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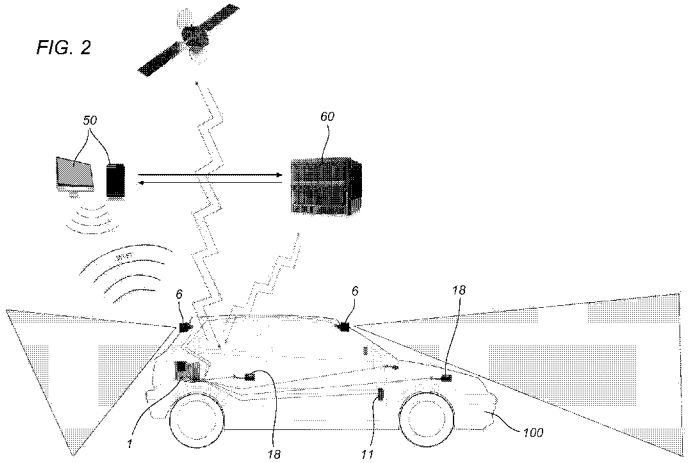
(54) Title: A GEODYNAMIC CONTROL EQUIPMENT FOR MEANS OF TRANSPORT AND GEODYNAMIC CONTROL COMPRISING SAID EQUIPMENT

FIG. 2



(57) Abstract: Described is a geodynamic control equipment for means of transport, comprising a localisation device (4), video acquisition means (5), a microcontroller (11) connectable with one or more mechanical or electronic units of the means of transport (100) and configured for acting on the one or more mechanical or electronic units, communication means (8) for making available the images acquired from the video acquisition means (5) and the data relative to the position of the means of transport (100) in real time to a remote device (50). The equipment also comprises processing means (3) housed in the box-shaped body, connected to the localisation device (4), video acquisition means (5) and communication means (8) and configured for processing the data received and being configured for calculating a plurality of parameters relative to the dynamics of the means of transport (100) as a function of the data acquired, receiving the at least one video signal acquired and for compressing it into a predetermined transmission format and sending in real time the parameters relative to the dynamics of the means of transport and the compressed video signal to a remote device using the communication means. The processing means (3) comprise an interface module (3a) accessible from a remote device (50) connected to the communication means (8) and selectively programmable as a function of commands received from the remote device for setting a value of one or more parameters for operating the video acquisition means (5) and the microcontroller (11).

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DESCRIPTION
A GEODYNAMIC CONTROL EQUIPMENT FOR MEANS OF TRANSPORT AND GEODYNAMIC CONTROL COMPRISING SAID EQUIPMENT.

Technical Field

This invention relates to a geodynamic control equipment and system for moving means, preferably motor vehicles, boats or mobile stations.

In a preferred embodiment, the geodynamic control equipment according to this invention forms a black box for vehicles.

This invention is applied in particular to the nautical and automotive sector and in particular to the electronic control of vehicles.

Background Art

Various type of "black boxes", otherwise referred to as "event recorders", are known in the prior art, installed mainly on aquatic vehicles (boats) or aerial vehicles (aircraft) for recording data relative to the driving of the vehicle, allowing, in the case of an accident, to recover information regarding the last moments of driving of the vehicle. In this way, it is possible to make a deductive reconstruction of the trend of the events used both for information and insurance purposes.

Prior art black boxes comprise a box-shaped body housing a GPS localisation device (equipped with GSM/GPRS modem) and a memory designed to record the events.

Moreover, the GPS localisation device is associated with a processor configured for extrapolating from the localisation device parameters regarding the movement of the motor vehicle, that is, position, speed, acceleration, stops.

A further device associated with the prior art black boxes is the emergency module, which interfaces with the user using an "anti-panic" button facing inside the cab in such a way as to allow activation if necessary.

Disadvantageously, prior at black boxes for motor vehicles only provide brief information to the personnel responsible for analysing the data contained therein, requiring a deductive type of analysis to provide acceptable results.

Consequently, prior art black boxes are not able to transfer to the personnel a real and complete photograph of the situation in the moments preceding the collision, but only a set of data to be analysed and processed.

Disclosure of the Invention

The aim of this invention is to provide a a geodynamic control equipment and system that overcomes the above mentioned disadvantages of the prior art.

More specifically, the aim of this invention is to provide a multi-purpose geodynamic control equipment and system of the active type, that is, which is able to provide more complete and objective information in real time allowing a user, at the same time, to act remotely on the vehicle.

In effect, the aim of this invention is to provide an intelligent, high performance and interactive geodynamic control equipment and system.

These aims are fully achieved by geodynamic control equipment according to this invention, comprising a localisation device configured for receiving data relative to the position of the means of transport, video acquisition means configured for acquiring at least one video signal from at least one video camera mounted on board the means of transport, communication means for making available the images acquired from the video acquisition means and the data relative to the position of the vehicle in real time to a remote device, a microcontroller connectable with one or more mechanical or electronic units of the means of transport and configured for acting on the one or more mechanical or electronic units, processing means housed in the box-shaped body, connected to the localisation device, video acquisition means and communication means and configured for.

- processing the data received and being configured for calculating a plurality of parameters relative to the dynamics of the means of transport (100) as a function of the data acquired;
- receiving the at least one video signal acquired and compressing it into a predetermined transmission format;
- sending in real time the parameters relative to the dynamics of the means of transport and the compressed video signal to a remote device

using the communication means;

wherein the processing means comprise an interface module accessible from a remote device connected to the communication means and selectively programmable as a function of commands received from the remote device for setting a value of one or more parameters for operating the video acquisition means and the microcontroller.

Advantageously, in this way the user is able to display remotely, using a device connectable to a communication network (for example PC or smartphone), the condition of the relative means of transport and at the same time, as a function of this display, to manage the configuration parameters regarding the recording functions, for recording by movement detection, the recordings by alarm event signalling and all those parameters regarding configuration of the system.

Brief Description of the Drawings

These and other features of the invention will become more apparent from the following detailed description of a preferred, non-limiting example embodiment of it, with reference to the accompanying drawings, in which:

- Figure 1 shows a diagram representing the geodynamic control equipment according to this invention;
- Figure 2 is a schematic side view of a geodynamic control system comprising the equipment of Figure 1;
- Figure 3 shows the programmable interface accessible from a remote device for communicating with the equipment 1.

Detailed Description of the Preferred Embodiments of the Invention

With reference to the accompanying drawings, the numeral 1 denotes a geodynamic control equipment for moving means according to this invention.

The geodynamic control equipment 1 is a device to install in a (car) vehicle 100 for recording information relative to the driving of the vehicle and what occurs inside the vehicle.

Preferably, the geodynamic control equipment 1 is a “black box”. Consequently, the expressions “geodynamic control equipment” and “black box” will be interchangeable in the description below.

The equipment 1 comprises a box-shaped body 2, or case, inside of which the processing means 3 are housed.

The box-shaped body 2 is preferably made from materials which are able withstand very high pressures and temperatures, in such a way as to be kept integral even after collisions.

Alternatively, or in addition, the box-shaped body 2 is housed in an area of the motor vehicle 100 which is particularly protected and not very much exposed in the event of an accident.

The equipment 1 also comprises a localisation device 4 configured for receiving data relative to the position of the motor vehicle 100.

In the preferred embodiment, the localisation device 4 is of the satellite type.

In other words, the localisation device 4 comprises a GPS receiver.

The localisation device 4 is connected to processing means 3, which are configured for processing the data received from the localisation device.

More specifically, the processing means 3 are operatively associated with the localisation device 4 for deriving, as a function of the data processed, a plurality of parameters correlated with the dynamics of the motor vehicle 100.

The localisation device 4 is designed for receiving a plurality of satellite signals (four) which are processed (by the device 4 or by the processing means 3) to extrapolate data representing the position of the motor vehicle 100.

Moreover, the processing means 3 are configured for processing the data in such a way as to derive the above-mentioned plurality of parameters relative to the dynamics of the motor vehicle 100, which comprise one or more of the following parameters:

- speed of motor vehicle;
- acceleration of motor vehicle;
- number of stops;
- stop time;
- others.

It should be noted that almost all the parameters are a function of the position of the motor vehicle 100 compared with a variable time.

The geodynamic control equipment 1 comprises video acquisition means

5 configured for acquiring at least one video signal from at least one video camera 6 mounted on board the motor vehicle 100.

Preferably, a plurality of video cameras 6 are installed on board the motor vehicle 100 in such a way as to provide a complete view inside the motor vehicle 100.

Each video camera 6 has, preferably, a three-dimensional virtual filter combined with an advanced DNR for maximum reduction of disturbances in low lighting conditions.

Moreover, the remote video camera 6 is configured for automatically performing, during night time hours, a switching from a colour configuration to a black & white configuration.

More preferably, each video camera is equipped with an auto iris lens made of glass.

Preferably, the video acquisition means 5 are connected (operatively associated) with the processing means 3 defining a DVR system.

In effect, the processing means 3 are connected to the video acquisition means 5 for processing the video signals acquired.

In the preferred embodiment, the processing means 3 are defined by a processor 3a (CPU) associated both with the video acquisition means 5 and the localisation device 4.

Alternatively, the video acquisition means 5 and the localisation device 4 are each associated with a relative processor (CPU), preferably integrated with it. In this embodiment, both the processors are in communication with a single memory.

In any case, the processing means 3 are designed for receiving each video signal acquired and configured for compressing it into a predetermined transmission format.

Advantageously, in this way the video signal can be easily transmitted, making it more usable.

Preferably, the compression format is of the H264 pro Evolution type.

Preferably, the video acquisition means 5 and the processing means 3 (integrated) define a DVR (Digital Video Recorder) configured for recording in digital format the images captured by the video cameras 6.

Advantageously, in this way it is possible to obtain a “digital zoom” of the images, thereby facilitating the analysis of the films by the operators who

must examine the details.

In detail, the video acquisition means 5 comprise:

- at least one analogue video input signal;
- at least one analogue audio input signal;
- at least one digital video input signal;
- at least one analogue video input signal (RCA or BNC);
- at least one video output signal (VGA or HDMI);
- at least one RS 485 for managing motor-driven PTZ video cameras;
- at least one inlet for connecting PIR wired detectors;
- at least one LAN port;
- at least one USB port for connecting external data storage units + operations for updating device firmware;
- at least one SATA input for connecting internal Hard Disk;
- at least one CPU for processing audio/video signals with relative compressions;
- at least one CPU for managing WEB Server functions.

The equipment 1 also comprises a microcontroller 11 connectable with one or more mechanical or electronic units 10 of the motor vehicle 100 and configured for acting on the one or more mechanical or electronic units.

More specifically, the microcontroller 11 is of the OBD type, which is able to provide the owner of the vehicle with access to the information on the "state of health" of the various subsystems of the motor vehicle 100.

Preferably, the microcontroller 11 is of the OBD-II type, in such a way as to allow a complete control over the parameters of the motor vehicle (revs, pressure, etc..) and monitor other parts of the motor vehicle 100 such as, for example, the frame and the accessories.

The microcontroller 11 is interposed between the processing means 3 and at least one corresponding component of the motor vehicle 100.

In a first embodiment, the microcontroller 11 is operatively connected to an electronic control unit of the motor vehicle 100.

In this regard, the motor vehicle 100 (more specifically the control unit) comprises at least one speed limiter associated with the engine of the motor vehicle 100 and configured for setting a speed threshold value.

More specifically, the processing means 3 of the equipment 1 is designed

for receiving from the localisation device 4, in real time, data relative to a speed limit set in the zone passed through by the motor vehicle 100 and it is programmed for setting the speed limiter threshold value according to the speed limit received.

According to the invention, the equipment 1 also comprises communication means 8 associated with the processing means 3 for making the calculated parameters and the compressed video signal available to a remote device.

In other words, the communication means 8 are configured for making the black box 1 accessible remotely using a communication network.

Preferably, the communication means 8 are also housed at least partly in the box-shaped body 2.

More specifically, the processing means 3 are connected to the localisation device 4, the video acquisition means 5 and the communication means 8.

The processing means 3 are configured for:

- processing the data received and calculating a plurality of parameters relative to the dynamics of the means of transport 100 as a function of the data acquired from the localisation device 4;
- receiving the at least one video signal acquired from the video acquisition means 5 and compressing it into a predetermined transmission format;
- sending in real time the parameters relative to the dynamics of the means of transport and the compressed video signal to a remote device using the communication means 8.

More specifically, the processing means 3 comprise an interface module 3a accessible from a remote device 50 connected to the communication means 8 and selectively programmable as a function of commands received from the remote device for setting a value of one or more parameters for operating the video acquisition means 5 and the microcontroller 11.

It should be noted that the operating parameters of the video acquisition means 5 and of the microcontroller 11 are one or more of the following:

- feeding of the fuel;
- maximum speed limit of the means of transport ;
- ON/OFF status of the lighting system of the means of transport;

- position of the windows of the means of transport;
- position of the video camera;
- activation status of the video camera;
- duration of the video acquisition;
- recording in a memory of the video acquisition.

The equipment is advantageously of the active type, that is, accessible by a remote user using a remote device, configured or configurable for communicating with the equipment and programmable according to the user's requirements.

Advantageously, the user can in this way monitor in real time the condition of the vehicle and act on it using the above-mentioned microcontroller 11 (OBD II).

Preferably, the communication means 8 comprise a router 8a configured for setting up a permanent connection to the communication network, in such a way as to allow access to the processing means 3 by a remote device.

In the preferred embodiment, the communication network is based on an IP type protocol.

The router 8a is configured for keeping its IP address constant (static IP) facilitating access to the information contained in the equipment 1.

It should be noted that, using the communication means 8 (more specifically, the router 8a), the equipment 1 is able to transfer in real time the data processed (video, audio, GPS) to a suitable server which can be reached from the remote device.

The processing means 3 are configured for loading, using the communication means 8, the films acquired using the video acquisition means 5 on a suitable transmission channel (preferably of the FTP type) for sending them to the remote server in real time.

In light of this, a user, using a relative device connectable to the network, has the possibility of interrogating the server and/or directly the geodynamic control equipment 1 for extrapolating the data contained therein.

Preferably, the router 8a is configured for operating in the UMTS frequency bands (850/1900/2100 MHz respectively).

The router 8a is configured for providing one or more of the following

services:
- voice
- data traffic
- Internet access port (default gateway).

In other words, the router 8a is designed for combining a wireless data connectivity on public HSDPA networks with support for legacy telephone services.

Advantageously, in this way the geodynamic control equipment forms an access to the Internet for any calculator (Personal Computer and/or smartphone) equipped with wireless connectivity, without the need for a fixed public network line connection.

According to a preferred embodiment of the invention, the processing means 3 comprise at least one ROM memory designed for the Web Server function. Advantageously, in this way the remote device 50 can access the contents of the equipment (in real time or inside a storage memory 7) and communicate actively with it using the Web Server. More specifically, the interface module 3a of the processing means is programmed to send to the remote device 50 an authentication request and configured for allowing communication with the remote device 50 only after a positive response to the request.

In order to memorise (or record) the parameters and the data, the equipment 1 comprises a memory 7 associated with the processing means 3 and designed for receiving the parameters calculated and memorising them.

Preferably, the memory 7 is configured for updating the memorised data at every predetermined time interval.

The memory 7 is connected to the processing means 3 for receiving the compressed video signals from the processing means 3 and the data supplied by the microcontroller 11 (as well as the localisation device 4) storing it for a predetermined time interval.

The memory 7 is connected to the processing means 3 (that is, the processor 3a) for storing the video signals acquired from the video acquisition means 5 (DVR), the dynamic parameters of the motor vehicle 100 supplied by the localisation device 4 (GPS) and the parameters correlated with the microcontroller 11.

Preferably, the processing means 3 are configured for updating the memory 7 at every predetermined time interval. In the preferred embodiment, the time interval is between 12 and 36 hours, more preferably 24 hours.

Moreover, the memory 7 is equipped with a connection port 7a for putting it in communication with an external device, such as, for example, a data storage device.

In the preferred embodiment, the connection port 7a is of the USB (Universal Serial Bus) type, in such a way as to accommodate a portable mass storage unit (commonly known as "USB key").

Preferably, the equipment 1 comprises a further connection port 12 for connecting a pointing device (mouse). The port 12 is operatively connected to the processing means 3.

Preferably, both the video acquisition means 5 and the memory 7 are housed at least partly in the box-shaped body 2.

Advantageously, this simplifies the installation of the black box 1 in the motor vehicle 100.

Moreover, the equipment preferably comprises a further microcontroller 13 for managing the consumption of the equipment 1 connectable to a battery of the means of transport (or motor vehicle 100) and programmed for keeping the equipment 1 in an active condition for a predetermined time interval following switching OFF of the means of transport.

More specifically, the further microcontroller 13 is programmed for:

- switching the equipment from the active condition to a passive condition, of minimum consumption, at the end of the predetermined time interval;
- switching the equipment from the passive condition to the active condition following the occurrence of one or more predetermined conditions.

These predetermined conditions can be, for example, linked to monitoring performed by sensors positioned in the motor vehicle 100 and connected to the equipment 1 (in particular to the processing means 3), such as, for example, an impact, movement or presence sensor 18, a gyroscopic sensor.

More specifically, the further microcontroller 13 is equipped with at least two positive inputs which can be switched between a first and a second

status and at least one negative input. The further microcontroller 13 is configured for providing an output voltage equal to the input voltage, for a predetermined time interval following a switching from the first to the second status of at least one of the inputs.

Advantageously, in this way, the equipment returns to the active condition upon the occurrence of one of the above-mentioned conditions.

In effect, the two inputs are each connected to an external sensor configured for detecting a condition of danger of the means of transport (or motor vehicle) 100.

In the preferred embodiment, the further microcontroller 13 is configured for working with an input voltage of between 8 and 16Vdc and a maximum load tolerance of approximately 4A.

This further microcontroller is essential when referring to automotive applications, where it is extremely important to safeguard the battery consumption of the means of transport.

Preferably, the geodynamic control equipment 1 comprises a sensor 9 for monitoring the electromagnetic emissions operatively associated with the processing means 3.

More specifically, the sensor is designed to monitor electromagnetic waves in a predetermined frequency interval and configured for sending a signal representing an alarm condition to the processing means 3.

Preferably, the frequency interval is between 100 and 2400 MHz, that is, corresponding to the GSM and/or GPRS and/or EDGE and/or 3G and/or WCDMA and/or HSDPA bands.

Alternatively, the sensor could be configured for measuring a spectrum of frequencies around the motor vehicle 100 and for making the spectrum available to the processing means which would be programmed for determining the presence of absence of disturbances.

Advantageously, this allows the black box 1 to monitor the presence of so-called jammers, that is, frequency inhibition devices which, if used in a fraudulent manner, allow the motor vehicle to be isolated from the satellite, GSM, UMTS network thus preventing operation of the anti-theft device, as it prevents communication with the service centre or the owner of the motor vehicle.

In light of this, the processing means 3 are connectable (connected) to

means (not illustrated) of regulating the flow of fuel to the engine of the motor vehicle 100 (preferably using the microcontroller 11, e.g. OBD).

In use, the processing means 3 are programmed for controlling the regulating means in such a way as to inhibit the flow of fuel to the engine of the motor vehicle 100 in response to the alarm signal.

It should be noted that, even in the presence of such a disturbance, the processing means are configured for remaining operative, compressing the video signals and memorising the images acquired from the video cameras 6.

Advantageously, this allows the images to be analysed in a subsequent step, if necessary identifying the criminals who have attempted to steal the motor vehicle 100.

In the preferred embodiment, the motor vehicle 100 (or the geodynamic control system 1) is equipped with an alarm device (visual and/or acoustic) connected to the processing means 3. In this regard, the equipment 1 comprises an outlet port 14 connectable to the alarm device (e.g. siren).

The processing means 3 are programmed for activating the alarm device in response to the alarm signal coming from a sensor or in response to a processing of the video signals corresponding to a predetermined condition of danger (anti-vandal function).

With reference to the preferred embodiment illustrated in the accompanying drawings, the equipment comprises:

- video acquisition means 5 of the DVR and NVR type
- at least one microcontroller 11 (OBD or OBD II) designed for controlling external sensors, to be positioned on the motor vehicle, with relative analogue and/or digital inputs and outputs.
- at least one GPS 4 receiver for acquiring the parameters of the geographical coordinates of the motor vehicle.
- at least one router 8a designed for communicating using the 3G and/or 4G band, which is able to support GPRS, EDGE, UMTS, HSDPA and HSUPA technologies, as well as the wireless function.
- at least one further microcontroller 13 designed for controlling the consumption of the device when it is installed in automotive applications.
- at least one sensor device 9 with both analogue and digital inputs and outputs, designed for monitoring the disturbances emitted on the GSM,

UMTS, Wireless and GPS frequencies, emitted by Jammer devices.

- at least one memory 7 for saving the data and the audio-video recordings.

- processing means (CPU) 3 with ROM memory designed for the Web server function, for requesting access to the device using remote connection from PC and smartphone;

- at least one video outlet 15 (in VGA or HDMI format) for connecting an external monitor;

- at least one inlet 16 for connecting PIR wired detectors;

- at least one LAN port 17;

Preferably, the processing means 3 comprise a three-dimensional processing module 3b configured for processing in real time the video signals of two video cameras 6 coupled with each other (for example, positioned at 1.2 cm from each other on the same horizontal plane) compressing them.

The three-dimensional processing module 3b is also designed for transmitting the source files on the external server 60. The server 60, thanks to the compression with the algorithm received in the data sent to it from the three-dimensional processing module 3b (using the communication means 8), is able to process and create a 3D video file in real time. The 3D files processed are now allocated in real time on a suitable space of the external server, ready for being displayed on the remote device 50 (PC, smartphone, TV).

The equipment 1 is inserted into a geodynamic control system for vehicles, comprising at least one video camera 6 associated with the video acquisition means 5 of the equipment 1, a remote server 60 connected to the processing means 3 (using the communication means 8).

The system also comprises a remote device 50 equipped with a programming interface 20 connectable to the interface module 3a of the processing means 3 of the equipment 1 and configured for exchanging data with the equipment 1 so as to display the condition of the means of transport (vehicle) 100 and program the value of one or more operating parameters of the video acquisition means 5 and of the microcontroller 11.

It should be noted that the programming interface 20 can be viewed by an operator using a screen 51 of the remote device.

Moreover, the user can interact with the programming interface 20 using a control unit 52, such as, for example, a touch screen or a keyboard (using a suitable CPU of the remote device 50).

More specifically, the programming interface 20 comprises at least one displaying module 21 configured to decompress in real time the video signal sent by the equipment 1 and to show to a user a sequence of images corresponding to the video signal.

The displaying module 21 is defined by at least one video window wherein the above-mentioned sequence of images is reproducible.

Moreover, the programming interface 20 comprises at least one control module 22 which can be operated by a command by a user interfaced with the remote device 50 and configured for sending to the processing means 3 of the equipment 1 a signal representing a movement to be imparted to the video cameras 6 connected to the video acquisition means 5.

Advantageously, in this way the user can control the movement of the video cameras displaying the situation around the motor vehicle 100 even remotely.

Moreover, the programming interface 20 preferably comprises at least one selection module 23 which can be operated by a command by a user interfaced with the remote device 50 and configured for sending to the processing means 3 of the equipment 1 a signal representing a condition for switching ON/OFF a predetermined video camera 6.

Moreover, the programming interface 20 preferably comprises at least one management module 24 which can be operated by a command by a user interfaced with the remote device 50 and configured for allowing the user to create and/or delete and/or modify the settings for access to the data of the equipment 1.

Advantageously, an enabled user (administrator) can thereby autonomously manage the list of enabled users, setting the user name, the password and the rights for using the device.

In effect, the management module 24 is designed for allowing the creation and/or modification and/or deletion of personal profiles provided with respective identification parameters enabling access to the data of the equipment.

Again, preferably, the programming interface 20 comprises a settings

module 25 designed for communicating with the microcontroller 11 and configured for allowing an operator to enter one or more parameters for driving the means of transport 100.

The invention achieves the preset aims and brings important advantages.

In effect, the above-mentioned equipment is intended, mainly, for all those applications regarding the protection of individuals and fixed and mobile assets, in order to ascertain the responsibilities for and the causes of road accidents, and therefore with significant costs savings for insurance companies in the case of reconstruction of more or less serious accidents.

This is also the case in the event of acts of vandalism, helping to reconstruct the occurrence and therefore correctly attribute the responsibilities.

It is intended for the safety of one's children, being able to monitor and see in real time using a smartphone and/or PC where they are, the speed at which they are travelling, if they are in good psychological-physical state and helping them to maintain the vehicle in good working order. It can be used in the monitoring of the psychological-physical state of the driver, providing useful information in the event of intervention of rescue services.

The system is innovative as it is able to provide all the above-mentioned services and/or functions, communicating using any PC having an Internet connection and/or any smartphone which everyone now possesses.

The system provides information regarding the occurrence (for example, a claim) in such a way as to be able to read the statuses even if the device is destroyed (during an accident) together with the vehicle. The device, if it transits in a zone which is covered by 3G or 4G signal or a wireless network, is able to transfer in real time all the data acquired (audio-video recordings, position, speed of vehicle, vital parameters such as cardiac frequency and oxygen saturation, information acquired by the OBD II port of the vehicle) to an external server. The transfer is very fast and light thanks to a special encrypted compression.

The equipment can be programmed and consulted remotely using a PC and/or smartphone.

The equipment is able to provide information on what happens around the vehicle once this is parked.

The equipment is able to keep the vehicle in perfect working efficiency

without compromising the battery consumption as it can switch itself OFF after a predetermined period of time and switch itself ON again in the case of external events considered to be abnormal, such as acts of vandalism, an impact etc.

The equipment can find useful applications for all the public and rescue services.

Moreover, the equipment consolidates its worth as vehicle anti-theft system thanks to the Jammer detection system.

Thanks to the router and telephone functions it can be widely used in all those applications designed for the civil and industrial safety fields.

Moreover, the possibility of connecting a number of PIR sensors equal to the number of video cameras allows the integration and processing of different types of data, coming from the PIR sensors and from the video cameras, so as to detect a theft event without any approximation.

It should be noted that the equipment is particularly suitable for use in automotive applications thanks to its extremely low energy consumption, achieved by using special video cameras with extremely small dimensions which are able to film in high resolution, in total absence of light for the human eye (0.0002 lux). These video cameras can constitute an integral part of the equipment.

CLAIMS

1.Geodynamic control equipment for means of transport, comprising:

- a localisation device (4) configured for receiving data relating to the position of the means of transport (100);
- video acquisition means (5) configured for acquiring at least one video signal from at least one video camera (6) mounted on board the means of transport (100);
- communication means (8) for making available the images acquired from the video acquisition means (5) and the data relative to the position of the means of transport (100) in real time to a remote device (50);
- a microcontroller (11) connectable with one or more mechanical or electronic units of the means of transport (100) and configured for acting on the one or more mechanical or electronic units;
- processing means (3) housed in the box-shaped body, connected to the localisation device (4), video acquisition means (5) and communication means (8) and configured for:
- processing the data received and being configured for calculating a plurality of parameters relative to the dynamics of the means of transport (100) as a function of the data acquired;
- receiving the at least one video signal acquired and compressing it into a predetermined transmission format;
- sending in real time the parameters relative to the dynamics of the means of transport and the compressed video signal to a remote device using the communication means;

wherein the processing means (3) comprise an interface module (3a) accessible from a remote device (50) connected to the communication means (8) and selectively programmable as a function of commands received from the remote device for setting a value of one or more parameters for operating the video acquisition means (5) and the microcontroller (11).

2. The geodynamic control equipment according to claim 1, characterised in that the interface module (3a) is configured for allowing the remote device (50) to vary and actively set the value of the one or more operating parameters.

3. The geodynamic control equipment according to claim 1 or 2,

characterised in that the operating parameters of the video acquisition means (5) and of the microcontroller (11) are one or more of the following:
- feeding of the fuel;
- maximum speed limit of the means of transport (100);
- ON/OFF status of the lighting system of the means of transport (100);
- position of the windows of the means of transport (100);
- position of the video camera (6);
- activation status of the video camera (6);
- duration of the video acquisition;
- recording in a memory of the video acquisition.

4. The geodynamic control equipment according to any one of the preceding claims, characterised in that the interface module (3a) is programmed to send to the remote device (50) an authentication request and configured for allowing communication with the remote device (50) only after a positive response to the request.

5. The geodynamic control equipment according to any one of the preceding claims, characterised in that it comprises a memory (7) connected with the processing means (3) for receiving the parameters calculated storing them for a predetermined time interval selectively programmable using the interface module (3a).

6. The geodynamic control equipment according to any one of the preceding claims, characterised in that the localisation device (4) the video acquisition means (5), the communication means (8) and/or the memory (4) are housed inside a box-shaped body (2).

7. The geodynamic control equipment according to any one of the preceding claims, characterised in that the video acquisition means (5) and the processing means (3) form a digital video recorder DVR.

8. The geodynamic control equipment according to any one of the preceding claims, characterised in that it comprises a further microcontroller (13) for managing the consumption of the equipment connectable to a battery of the means of transport (100) and programmed for keeping the equipment in an active condition for a predetermined time interval following switching OFF of the means of transport.

9. The geodynamic control equipment according to claim 8, characterised in that the further microcontroller (13) is programmed for:

- switching the equipment from the active condition to a passive condition, of minimum consumption, at the end of the predetermined time interval;
- switching the equipment from the passive condition to the active condition following the occurrence of one or more predetermined conditions.

10. The geodynamic control equipment according to claim 9, characterised in that the further microcontroller (13) is equipped with at least two positive inputs which can be switched between a first and a second status and at least one negative input; the further microcontroller (13) being configured for providing an output voltage equal to the input voltage, for a predetermined time interval following a switching from the first to the second status of at least one of the inputs.

11. The geodynamic control equipment according to claim 10, characterised in that the two inputs are each connected to an external sensor (18) configured for detecting a condition of danger of the means of transport (100).

12. The geodynamic control equipment according to any one of claims 8 to 11, characterised in that the further microcontroller (13) is configured for working with an input voltage of between 8 and 16Vdc and a maximum load tolerance of approximately 4A.

13. The geodynamic control equipment according to any one of the preceding claims, characterised in that it comprises a sensor (9) for detecting electromagnetic emissions connected to the processing means (3), designed to measure electromagnetic waves in a predetermined frequency interval and configured for sending a signal representing an alarm condition to the processing means (3); the processing means (3) being connectable to means for regulating the flow of fuel to the engine of the means of transport (100), and configured for controlling the regulating means in such a way as to inhibit the flow of fuel to the engine of the means of transport (100) in response to the signal representing an alarm condition.

14. The geodynamic control equipment according to any one of the preceding claims, characterised in that the communication means (8) comprise a router (8a) configured for setting up a permanent connection to a communication network in such a way as to allow access to the memory

(7) by a remote device.

15. The geodynamic control equipment according to claim 14, characterised in that the communication network is based on an IP type protocol; the router (8a) being configured for keeping its IP address constant.

16. The geodynamic control equipment according to claim 14 or 15, characterised in that the router (8a) is designed for communicating using band 3G and/or 4G and is configured for communicating at the frequencies of 850, 1900 and 2100 MHz.

17. The geodynamic control equipment according to any one of the preceding claims, characterised in that microcontroller (100) is configured for communicating using protocol OBD or OBD II.

18. A geodynamic control system for means of transport, comprising:

- a geodynamic control equipment (1) according to any one of the preceding claims;
- at least one video camera (6) associated with the video acquisition means of the equipment (1);
- a remote server (60) connected to the processing means (3) using the communication means (8a);
- a remote device (50) equipped with a programming interface (20) connectable to the interface module (3a) of the processing means (3) of the equipment (1) and configured for exchanging data with the equipment (1) so as to display the condition of the means of transport and program the value of one or more operating parameters of the video acquisition means (5) and the microcontroller (11).

19. The system according to claim 18, characterised in that the programming interface (20) comprises at least one displaying module (21) configured to decompress in real time the video signal sent by the equipment (1) and to show to a user a sequence of images corresponding to the video signal.

20. The system according to claim 18 or 19, characterised in that the programming interface comprises at least one control module (22) which can be operated by a command by a user interfaced with the remote device (50) and configured for sending to the processing means (3) of the equipment (1) a signal representing a movement to be imparted to the

video cameras (6) connected to the video acquisition means (5).

21. The system according to any one of claims 18 to 20, characterised in that the programming interface (20) comprises at least one selection module (23) which can be operated by a command by a user interfaced with the remote device (50) and configured for sending to the processing means (3) of the equipment (1) a signal representing a condition for switching ON/OFF a predetermined video camera (6).

22. The system according to any one of claims 18 to 21, characterised in that the programming interface (20) comprises at least one management module (24) which can be operated by a command by a user interfaced with the remote device (50) and configured for allowing the user to create and/or delete and/or modify the settings for access to the data of the equipment (1).

23. The system according to claim 22, characterised in that the the management module (24) is designed for allowing the creation and/or modification and/or deletion of personal profiles provided with respective identification parameters enabling access to the data of the equipment.

24. The system according to any one of claims 18 to 23, characterised in that the programming interface (20) comprises a settings module (25) designed for communicating with the microcontroller (11) and configured for allowing an operator to enter one or more parameters for driving the means of transport (100).

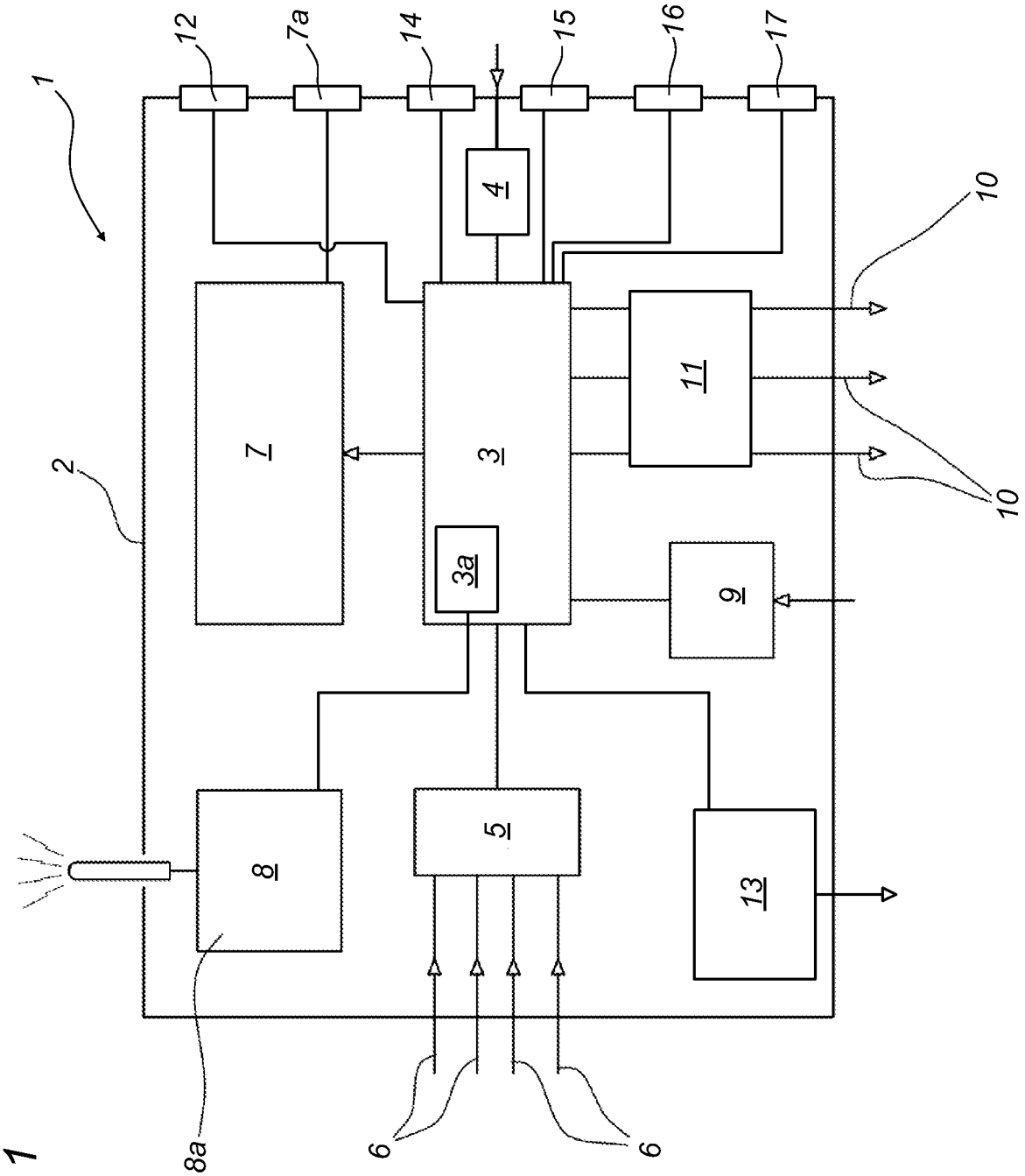

FIG. 1

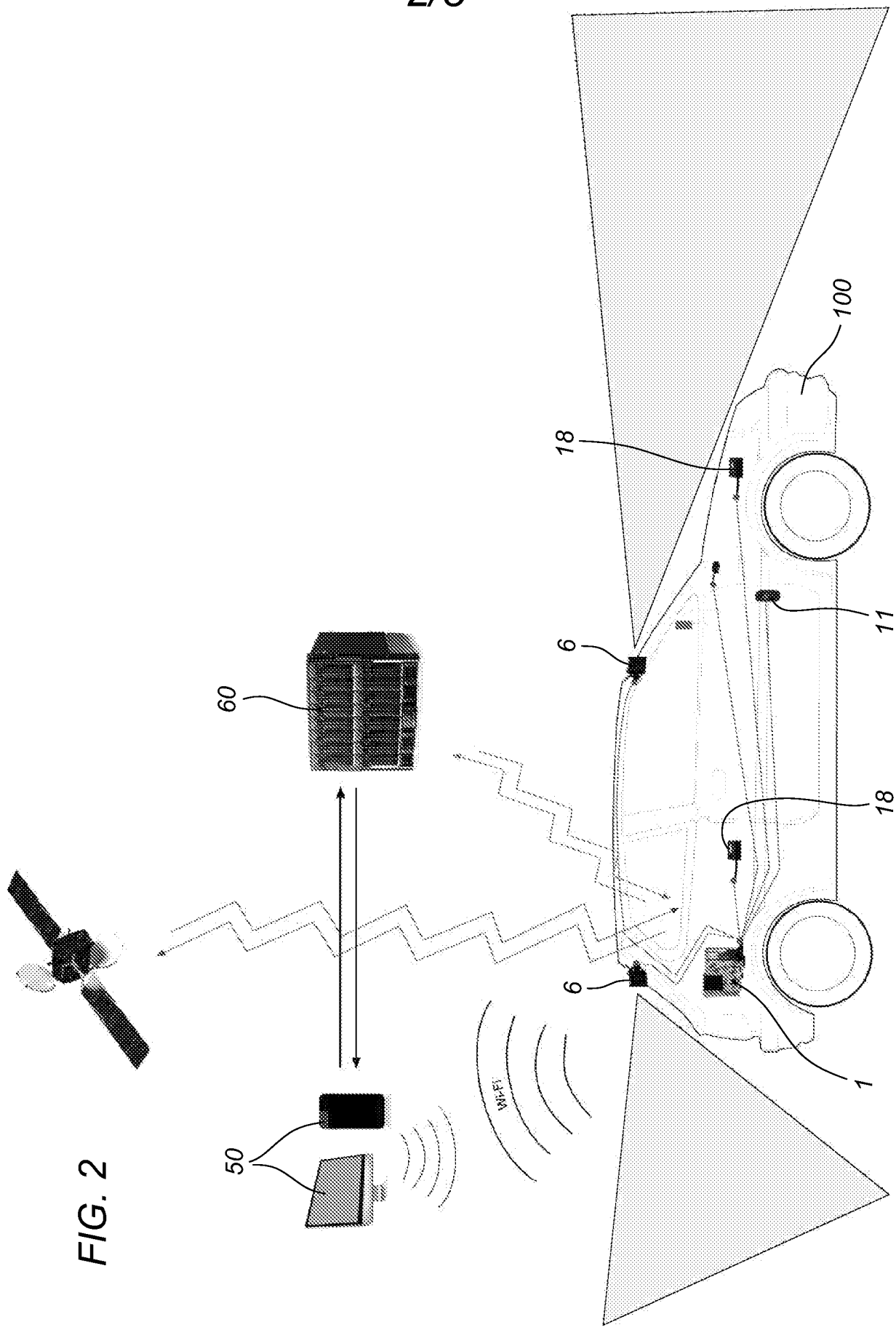

FIG. 2

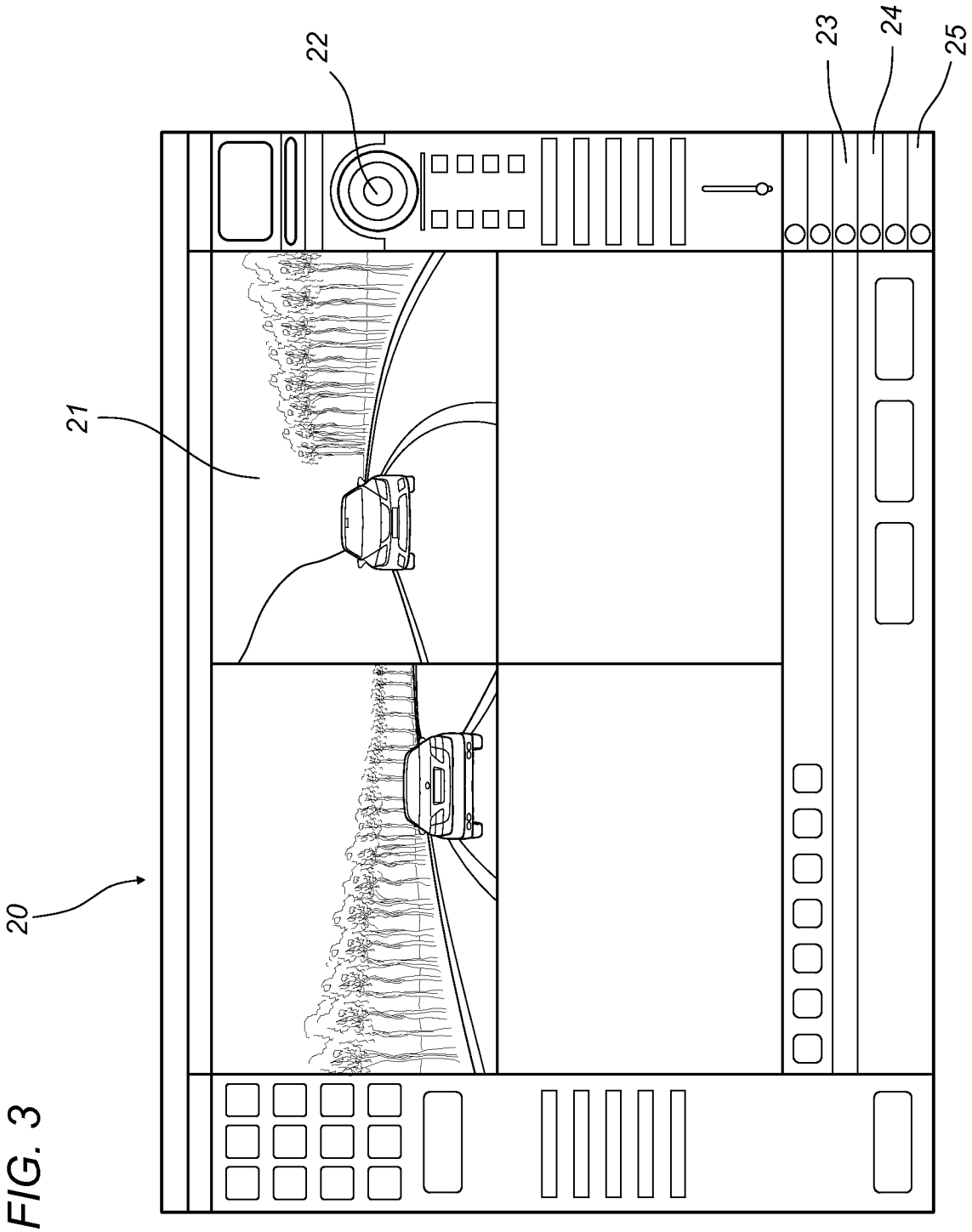

FIG. 3

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2013/051945

A. CLASSIFICATION OF SUBJECT MATTER
INV. G08G1/0967
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)
G08G

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 2001/005217 A1 (HAMILTON JEFFREY ALLEN [US] ET AL) 28 June 2001 (2001-06-28)	1,18
Y	paragraph [0010]; figures 1-3 paragraph [0013] - paragraph [0018] paragraph [0024] - paragraph [0027] paragraph [0031] - paragraph [0032] paragraph [0034] paragraph [0037] -----	2-17, 19-24
Y	DATABASE WPI Week 200834 Thomson Scientific, London, GB; AN 2008-E95437 XP002685751, & KR 100 765 098 B1 (HYUNDAI AUTONET CO LTD) 8 October 2007 (2007-10-08) abstract ----- -/--	2-17, 19-24

[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

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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
12 July 2013	19/07/2013

Name and mailing address of the ISA/	Authorized officer
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INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2013/051945

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DE 103 44 433 A1 (DAIMLER CHRYSLER AG [DE]) 21 April 2005 (2005-04-21) abstract paragraph [0009] paragraph [0023] - paragraph [0025]; figure 1	1-24
Y	US 6 246 933 B1 (BAQUE ADOLFO VAEZA [AR]) 12 June 2001 (2001-06-12) column 6, line 8 - line 26 column 6, line 49 - line 65	1-24
Y	EP 1 233 387 A2 (HITACHI INT ELECTRIC INC [JP]) 21 August 2002 (2002-08-21) paragraph [0020] - paragraph [0021] paragraph [0029] - paragraph [0042]; figures 1,9	1-24

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IB2013/051945

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