application Number:

PCT/EP2017/079564

(22) International Filing Date:

17 November 2017 (17.11.2017)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

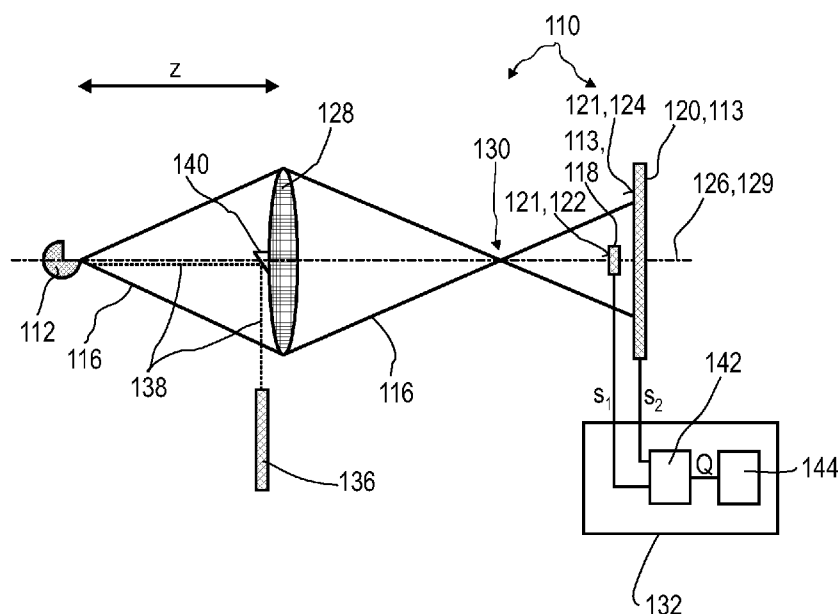
16199397.7 17 November 2016 (17.11.2016) EP
 16199398.5 17 November 2016 (17.11.2016) EP
 16199399.3 17 November 2016 (17.11.2016) EP
 17161334.2 16 March 2017 (16.03.2017) EP

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(54) Title: DETECTOR FOR OPTICALLY DETECTING AT LEAST ONE OBJECT

FIG.2



(57) Abstract: A detector (110, 1110, 2110) for determining a position of at least one object (112) is proposed. The detector (110, 1110, 2110) comprises: at least one transfer device (128, 1128), wherein the transfer device (128, 1128) has at least one focal length in response to at least one incident light beam (116, 1116) propagating from the object (112, 1112) to the detector (110, 1110, 2110); at least two optical sensors (113, 1118, 1120), wherein each optical sensor (113, 1118, 1120) has at least one light sensitive area (121, 1122, 1124), wherein each optical sensor (113, 1118, 1120) is designed to generate at least one sensor signal in response to an illumination of its respective light-sensitive area by the light beam (116, 1116), at least one evaluation device (132, 1132) being configured for determining at least one longitudinal coordinate z of the object (112, 1112) by evaluating a quotient signal Q from the sensor signals. The detector is adapted to determine the longitudinal coordinate z of the object in at least one measurement range independent from



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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).

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:**
 28 June 2018 (28.06.2018)

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2017/079564

A. CLASSIFICATION OF SUBJECT MATTER INV. G01S7/481 G01S17/46 G01S3/783 G01S5/16 G01S7/48 G01S11/12 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, INSPEC, WPI Data								
C. DOCUMENTS CONSIDERED TO BE RELEVANT <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%; padding: 5px;">Category*</th> <th style="width: 70%; padding: 5px;">Citation of document, with indication, where appropriate, of the relevant passages</th> <th style="width: 20%; padding: 5px;">Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td style="vertical-align: top; padding: 5px;">X Y A</td> <td style="vertical-align: top; padding: 5px;"> US 5 323 222 A (KUNISHIGE KEIJI [JP]) 21 June 1994 (1994-06-21) cited in the application figures 1, 2A-2D figures 8A-8C, 9A-9C figures 13A-13E figures 14A-14B figures 15A-15E column 1, line 16 - column 2, line 28 column 3, lines 28-52 column 4, line 58 - column 9, line 32 ----- -/-- </td> <td style="vertical-align: top; padding: 5px;"> 1-14, 59-65,72 52-58 15-17 </td> </tr> </tbody> </table>			Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	X Y A	US 5 323 222 A (KUNISHIGE KEIJI [JP]) 21 June 1994 (1994-06-21) cited in the application figures 1, 2A-2D figures 8A-8C, 9A-9C figures 13A-13E figures 14A-14B figures 15A-15E column 1, line 16 - column 2, line 28 column 3, lines 28-52 column 4, line 58 - column 9, line 32 ----- -/--	1-14, 59-65,72 52-58 15-17
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.						
X Y A	US 5 323 222 A (KUNISHIGE KEIJI [JP]) 21 June 1994 (1994-06-21) cited in the application figures 1, 2A-2D figures 8A-8C, 9A-9C figures 13A-13E figures 14A-14B figures 15A-15E column 1, line 16 - column 2, line 28 column 3, lines 28-52 column 4, line 58 - column 9, line 32 ----- -/--	1-14, 59-65,72 52-58 15-17						
<div style="display: flex; justify-content: space-between;"> <div> ☒ Further documents are listed in the continuation of Box C. </div> <div> ☒ See patent family annex. </div> </div>								
<div style="display: flex;"> <div style="flex: 1;"> <p>* Special categories of cited documents :</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="flex: 1;"> <p>"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</p> <p>"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</p> <p>"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</p> <p>"&" document member of the same patent family</p> </div> </div>								
Date of the actual completion of the international search <div style="text-align: center; font-size: 1.2em;">27 February 2018</div>	Date of mailing of the international search report <div style="text-align: center; font-size: 1.2em;">17/05/2018</div>							
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer <div style="text-align: center; font-size: 1.2em;">Hirsch, Stefanie</div>							

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2017/079564

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 4 675 517 A (SHIOMI YASUHIKO [JP]) 23 June 1987 (1987-06-23) cited in the application figures 2, 3(a)-3(c) figures 4(a)-4(d) figures 5, 6 column 1, line 15 - column 2, line 68 -----	1
Y	WO 2015/024871 A1 (BASF SE [DE]) 26 February 2015 (2015-02-26) cited in the application page 1, lines 7-21 page 64, line 32 - page 65, line 18 -----	52-58

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2017/079564

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.:

1-17, 52-65, 72

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: 1-17, 52-65, 72

evaluation of sensor signals based on information parts of a known beam profile

2. claims: 18-20

light sensors being arranged such that a certain condition is satisfied

3. claims: 21-27, 66

optical sensors being arranged linearly in the beam path of the detector

4. claims: 28-34, 67, 68

sensor element having a matrix of optical sensors

5. claims: 35-39, 69

sensor with its geometrical center being offset from the optical axis

6. claims: 40-49, 70

optical sensor having a fluorescent waveguiding sheet

7. claims: 50, 51, 71

optical sensor having an angle dependent optical element

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2017/079564

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
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