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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
27 November 2014 (27.11.2014)

WIPO | PCT

(10) International Publication Number
WO 2014/188162 A3

(51) International Patent Classification:
B60L 3/00 (2006.01) ***B66F 9/075*** (2006.01)
B60L 3/08 (2006.01) ***B66F 9/24*** (2006.01)
B60L 15/20 (2006.01) ***B66F 17/00*** (2006.01)

(21) International Application Number:
PCT/GB2014/051517

(22) International Filing Date:
16 May 2014 (16.05.2014)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
1309072.5 20 May 2013 (20.05.2013) GB

(71) Applicant *(for all designated States except US)*: **SEVCON LIMITED** [GB/GB]; Kingsway, Team Valley, Gateshead Tyne and Wear NE11 0QA (GB).

(72) Inventor; and
(71) Applicant *(for US only)*: **BARRASS, Peter** [GB/GB]; c/o Sevcon Limited, Kingsway, Team Valley, Gateshead Tyne NE11 0QA (GB).

(74) Agent: **LEACH, Sean**; Mathys & Squire, The Shard, 32 London Bridge Street, London London SE1 9SG (GB).

(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, IR, 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, 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.

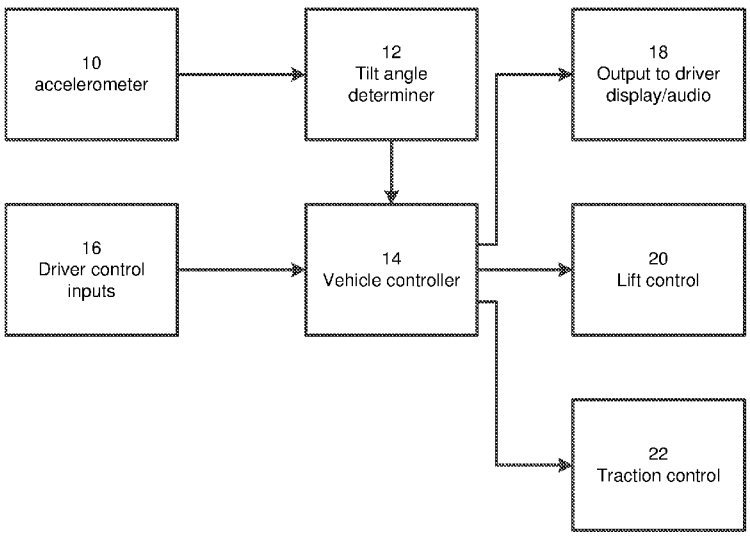
(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, 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))*

[Continued on next page]

(54) Title: VEHICLE CONTROLLER AND METHOD OF CONTROLLING A VEHICLE

Figure 1



(57) Abstract: An electric motor control unit for controlling the operation of an electric motor. The unit comprises: an electric motor controller comprising a processor having at least one input and at least one output, wherein an output of the processor is coupled to a power provider for controlling power to an electric motor; a tilt accelerometer system comprising a tilt accelerometer for determining a measure of the tilt of the electric motor unit relative to a reference orientation, wherein the tilt accelerometer system comprises an output for providing a signal based on the determined measure of the tilt; wherein the output of the tilt accelerometer system is coupled to an input of the processor of the electric motor controller; wherein the power provider comprises a power output for controlling the operation of an electric motor based on the output of the tilt accelerometer system.

WO 2014/188162 A3

— *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:
30 July 2015

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2014/051517

A. CLASSIFICATION OF SUBJECT MATTER
INV. B60L3/00 B60L3/08 B60L15/20 B66F9/075 B66F9/24
B66F17/00
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)
B66F G05D

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.
A	WO 2008/022067 A2 (SEGWAY INC [US]; STEVENS JON M [US]; ROBINSON DAVID [US]) 21 February 2008 (2008-02-21) pages 6-15 - pages 22-36; figures 1-7,18-25	1-18
A	US 2009/157266 A1 (KRIMBACHER NORBERT [AT]) 18 June 2009 (2009-06-18) abstract; figures 1,2	1-18
A	WO 2004/009396 A1 (HOERBIGER & CO [DE]; WALLAERT JOHAN [BE]) 29 January 2004 (2004-01-29) abstract; figures 1,2	1-18
A	US 2007/208483 A1 (RABIN AMIHUD [IL]) 6 September 2007 (2007-09-06) abstract; figures 1-12	1-18

☐ 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	Date of mailing of the international search report
18 February 2015	12/06/2015

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	Rupcic, Zoran

3

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

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB2014/051517

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.:

1-18(completely); 51, 52(partially)

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: 1-18(completely); 51, 52(partially)

   Compact electric motor control unit with a tilt accelerometer system

   ---

2. claims: 19-50(completely); 51, 52(partially)

   Apparatus, controller and method for controlling operation of a load bearing vehicle as e.g. operating a lifting motor or a traction motor, having a turning input, a speed input, a tilt angle determiner and a controller for modifying operation(s) of the vehicle; also calibrating of said apparatus and/or controller

   ---

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/GB2014/051517

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2008022067 A2	21-02-2008	AU 2007286080 A1	21-02-2008
		CA 2659308 A1	21-02-2008
		CN 101501598 A	05-08-2009
		EP 2049963 A2	22-04-2009
		ES 2394660 T3	04-02-2013
		JP 5203368 B2	05-06-2013
		JP 2010500220 A	07-01-2010
		KR 20090048584 A	14-05-2009
		RU 2009108658 A	20-09-2010
		US 2008039990 A1	14-02-2008
		WO 2008022067 A2	21-02-2008
US 2009157266 A1	18-06-2009	DE 102007059727 A1	18-06-2009
		EP 2070863 A1	17-06-2009
		US 2009157266 A1	18-06-2009
WO 2004009396 A1	29-01-2004	DE 10232639 A1	12-02-2004
		WO 2004009396 A1	29-01-2004
US 2007208483 A1	06-09-2007	CN 101104385 A	16-01-2008
		IT MI20070068 U1	03-09-2007
		US 2007208483 A1	06-09-2007