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[Continued on next page]

(54) Title: Z-AXIS PHYSICAL PROXIMITY SWITCH

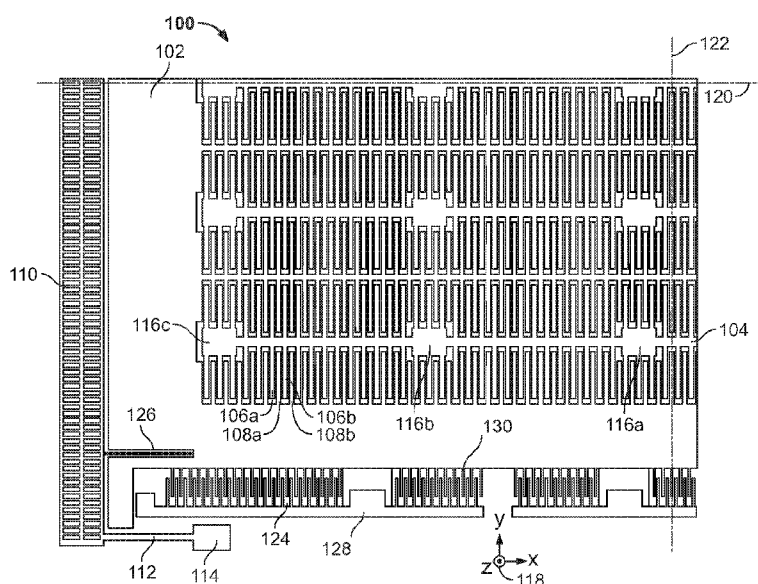


FIG. 1

(57) Abstract: Sensors (100) and systems (100) are described herein for out-of-plane sensing. In particular, the sensors (100) and systems (100) relate to vibratory inertial sensors implementing time-domain sensing techniques with linear combinations of multiple signals. In out-of-plane sensing, these multiple signals may be produced from a single sense mass (102, 208, 312) oscillation. Time intervals (624) produced from linear combinations of these multiple signals can be used to measure inertial parameters, such as acceleration, and other values of interest.



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

— *before the expiration of the time limit for amending the
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INTERNATIONAL SEARCH REPORT

International application No

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A. CLASSIFICATION OF SUBJECT MATTER

INV. G01C19/56 G01P15/00
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)

G01C G01P

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 A	US 2013/104622 A1 (SWANSON PAUL D [US] ET AL) 2 May 2013 (2013-05-02) abstract figures 1-7 paragraphs [0010], [0044] - [0046], [0064], [0123], [0124], [0134], [0139] - [0142], [0190] claims 1-17 -----	1,15 2-6, 16-20
X	US 8 427 249 B1 (SWANSON PAUL D [US] ET AL) 23 April 2013 (2013-04-23) abstract figures 1-17 column 1, lines 65-66 column 6, line 45 - column 7, line 8 column 7, lines 9-35 column 8, lines 46-56 claims 1-19 -----	1-6, 15-20



Further documents are listed in the continuation of Box C.



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

"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)

"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

28 September 2016

Date of mailing of the international search report

04/01/2017

Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2016/040538

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2013104622	A1	02-05-2013	NONE

US 8427249	B1	23-04-2013	EP 2769467 A1 27-08-2014
			JP 2014533009 A 08-12-2014
			JP 2016154333 A 25-08-2016
			TW 201330339 A 16-07-2013
			US 8427249 B1 23-04-2013
			WO 2013058993 A1 25-04-2013

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2016/040538

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.:

1-6, 15-20

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: 1-6, 15-20

Oscillation motion of sense mass

2. claims: 7-14, 21-28

Positioning of switch electrodes
