(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 843 297 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
30.06.2021 Bulletin 2021/26

(51) Int Cl.:
H04H 20/59 *(2008.01)* ***G08G 1/0965*** *(2006.01)*

(21) Application number: **19020735.7**

(22) Date of filing: **23.12.2019**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
KH MA MD TN

(71) Applicant: **Jámbor, Péter**
8671 Kapoly (HU)

(72) Inventor: **Jámbor, Péter**
8671 Kapoly (HU)

(74) Representative: **Germus, Gábor**
Germus & Partners
Pauler u. 11
1013 Budapest (HU)

(54) **METHOD AND ELECTRONIC SYSTEMS TECHNOLOGY ARRANGEMENT FOR ASSISTING THE TRAVEL OF A VEHICLE USING DISTINCTIVE SIGNAL**

(57) Method and electronic systems technology arrangement for assisting the travel of a vehicle using distinctive signal, the vehicle is provided with a diffuse active module for being detected (1) having radiofrequency transmitter outputs and transmitting aerials connected to them whose transmission can be received within a given range. At least two of the following transmission types a), b), c) and d) are used at the same time and automatically when the distinctive signal is on:

-a) the broadcast of one or more AM-FM transmitters receivable by an AM-FM mobile radio receiver (3) or car radio (2) in a first effective range is overwritten by an AM-FM diffuse broadcast (I.b, I.(n)) containing a short warning audio message;

-b) an RDS visual and/or audio warning is sent through an RDS diffuse broadcast (I.a) receivable by a car radio (2) in a second effective range;

-c) sending a one-sided Bluetooth Request (II.a, II.b, II.(n)) warning signal receivable by a mobile phone or other smart devices in a third effective range; and

-d) sending textual or iconographic warning through Wi-Fi broadcast (III.) by applying 7API interfaces for the real time traffic information boards (9, 30) of the public road maintainer.

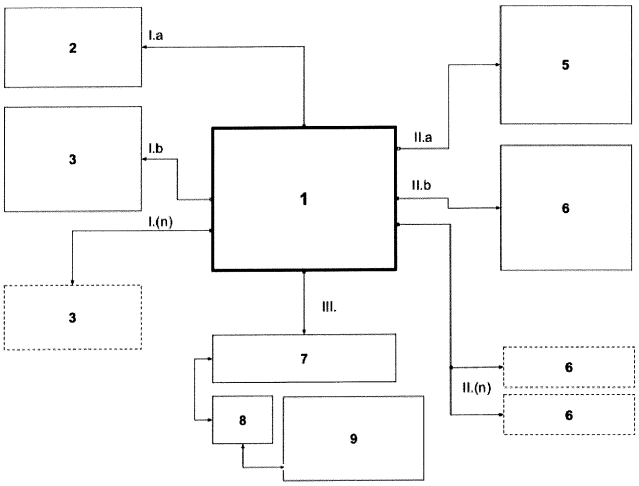

Fig. 1

EP 3 843 297 A1

Description

[0001] The present invention relates to a method for assisting the travel of a vehicle using distinctive signal. In the method the vehicle is provided with a diffuse active module for being detected, the module has radiofrequency transmitter outputs and transmitting aerials connected to them whose transmission can be received within a given range. The invention further relates to an electronic systems technology arrangement for assisting the travel of a vehicle using distinctive signal, the arrangement has a diffuse active module for being detected, the module is provided with radiofrequency transmitter outputs and transmitting aerials connected to them whose transmission can be detected within a given range.

[0002] Considering the experiences and the number of regrettable events it can be stated that using a distinctive signal in itself is not enough for helping the safe travel of a vehicle. Using audio and light signals is an active means for an emergency vehicle in order to help its safe and continuous travel while it is a passive means for the other participants of the public traffic. In these days audio and light signals which should ensure the safe travel of the emergency vehicle does not always elicit a satisfactory effect because of the number of people participating in the public traffic either as pedestrians or drivers of a vehicle as they are partially isolated from the environment.

[0003] The widespread smart phones, music playing instruments, sometimes other multimedia devices isolate people (drivers, pedestrians, people getting on/off a public transport vehicle) from their environment as is often the case.

[0004] It is known that using cell phones while driving is particularly dangerous. Also, listening to loud music (or perhaps observing the content displayed on the smart phone or multimedia device) have a negative influence on the driver. This negative influence is even greater when the driver uses an earphone or headphone. An interesting fact is that this behaviour is regulated by the law instead of prohibiting the use of these devices.

[0005] When earphones or headphones are used (mainly for listening to music) drivers (especially pedestrians, cyclists) will take no notice of the nearby sound effects as their perception is entirely blocked.

[0006] Perception of sound signals or even warning light signals arriving from the environment in case of a pedestrian using earphones or headphones is lower since the pedestrian is not in a so-called preparedness situation i.e. the traffic is watched only in special cases by him. While drivers travelling in the public traffic are controlled for this purpose by the law there is no such rule for pedestrians.

[0007] When the ears of any of the people participating in the public transport is directly exposed to often unjustified loud music or when he listens attentively to an audio content, he is physically hindered in hearing the sirens and other sound signals. He simply does not hear it.

[0008] Patent application US2008150759 (A1) describes a method in which RFID technology is used for communication with Intelligent Traffic signalling system to efficiently handle traffic. Owing to the interaction between an existing intelligent traffic system and the RFID the temporary position of an emergency vehicle with distinctive signals is detected. Typically, this solution can only be used in the infrastructure of large cities where the intelligent traffic system is installed. Further, because of the short effective range of the RFID cards they can provide data only at separate discrete points.

[0009] The aim of the present invention is to provide a more active electronic system which can inform not only in a passive but in an active manner all the participants (drivers, pedestrians, cyclists, motorcyclists) of the traffic for assisting the travel of a nearby vehicle with distinctive signal i.e. a system that makes them perceive the emergency vehicle in order to give way to it.

[0010] It has been realized that the travel assisting system which can be installed in a given vehicle in addition to the distinctive sound and light signals can ensure an active means for the travelling vehicle so that it may be detected more efficiently for the public traffic. It is ensured by an assisting systems technology arrangement which changes the perception from a passive process into an active process.

[0011] With the method and the Travel Assisting System according to the present invention - hereinafter shortly called TAS - safe and continuous travel of an emergency vehicle can be ensured generally even in the aforementioned situations.

[0012] The TAS according to the invention in addition to the distinctive light and sound signals is able to provide information to the people participating in the traffic through more channels at the same time even by blocking or possibly overwriting the hindering factors mentioned in the introductory part. For promoting the so called diffuse active detection it is able to assist the emergency travel by using the public road apparatuses, the communications devices, entertaining devices which are just employed by the people travelling on the road, or even by using the hindering smart devices for a short time. The short time is physically required since the emergency vehicle usually travels fast as compared to the effective ranges of the installed module of TAS.

[0013] The method according to the preamble is implemented by using at least two of the following transmission types a), b), c), and d) at the same time automatically when the distinctive signal is in on:

- a) the broadcast of one or more AM-FM transmitters receivable by an AM-FM mobile radio receiver or car radio in a first effective range is overwritten by an AM-FM diffuse broadcast containing a short warning audio message;
- b) an RDS visual and/or audio warning is sent through an RDS diffuse broadcast receivable by a

car radio in a second effective range;

- c) sending a one-sided Bluetooth Request warning signal receivable by a mobile phone or other smart devices in a third effective range; and

- d) sending textual or iconographic warning through Wi-Fi broadcast by applying 7API interfaces for the signboards of the public road maintainer providing real-time information.

[0014] The electronic systems technology arrangement according to the preamble is realized by using at least two of the following transmission types a), b), c), and d):

- a) the arrangement is provided with an AM-FM RF transmitter whose output is connected to RF transmitting aerial, the AM-FM RF transmitter is applicable to send by an AM-FM diffuse broadcast containing a short warning audio message which overwrites the broadcast of one or more AM-FM broadcasting transmitters receivable by an AM-FM mobile radio receiver or car radio in a first effective range;

- b) the arrangement is provided with an RDS decoder connected to the RF transmitting aerial through the AM-FM RF transmitter, the RDS decoder is applicable to send an RDS visual and/or audio warning through an RDS diffuse broadcast receivable by a car radio in a second effective range;

- c) the arrangement is provided with a Bluetooth module the output of which is connected to Bluetooth aerial, the Bluetooth module is applicable to transmit a one-sided Bluetooth Request warning signal receivable by a mobile phone or other smart devices in a third effective range; and

- d) the arrangement is provided with a Wi-Fi GSM module the output of which is connected to GSM aerial, the Wi-Fi GSM module is applicable to transmit by applying 7API interfaces textual or iconographic warnings through Wi-Fi broadcast to the signboards of the public road maintainer providing real-time information.

[0015] TAS as a system is an electronic systems technology arrangement for realizing the object of the present invention. The system and method according to the invention makes the diffuse active detection possible. The primary means for it is a Diffuse Active Module for being detected - hereinafter shortly called DAM - which is parallelly activated or deactivated when the current distinctive signals are switched on or off. The DAM does not require any further control or intervention. Occasionally it can be pre-configured by using different configurations for adjusting it to specific regional features but it is independent of its operation. Practically, the present invention involves all the devices and solutions resting on automatic services, functions of DAM. This is realized virtually and/or through technical solutions which do not require pre-linking, pre-configuration. The invention involves all the devices and solutions comprising dynamically varying number of units and devices ensuring active detection. These are physically independent of the automatic services of DAM. They dynamically vary depending on the number of users, channels and services. A simple, so called cloud-based solution presents the essence of the method and system of the invention for utilizing the automatic services of DAM and certain premium services. The premium services are information transmitted through the Real Time Information System operated by the public road maintainer and usually displayed on a real time traffic information board.

[0016] A detailed description of a possible embodiment of the arrangement according to the invention will be given with reference to the accompanying drawings, in which:

Fig. 1 shows the block diagram of the entire systems technology arrangement together with the target environment according to the invention;

Fig. 2 shows the block diagram of the diffuse active module for being detected of the technology arrangement of Fig. 1 to be installed in the emergency vehicle;

Fig. 3 is a block diagram showing how a real time traffic information board of the public road maintainer is connected to the arrangement of Fig. 2 through the internet.

[0017] In Fig. 1 the block diagram of the entire systems technology arrangement together with the target environment according to the invention can be seen. The core of the system is a diffuse active module for being detected 1. A possible embodiment of this is explained later. In this Figure the environment is represented as a main factor. The diffuse active module for being detected 1 communicates with car radios 2 by means of the RDS diffuse broadcast I.a. Through these GPS coordinates can also be transmitted via wireless (SIM card based) internet network. The diffuse active module for being detected 1 may further communicate with other AM-FM mobile radio receivers 3 through AM-FM diffuse broadcast I.b. These can be switched on devices which have AM-FM mobile radio receiver 3 used by motorcyclists, cyclists, pedestrians e.g. phones, tablets, music playing devices, etc. Naturally, number of car radios 2 and AM-FM mobile radio receivers 3 may be in the effective range of the diffuse active module for being detected 1 transmitting in a given wave length. In the Figure this is indicated by diffuse broadcast I.(n).

[0018] Further, the diffuse active module for being de-

tected through a one-sided Bluetooth Request II.a communicates with any switched on portable devices having Bluetooth connection. To this the portable device must be provided with a previously uploaded application 5. Several types of these devices are feasible, in the Figure it is shown by the previously uploaded applications 6 with one-sided Bluetooth Request II.b and II.(n) connections, and other devices provided with applications which do not require pairing due to the proper information technologies.

[0019] Finally, the diffuse active module for being detected 1 communicates with a real time traffic information board 9 of the public road maintainer through Wi-Fi broadcast III. To this a suitably coded message, for example a text message or a pictogram is sent for display from the server-side application and data base 7. To this an application 8 is needed at a distant place, usually in the neighbourhood of the real time traffic information board 9 which makes display of the real time traffic information on the real time traffic information board 9 possible through the internet according to the solution of Fig. 3 supplementing Fig. 2. The block diagram of it is shown in Fig. 3.

[0020] In Fig. 2 the block diagram of the diffuse active module for being detected of the technology arrangement of Fig. 1 to be installed in the emergency vehicle is shown. It contains a main unit 11 fixedly built in the vehicle or it can be realized as a portable unit. These two options are commonly referred to as installed unit. Single board computers called Tinker board are widely known. This is used as well in a preferred embodiment of the present invention. Tinker Board CPU 12 serves as the processor. It contains an operation system 18 and software programs. An SD card 17 and a previously uploaded application 16 are in memory connection for synchronized and proper operation of main unit 11. An analogue converter/switching interface device 24 connected to Line IN 20 and Line OUT 21 for controlling AM-FM RF transmitter 28 and RDS decoder 29 operating in the similar range of frequency. AM-FM transmitter 28 is connected to RF transmitting aerial 31. Main unit 11 further may contain a GPS module 13 with outputs connected to GPS aerial 33 for obtaining geopositioning data if necessary. GSM Wi-Fi module 14 provides for the aforementioned one-sided Bluetooth Request connections II.b and II.(n).In a preferred embodiment SIM card 23 does not only serves for GSM broadcast, but it also participates in storing programs in its internal memory area.

[0021] The messages, warnings (alerts) of the radiofrequency and RDS diffuse broadcast - i.e. data - as well as programs, program elements - implemented by a novel programming technology which is not described here - are advantageously stored in the memory of SIM card 23, preferably in its SMS memory thereby making the operation of the diffuse active module for being detected 1 more rapid. In this case it is not necessary for the central processor to obtain programs and data from other storages, to run programs and to transmit the results to SIM card 23. All these take place on the spot, i.e. in the SIM card 23 directly through the communication between the CPU and the SIM card.

[0022] Diffuse active module for being detected 1 is an apparatus containing digital and analogue and semi-analogue units. Its control and its communication with other distant apparatuses, IT systems is implemented by means of software running on a mini computer consisting of a single card, advantageously a Tinker Board applying digital devices, signals in digital system. The radiofrequency devices using analogue systems taking part in the diffuse active module for being detected 1 e. g. the AM-FM RF transmitter 28 and the RDS decoder 29 connected to it must ensure various kinds of communication bidirectionally, to and from Tinker Board:

switching on and off at the same time

switching off the modules, making their configuration and timing possible advantageously automatically,

AM-FM RF transmitter 28 must be able to receive the signal controlling the switching on, the signal for switching off, or its timing (for example the vehicle with the distinctive signal does no longer travel as it is on the scene and uses only the light signal for calling the attention). In this case - according to the configuration - the diffuse active module for being detected 1 may still transmit the signals possibly with other, more specific content and with lower signal strength.

[0023] Advantageously, the broadcast stored in the memory of SIM card 23 or SD card 17 connected to Tinker Board or stored in the variables of the actually running program must be received by AM-FM RF transmitter 28 and the connected RDS decoder 29.

[0024] Preferably, as the Tinker Board is provided with Line IN 20 and Line OUT 21 connections (microphone input and loudspeaker output) they are used for the controlled switch on/off and for realizing the above-mentioned communication.

[0025] Fig. 3 is a block diagram showing how a real time traffic information board of the public road maintainer is connected to the arrangement of Fig. 2 through the internet. Server 27 containing database 25 and an API 26 and application are used for providing information for the real time traffic information board 30. To this a server internet connection 35 is needed. Through this there is a possibility for displaying the required message in LED matrix or in another manner. These messages and pictograms or the combination of them may be standardized but this is not the subject matter of the present invention.

[0026] The DAM is advantageously capable to recognize any other vehicle using distinctive signal in the vicinity by sensing a corresponding Bluetooth or equivalent signal source. This makes possible to harmonise the alarm systems of the vehicles. Furthermore it is a great

advantage in an embodiment to receive any close Bluetooth or equivalent short range information connection, even if it uses passive components, to adapt the invented system to send alert in proper way.

[0027] Number of technical solutions exist by which human voice can be recognized These solutions are able to identify a person if his voice sample is available. This solution is used in one embodiment of the present invention e.g. for the following purpose. When the vehicles using a distinctive signal travel as a group, it is enough if the TAS according to the invention is installed only in one of the vehicles of the group. By means of its voice recognizing application it identifies the siren of its own and/or partner vehicle and it is activated automatically. When several vehicles of the group are installed with TAS, its activation can be switched off automatically or manually e.g. in case of long-lasting identification of number of siren voice of different strength. In this manner problems resulting from possible interference of active RF broadcasts can be eliminated.

[0028] The advantage of the present invention is the obvious fact that travel of the vehicles using distinctive signals is promoted effectively.

Claims

1. Method for assisting the travel of a vehicle using distinctive signal, the vehicle is provided with a diffuse active module for being detected (1) having radiofrequency transmitter outputs and transmitting aerials connected to them whose transmission can be received within a given range, **characterized in that** at least two of the following transmission types a), b), c) and d) are used at the same time and automatically when the distinctive signal is on:

    - a) the broadcast of one or more AM-FM transmitters receivable by an AM-FM mobile radio receiver (3) or car radio (2) in a first effective range is overwritten by an AM-FM diffuse broadcast (I.b, I.(n)) containing a short warning audio message;
    - b) an RDS visual and/or audio warning is sent through an RDS diffuse broadcast (I.a) receivable by a car radio (2) in a second effective range;
    - c) sending a one-sided Bluetooth Request (II.a, II.b, II.(n)) warning signal receivable by a mobile phone or other smart devices in a third effective range; and
    - d) sending textual or iconographic warning through Wi-Fi broadcast (III.) by applying 7API interfaces for the real time traffic information boards (9, 30) of the public road maintainer.

2. Method according to claim 1 **characterized in that** at least three of the transmission types a), b), c) and d) are used at the same time and automatically.

3. Method according to claims 1 or 2 **characterized in that** the first, the second and the third effective ranges are between 150 and 300 meters.

4. Method according to any of claims 1-3 **characterized in that** within the third effective range a one-sided Bluetooth Request (II.a) warning signal is given receivable by a mobile phone or other smart devices provided with a previously uploaded application (5, 6).

5. Method according to any of claims 1-4 **characterized in that** the warning for the real time traffic information board (9, 30) of the public road maintainer is given through GSM based Wi-Fi transmission (III.) and textual or iconographic warning is allocated in a server-side application and database (7).

6. Electronic systems technology arrangement for assisting the travel of a vehicle using distinctive signal, the arrangement is provided with a diffuse active module for being detected (1) having radiofrequency transmitter outputs and transmitting aerials connected to them whose transmission can be detected within a given range, **characterized in that** the arrangement contains at least two of the following transmission types a), b), c) and d):

    - a) the arrangement is provided with an AM-FM RF transmitter (28) whose output is connected to RF transmitting aerial (31), said AM-FM RF transmitter (28) is applicable to send by an AM-FM diffuse broadcast (I.b, I.(n)) containing a short warning audio message which overwrites the broadcast of one or more AM-FM broadcasting transmitters receivable by an AM-FM mobile radio receiver (3) or car radio (2) in a first effective range;
    - b) the arrangement is provided with an RDS decoder connected to the RF transmitting aerial (31) through the AM-FM RF transmitter (28), said RDS decoder is applicable to send an RDS visual and/or audio warning through an RDS diffuse broadcast (I.a) receivable by a car radio (2) in a second effective range;
    - c) the arrangement is provided with a Bluetooth module the output of which is connected to Bluetooth aerial (32), said Bluetooth module is applicable to transmit a one-sided Bluetooth Request (II.a, II.b, II.(n)) warning signal receivable by a mobile phone or other smart devices in a third effective range; and
    - d) the arrangement is provided with a Wi-Fi GSM module (14) the output of which is connected to GSM aerial (34), said Wi-Fi GSM module (14) is applicable to transmit textual or icon-

ographic warnings to the real time traffic information boards (9, 30) of the public road maintainer through Wi-Fi broadcast by applying 7API interfaces.

7. Systems technology arrangement according to claim 6 **characterized in that** it contains at least three of said transmission types a), b), c) and d).

8. Systems technology arrangement according to claims 6 or 7 **characterized in that** the first, the second and the third effective ranges are between 150 and 300 meters.

9. Systems technology arrangement according to any of claims 6-8 **characterized in that** said diffuse active module for being detected (1) is provided with a main unit (11) containing a Tinker Board CPU (12).

10. Systems technology arrangement according to any of claims 6-9 **characterized in that** said main unit (11) further contains a GPS module (13) connected to GPS aerial (33) for defining the geoposition of the vehicle with the distinctive signal.

11. Systems technology arrangement according to any of claims 6-10 **characterized in that** said main unit (11) is provided with a storage using the internal memory of a GSM SIM card (23).

12. Systems technology arrangement according to claim 11 **characterized in that** the internal memory of said GSM SIM card (23) stores both programs or program portions and data.

13. Systems technology arrangement according to claim 11 **characterized in that** the internal memory of said GSM SIM card (23) stores programs or program portions.

14. Systems technology arrangement according to any of claims 6-13 **characterized in that** the warning for the real time traffic information board (9, 30) of the public road maintainer is given through GSM based Wi-Fi transmission (III.) and textual or iconographic warning is allocated in a server-side application and database (7).

15. Systems technology arrangement according to any of claims 6-14 **characterized in that** said diffuse active module for being detected (1) contains a voice recognizing and identifying device applicable for recognizing the sound of at least one siren.

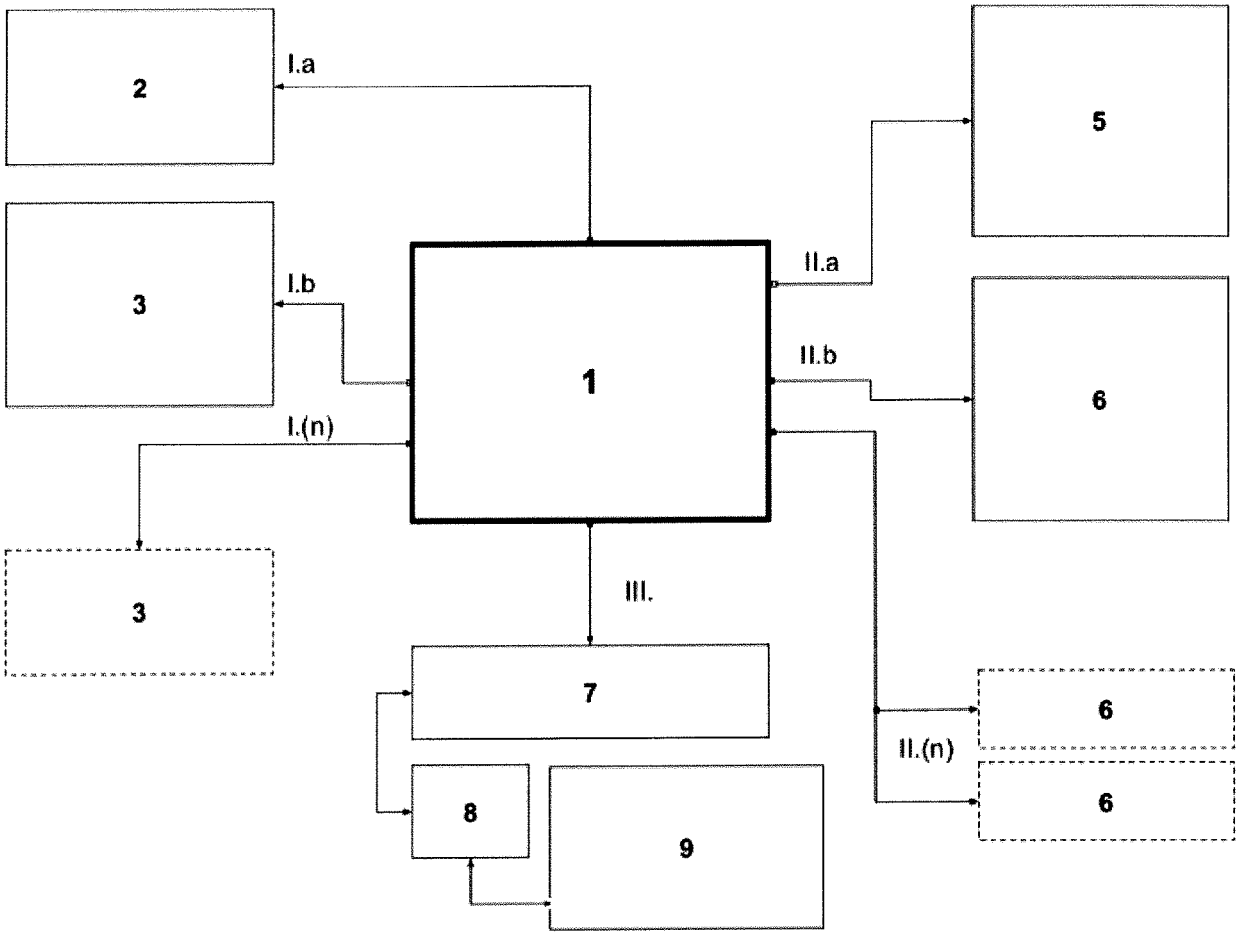

Fig. 1

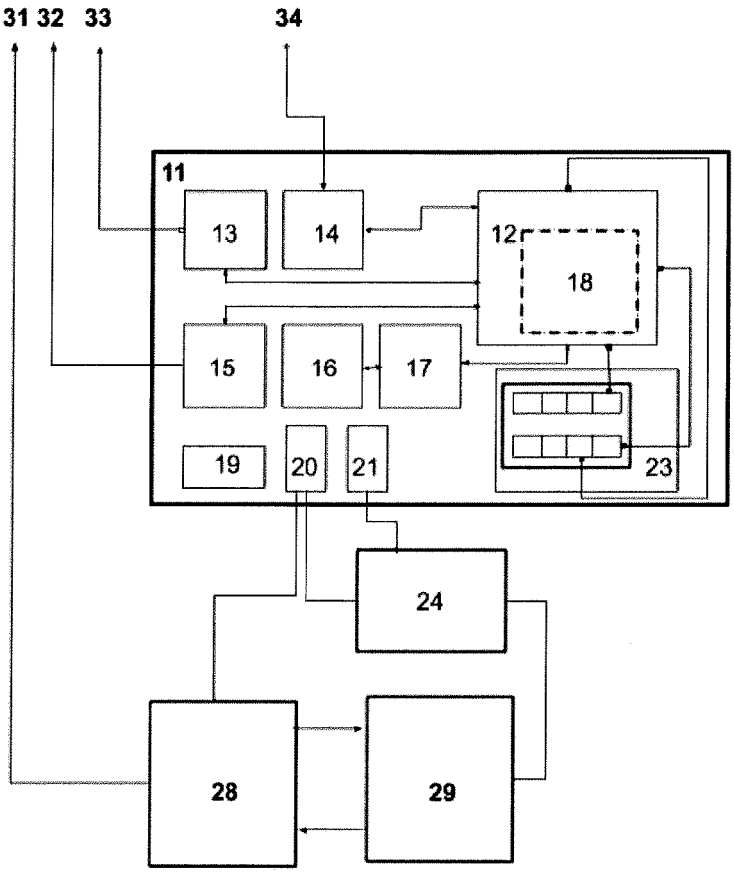

Fig. 2

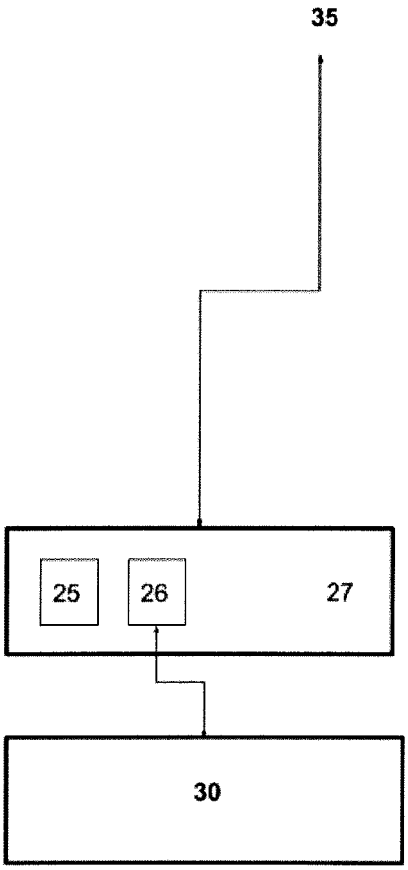

Fig. 3

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 19 02 0735

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 02/17269 A1 (PETARDS CIVIL SYSTEMS LTD [GB]; HUTCHINSON JAMES BROOKS [GB] ET AL.) 28 February 2002 (2002-02-28) * page 2, line 20 - page 5, line 21 *	1,3,6,8	INV. H04H20/59 G08G1/0965
X	WO 96/04632 A1 (FEDERAL SIGNAL CORP [US]) 15 February 1996 (1996-02-15) * page 6, line 13 - page 8, line 7 * * page 10, line 21 - page 19, line 28 * * page 36, line 34 - page 37, line 34 *	1-15	
A	US 7 515 065 B1 (BYGRAVE CHRIS [GB] ET AL) 7 April 2009 (2009-04-07) * column 2, lines 1-41 *	1-15	
A	WO 2016/196003 A1 (KARMA AUTOMOTIVE LLC [US]) 8 December 2016 (2016-12-08) * page 11, line 11 - page 14, line 12; figure 6 *	15	

TECHNICAL FIELDS SEARCHED (IPC)

H04H
G08G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	24 June 2020	Van Hoorick, Jan

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 19 02 0735

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

24-06-2020

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 0217269 A1	28-02-2002	AU 8228901 A	04-03-2002
		CA 2421068 A1	28-02-2002
		EP 1312063 A1	21-05-2003
		GB 2370194 A	19-06-2002
		JP 2004507004 A	04-03-2004
		US 2003164775 A1	04-09-2003
		WO 0217269 A1	28-02-2002
WO 9604632 A1	15-02-1996	BR 9508478 A	12-08-1997
		CA 2195194 A1	15-02-1996
		DE 69513402 T2	27-07-2000
		EP 0774147 A1	21-05-1997
		EP 0942402 A2	15-09-1999
		JP 3045776 B2	29-05-2000
		JP H09510311 A	14-10-1997
		US 5572201 A	05-11-1996
		WO 9604632 A1	15-02-1996
US 7515065 B1	07-04-2009	NONE	
WO 2016196003 A1	08-12-2016	CN 107709079 A	16-02-2018
		EP 3304517 A1	11-04-2018
		US 2016355125 A1	08-12-2016
		US 2018072222 A1	15-03-2018
		WO 2016196003 A1	08-12-2016

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 2008150759 A1 **[0008]**