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(54) DEVICE FOR MONITORING THE USAGE OF VEHICLE LIFTS IN GARAGES, AND CORRESPONDING VEHICLE LIFT

(57) A self-contained and stand-alone electronic monitoring device (1) to monitor the usage of a vehicle lift (2) in a garage, including a electronic sensory device (4) to determine the state of usage of the vehicle lift (2), an electronic storage device (5) to store data locally, an electronic communication device (6) for data communication with a remote service centre and possibly with vehicles on the lift (2), and an electronic control unit (7) electrically connected to the electronic sensory, storage and communication devices (4, 5, 6) and programmed to determine the state of usage of the vehicle lift (2) based on an output of the electronic sensory device (4) and to store on the electronic storage device (5) and/or to transmit to the remote service centre through the electronic communication device (6) data indicative of the usage of the vehicle lift (2).

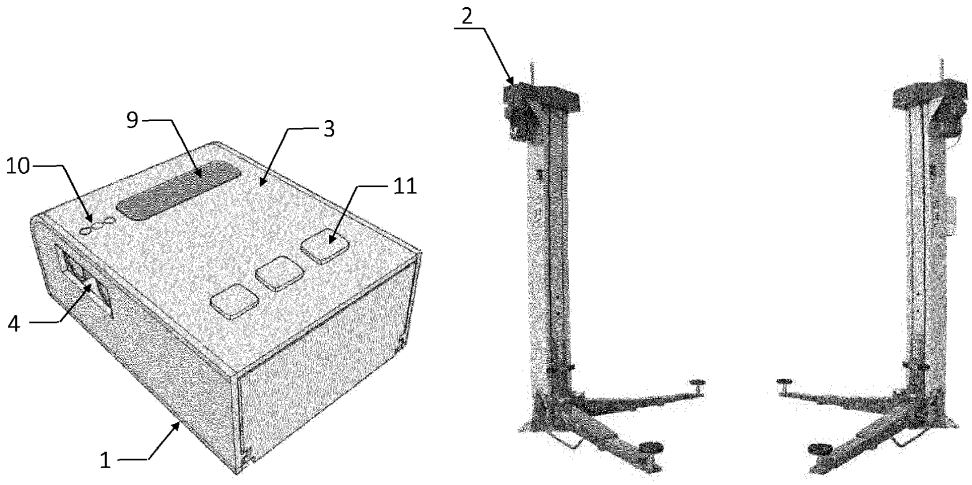

Fig. 1

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Description

Cross-Reference to Related Applications

[0001] This patent application claims priority from Italian patent application no. 102018000003454 filed on 12/03/2018.

Technical Field of the Invention

[0002] The present invention relates in general to vehicle lifts used in garages for lifting vehicles, typically motor vehicles and motorcycles, and in particular to monitoring usage of vehicle lifts in order to improve performance and competitiveness of the garages.

State of the Art

[0003] Industry 4.0 is an increasingly used term indicating the radical change that the manufacturing sector has been facing in recent years thanks to spreading digital technologies and their integration in the production chain.

[0004] In Industry 4.0, big data, robots, data analytics, and the Internet communication spread out in factories and streamline the production process, making it more efficient, dynamic and adaptable to market needs.

[0005] Besides the technological element, however, the 4.0 factories also show a change in human labour, which gradually becomes increasingly specialized precisely in order to "dialogue" with the digital technologies that are the basis of the production process.

[0006] Industry 4.0 derives from the fourth industrial revolution, the process that will lead to a fully automated and interconnected industrial production. The fundamental element of the fourth industrial revolution is the systematic application of the IoT (Internet of Things) technology to the production processes on a global scale.

[0007] In particular, according to a report from a multinational consulting company, the new digital technologies will have a profound impact following four development lines.

[0008] The first concerns the usage of data, computing power and connectivity, and involves big data, open data, IoT, machine-to-machine and cloud computing for information centralization and storage.

[0009] The second concerns analytics: once the data have been collected, a value must be obtained. Presently, only a modest percentage of the collected data is used by companies, which could instead obtain advantages starting from "machine learning", i.e. machines that improve their performance by "learning" from the data gradually collected and analysed.

[0010] The third direction of development is the interaction between man and machine, which involves the increasingly widespread "touch" interfaces and augmented reality.

[0011] Finally, there is the whole sector that deals with the transition from digital to "real" and which includes additive manufacturing, 3D printing, robotics, communications, machine-to-machine interactions and new technologies for storing and using energy in a targeted way, rationalizing costs and optimizing performances.

[0012] WO 2015/005772 A1, WO 2015/163757 A1, US 2015/246797 A1, US 2014/324214 A1, US 2013/240300 A1, KR 2012 0055138 A, WO 2004/026754 A, and WO 02/34665 A2 disclose application examples of IoT technology to the vehicle lifts used in garages to monitor their usage and determine their efficiency.

Object and Summary of the Invention

[0013] The Applicant has realized that the vehicle lift monitoring technologies disclosed in the aforementioned prior art are all based on a centralized control originally integrated in the vehicle lifts, thus resulting in technologies that are hardly applicable, if not completely inapplicable, to vehicle lifts that originally lack monitoring technologies.

[0014] The object of the present invention is therefore to provide an IoT-based technology for monitoring vehicle lifts in garages that is also applicable to vehicle lifts that were not originally provided with this monitoring technology.

[0015] The present invention therefore provides an electronic monitoring device to monitor the usage of vehicle lifts as claimed in the appended claims.

Brief Description of the Drawings

[0016]

Figure 1 shows a self-contained and stand-alone electronic device for monitoring the usage of vehicle lifts used in garages to lift vehicles.

Figure 2 shows a block diagram of the self-contained and stand-alone electronic monitoring device of Figure 1.

Detailed Description of Preferred Embodiments of the Invention

[0017] The present invention will now be described in detail with reference to the attached figures to allow a person skilled in the art to manufacture and use it. Various modifications to the described embodiments will be immediately apparent to the persons skilled in the art. The generic principles described may be applied to other embodiments and applications without departing from the protective scope of the present invention, as defined in the attached claims. Therefore, the present invention should not be considered limited to the described and shown embodiments, but it must be accorded the widest protective scope in accordance with the described and claimed features.

[0018] If not otherwise defined, all the technical and

scientific terms used herein have the same meaning commonly used by the persons skilled in the art of the present invention. In the event of a contention, this description, including the definitions provided, will be binding. Furthermore, the examples are provided for illustrative purposes only and as such should not be considered limiting.

[0019] In particular, the block diagrams included in the attached figures and described below are not intended as a representation of structural features or of constructive limitations, but as a representation of functional features, i.e. of the intrinsic properties of the devices defined by the obtained effects or by the functional limitations and which can be implemented in different ways to protect the functionalities of the device (operating abilities).

[0020] To facilitate the understanding of the embodiments described herein, reference will be made to some specific embodiments and a specific language will be used to describe them. The terminology used in the present document has the purpose of describing only particular embodiments, and is not intended to limit the scope of the present invention.

[0021] Figure 1 shows and indicates as a whole with reference numeral 1 an electronic monitoring device to monitor the usage of a vehicle lift 2 used in a garage for lifting vehicles such as, for example, motor vehicles and motorcycles.

[0022] The electronic monitoring device 1 is designed so that it can be installed on, or possibly also integrated into, any type of vehicle lift used in garages for lifting vehicles, both of the so-called column type, namely the type comprising a certain number of lifting columns from a minimum of one to four and one or a pair of lifting arms slidingly mounted on each lifting column, or, in four-post vehicle lifts, a pair of elongated platforms arranged side by side at a certain distance and fastened at their ends to the lifting columns, and of the so-called pantograph type, with single or double scissors, namely the type comprising a platform that is lifted by a pantograph system.

[0023] Figure 1 shows a preferred embodiment of the invention, in which the electronic monitoring device 1 is designed to be self-contained and stand-alone, namely having or containing all that is necessary to perform the functions for which it is designed and being able to operate without having to be connected to external resources.

[0024] The electronic monitoring device 1 is therefore designed to be provided with such hardware (processing, storage and communication) and software resources to be able to operate alone, independently and autonomously, without requiring external hardware resources, and in particular hardware resources of the vehicle lift on which it is installed.

[0025] In the embodiment shown in Figure 1, the electronic monitoring device 1 is further designed to be firmly applicable, conveniently also in an easily removable manner, to the outside of vehicle lifts 2 already in use in garages, e.g. to a part of the vehicle lift, such as a lifting column, so as to be replaceable or repairable in the event of a fault or for periodical maintenance.

[0026] In an alternative scenario not shown, the electronic monitoring device 1 could be integrated or housed within newly produced vehicle lifts 2 so as to provide the vehicle lifts with this functionality from the outset.

[0027] In the embodiment shown in Figures 1 and 2, the electronic monitoring device 1 comprises a protective casing 3 designed to allow the electronic monitoring device 1 to operate correctly and reliably under the operating and environmental conditions typical of the garages, and to house:

- a electronic sensory device 4 to detect the operating state of the vehicle lift 2,
- one or, conveniently, both of an electronic storage device 5 to store data locally and an electronic communication device 6 to communicate with a remote service centre and possibly with the vehicles on the vehicle lift 2, if these have communication capabilities, and
- an electronic control unit 7, conveniently in the form of a microprocessor, electrically connected to the electronic sensory, storage, and communication devices 4, 5 and 6, and programmed to control operation of the electronic monitoring device 1 to determine the state of usage of the monitored vehicle lift 2 based on data/signals provided by the electronic sensory device 4 and to store locally and/or transmit to the remote service centre data indicative of the usage of the vehicle lift 2, in the manner described in more detail hereinafter.

[0028] In one embodiment, the electronic monitoring device 1 may conveniently, but not necessarily, be further provided with a user interface 8 (HMI) connected to the electronic control unit 7 and comprising, on a face front of the protective casing 3, one or more of the following:

- an electronic display 9, conveniently of the liquid crystal type, to display information relating to the operation of the electronic monitoring device 1, to the usage of the vehicle lift 2, and possibly to the interventions to be carried out on the vehicles,
- one or different light indicators 10, conveniently of the LED type, operable to emit light indications of different colours indicative of different operating states of the vehicle lift 2, in which a green light indication may for example be used to indicate the availability of the vehicle lift 2, a red light indication may for example be used to indicate the unavailability of the vehicle lift 2, and a yellow light indication may for example be used to indicate that the vehicle lift 2 has been assigned to or booked for an intervention on a vehicle, and
- one or more buttons 11 associated with pre-set or programmable functions of the electronic monitoring device 1 and that are manually operable by an op-

erator to implement the related functions, such as, for example, displaying reports of failures/emergencies, indications of the states of the interventions carried out on the vehicles on the vehicle lift 2, for example start times of the interventions, end times of the interventions, reservations, etc., and conveniently comprising one or more buttons respectively associated with a relative function.

[0029] In one embodiment, the electronic sensory device 4 may be based on an optical technology, conveniently the imaging technology. It may therefore comprise an optical sensor conveniently in the form of a digital image capture sensor consisting of a common (micro) digital camera, for example a (micro) CCD (Charge-Coupled Device) or CMOS (Complementary Metal-Oxide-Semiconductor) camera, also known as APS camera (Active Pixel Sensor), that may be operated to capture one or more images of the vehicle lift so as to allow the electronic control unit 7 to detect the presence or absence of vehicles on the vehicle lift through an appropriate processing of the captured digital images.

[0030] In a different embodiment, the electronic sensory device 4 may be based on the radio-frequency identification (RFID) technology and therefore may comprise an RFID reader operable to detect within its range of action and by interrogation any electronic tag applied to vehicles on the vehicle lift.

[0031] The RFID technology may also be used to locate vehicles inside garages by signal triangulation and track the positions and the paths of the vehicles in the garages. This would make it possible to carry out an analysis on the optimal movement paths within the garages, and to monitor the vehicles in the sheltered areas out of the vehicle lift (e.g., diagnosis in dedicated areas). For this purpose, garages should be equipped with at least three RFID readers located in different areas.

[0032] In one embodiment, the electronic sensory device 4 may conveniently, but not necessarily, be designed to allow the vehicles on the vehicle lift 2 to be identified.

[0033] For this purpose, in the first embodiment described above, namely the one based on the optical technology, the electronic monitoring device 1 is designed to be mountable on the vehicle lift 2 with a preferential orientation to allow digital images of the registration plates of the vehicles on the vehicle lift 2 to be captured, so as to allow the vehicles on the vehicle lift 2 to be univocally identified by optical recognition of the alphanumeric identification characters in the captured digital images of the vehicle registration plates.

[0034] In the second embodiment described above, namely the one based on the RFID technology, the data that allow the vehicles on the vehicle lift 2 to be univocally identified is instead stored in the electronic tags applied to the vehicles.

[0035] In a further different embodiment, vehicles on the vehicle lift 2 may be detected and identified by means of separate dedicated sensors. For example, vehicles on the vehicle lift 2 may be detected by a dedicated proximity sensor and univocally identified by a dedicated optical sensor, for example of the type indicated above, operated simultaneously with the proximity sensor or only in response to the detection of the vehicles on the vehicle lift 2.

[0036] The electronic storage device 5 may conveniently be in the form of an extractable memory card, which, once extracted, may be connected to a personal computer to download the data contained therein and transmit them to the remote service centre via the Internet or via a dedicated connection.

[0037] The electronic communication device 6 may be operated to communicate with the remote service centre and also with the vehicles on the vehicle lift 2, when provided with communication capabilities, to transmit data relative to the usage of the vehicle lift 2 and possibly to receive data relative to the usage of the vehicle lift 2 and to the interventions to be carried out on the vehicles, and/or commands relating to the operation of the electronic monitoring device 1, for example to receive reservation data of the vehicle lift 2 and data indicative of the interventions to be carried out on the vehicles or diagnostic data of the vehicles on whose basis the interventions have been planned, so as to ensure that the electronic control unit 7 may control the electronic display 9 and the light indicators 9 of the user interface 8 to display on the electronic display 9 information relative to the interventions to be carried out on the vehicles and the consequent operating state of the vehicle lift 2, or commands for performing diagnostic operations on the electronic monitoring device 1.

[0038] In a different embodiment, the electronic communication device 6 may be operated to communicate with a decentralized and distributed database, otherwise known as blockchain, essentially consisting of a continuously growing list of records, called blocks, which are connected together and rendered secure through the use of cryptography.

[0039] Each block in the chain contains a hash pointer to the previous block, a timestamp, and the transaction data. A blockchain is basically an open and distributed ledger where transactions between two parties may be recorded securely, verifiably, and permanently. For this use, this database uses a peer-to-peer network associated to a protocol for the validation of new blocks.

[0040] The blockchain is a database used as a decentralized and distributed ledger used to record transactions on different computers, making sure that the records cannot be modified without altering all the following blocks and without the collusion of the majority of the network. This allows users of the blockchain to be able to control operations in an economic way.

[0041] For this purpose, the electronic communication device 6 can conveniently comprise one or more of the following:

- an electronic short-range radio communication device operable to communicate based on one or dif-

ferent short-range communication technologies conveniently comprising Wi-Fi technology, through which the electronic short-range radio communication device may communicate with the remote service centre and/or with the vehicles on the vehicle lift 2 through a wireless local network (WLAN) in the garage, or, in addition to or as an alternative to Wi-Fi technology, Bluetooth technology, for example the one according to the 4.0 specification and also known with the names Bluetooth Low Energy, Bluetooth LE or Bluetooth Smart, through which the electronic short-range radio communication device may communicate directly with the vehicles on the vehicle lift 2 and/or with the remote service centre through a personal mobile device paired with the electronic communication device 5, such as for example a smartphone within its communication range in the garage and belonging, for example, to the operator carrying out the interventions on the vehicles on the vehicle lift 2 or to the owner of the garage,

- an electronic long-range radio communication device operable to communicate with the remote service centre through one or several long-range communication technologies including one or more of the cellular communication technologies, 2G, 3G, 4G, 5G, etc., and
- an electronic wired communication device, conveniently the standard serial communication system known as USB (Universal Serial Bus) interface, which, as known, comprises appropriate connectors, known precisely with the name of USB connectors or ports, which can be connected to other USB connectors using special cables known as USB cables.

[0042] As far as the electric power supply is concerned, the electronic monitoring device 1 may be connected to an external electric power supply or, conveniently, may have an autonomous electric power supply, or both.

[0043] In order for it to be electrically power supplied from the outside, the electronic monitoring device 1 may be provided with a suitable electric power supply connector for the connection to an external electric power source by means of a suitable connection cable, and with an internal electric power supply stage with input connected to the electric power supply connector and designed to output a stabilized electrical voltage suitable for the electrical power supply of the electronic sensory device 4, the electronic storage device 5, the electronic communication device 6, the electronic control unit 7, and the user interface 8.

[0044] In order for it to be autonomously power supplied, the electronic monitoring device 1 may be provided with an internal electric power source designed to output an electric voltage suitable for the electrical supply of the electronic sensory device 4, the electronic storage device 5, the electronic communication device 6, the electronic control unit 7, and the user interface 8.

[0045] The internal electric power source may be either of the non-electrically rechargeable type or of the electrically rechargeable type.

[0046] In this second embodiment, in order for it to be electrically recharged, the internal electric power source may simply be of the type connectable to an external electric power source through an electric recharging connector and may be provided with an electric recharging stage designed to electrically recharge the internal electric power source through the electricity from the external electric power source.

[0047] In a more advanced embodiment, as an alternative or in addition to the connection to an external electric power source, the internal electric power source may be (further) provided with an electric recharging stage designed to perform a wireless or inductive recharge by exploiting RF energy in electromagnetic signals captured via an RF antenna.

[0048] The electronic control unit 7 is programmed to:

- operate, e.g., periodically, the electronic sensory device 4 to determine the operating state of the vehicle lift 2 and, when so configured, to univocally identify vehicles on the vehicle lift 2,
- receive and process output signals/data of the electronic sensory device 4 to detect and, when so configured, to univocally identify the vehicles on the vehicle lift 2, and, conveniently, to determine the dates and the start and end times of the mechanical interventions on the vehicles on the vehicle lift 2, which could actually correspond to the start and end times of the usage of the vehicle lift 2, which are in turn determinable as the times in which the presence and the subsequent absence of the vehicles on the vehicle lift 2 are detected,
- store in the electronic storage device 6, when provided, data indicative of the dates and durations of the mechanical interventions on the vehicles, and possibly also the start and end times of the mechanical interventions, together with the identification data of the vehicles subjected to the mechanical interventions, when determined,
- control the electronic communication device 5, when provided, to transmit to the remote service centre, for their subsequent processing, data indicative of the dates and durations of the mechanical intervention on the vehicles, and possibly also the start and end times of the mechanical interventions, together with the identification data of the vehicles on which the mechanical interventions was carried out, when determined, and
- control the electronic display device 9, when provided, to display the date and durations of the mechanical interventions on the vehicles and possibly also the start and end times of the mechanical interventions and, when determined, also the data identifying the vehicles subjected to the mechanical interventions, and to consequently activate the light indicator(s) 10 to provide a visual indication of the operating

state of the vehicle lift 2.

[0049] The data indicative of the dates and durations of the mechanical interventions on the vehicles, and possibly also the start and end times of the mechanical interventions and, when determined, also the identification data of the vehicles subjected to the mechanical intervention, may be transmitted individually as soon as they are determined, so that the remote service centre can know in real time the operating state of the monitored vehicle lifts, or even all together in a single data packet.

[0050] In turn, the data packets may then be transmitted individually or together with other data packets, according to a proprietary criterion, e.g., periodically, every hour, at the end of each work shift or at the end of each working day or when the storing capacity of the electronic storage device 6 is nearly over.

[0051] Every data transmission, whether it takes place in the form of individual data, data packets or groups of data packets, is conveniently marked temporally by means of a timestamp indicative of the date and time of transmission to allow the successful transmission to be verified and tracked.

[0052] The electronic control unit 7 is further programmed to receive, through the electronic communication device 6, data and/or commands from the remote service centre and/or from the vehicles on the vehicle lift 2, and to control the electronic display 8 to display the received data, as well as to execute the received commands and to check the operation of the electronic monitoring device 1.

[0053] The remote service centre is then designed to receive and process the data transmitted by various electronic monitoring devices 1 to monitor in real or pseudo-real time the state of usage of the various vehicle lifts monitored through the electronic monitoring devices 1, compute permanence times of the vehicles on the lifts, and determine the consistency of the vehicles permanence times on the lifts with the related interventions carried out on the vehicles.

[0054] In this way, the present invention allows the improvement of garage performance, increasing its competitiveness, and simplifies the exchange of information between the various companies and actors involved in its management such as service advisor, mechanical worker, garage manager, customer, etc.

Claims

1. A self-contained and stand-alone electronic monitoring device (1) to monitor the usage of a vehicle lift (2); the stand-alone electronic monitoring device (1) is designed to be firmly and removably applicable to a vehicle lift (2) and comprises:

    • an electronic sensory device (4) to determine the state of usage of the vehicle lift (2) and identify a vehicle on the vehicle lift (2),
    • an electronic storage device (5) to store data locally,
    • an electronic communication device (6) for data communication with a remote service centre and possibly with a vehicle on the vehicle lift (2),
    • a user interface (8) to allow a user to interact with the stand-alone electronic monitoring device (1), and
    • an electronic control unit (7) electrically connected to the electronic sensory, storage and communication devices (4, 5, 6) and to the user interface (8), and programmed to determine the state of usage of the vehicle lift (2) and to identify the vehicles on the vehicle lift (2) based on an output of the electronic sensory device (4) and to store in the electronic storage device (5) and/or to transmit to the remote service centre via the electronic communication device (6) data indicative of the usage of the vehicle lift (2) and of the identity of the vehicle (2) on the vehicle lift (2).

2. The self-contained and stand-alone electronic monitoring device (1) of claim 1, wherein it is either a imaging-based or a radio frequency identification (RFID)-based electronic sensory device (4).

3. The self-contained and stand-alone electronic monitoring device (1) of any one of the preceding claims, wherein the user interface (8) comprises one or more of the following:

    • an electronic display device (9) to display information on the usage of the vehicle lift (2) and/or on interventions to be carried out on the vehicles on the vehicle lift (2),
    • one or different light indicators (10) to provide visual indications of different operating states of the vehicle lift (2), and
    • one or more buttons (11) associated to pre-set functions of the electronic monitoring device (1).

4. The self-contained and stand-alone electronic monitoring device (1) of any one of the preceding claims, wherein the electronic communication device (6) comprises one or more of the following:

    • an electronic short-range radio communications device to allow the electronic monitoring device (1) to communicate with the remote service centre and possibly with vehicles on the vehicle lift (2) through one or different short-range communications technologies comprising Wi-Fi and Bluetooth technologies,
    • an electronic long-range radio communications device to allow the electronic monitoring device (1) to communicate with the remote serv-

ice centre through one or different long-range communications technologies, and
• an electronic wired communications device to allow the electronic monitoring device (1) to communicate with the remote service centre through a wired connection.

5. The self-contained and stand-alone electronic monitoring device (1) of any one of the preceding claims, comprising a protective casing (3) designed to contain said electronic sensory, storage and communication devices (4, 5, 6) and said electronic control unit (7), as well as to expose said user interface (8) and designed to allow the self-contained and stand-alone electronic monitoring device (1) to be firmly installed onto vehicle lifts (2) according to such an orientation as to allow vehicles on the vehicle lifts (2) to be detected and identified.

6. The self-contained and stand-alone electronic monitoring device (1) of any one of the preceding claims, further comprising an electrical power supply device housed in the protective casing (3).

7. The self-contained and stand-alone electronic monitoring device (1) of claim 6, wherein the electrical power supply device comprises:

• an electric power supply connector for connection to an external electric power source using a special connection cable, and
• an internal electric power supply stage with an input connected to the electrical power supply connector and designed to output a stabilized electrical voltage suitable for the power supply of the electronic sensory, storage and communication devices (4, 5, 6), the electronic control unit (7), and the user interface (8).

8. The self-contained and stand-alone electronic monitoring device (1) of claim 6 or 7, wherein the electrical power supply device is an autonomous electrical power supply device.

9. The self-contained and stand-alone electronic monitoring device (1) of claim 8, wherein the autonomous electric power supply device is either a non-electrically rechargeable or an electrically rechargeable electric power supply device.

10. The self-contained and stand-alone electronic monitoring device (1) of claim 9, wherein the electrically rechargeable power supply device comprises:

• an electric recharging stage configured to be connectable to an external electric power source through an electric recharging connector and designed to electrically recharge the internal electric power source by means of the electric energy from the external electric power source.

11. The self-contained and stand-alone electronic monitoring device (1) of claim 9 or 10, wherein the electrically rechargeable power supply device comprises:

• an electric recharging stage designed to perform a wireless or inductive recharge exploiting RF energy contained in electromagnetic signals captured via an RF antenna.

12. The self-contained and stand-alone electronic monitoring device (1) of any one of the preceding claims, wherein the electronic control unit (7) is configured to:

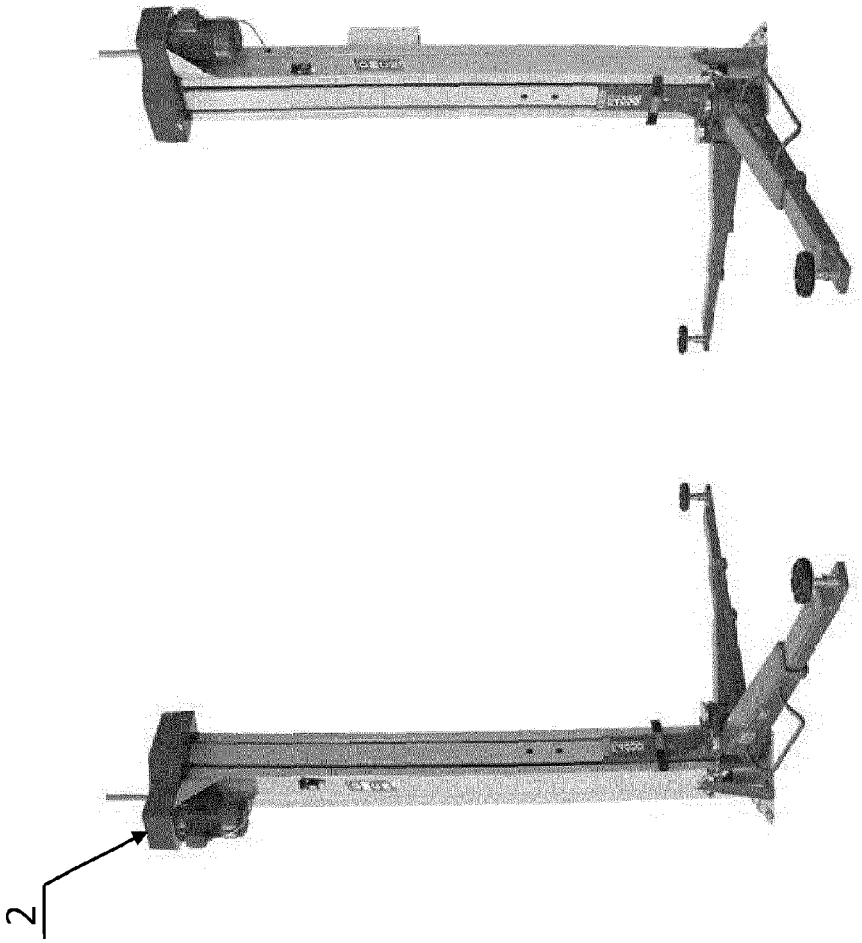
- operate the electronic sensory device (4) to detect, and when so configured, identify vehicles on the vehicle lift (2),
- receive and process an output of the electronic sensory device (4) to determine a state of usage of the vehicle lift (2), and date and start and end times of interventions carried out on vehicles on the vehicle lift (2),
- store in the electronic storage device (5) data indicative of date and either duration or start and end times of interventions carried out on vehicles on the vehicle lift (2), and identification data of vehicles subjected to interventions, and
- control the electronic communication device (6) to transmit to the remote service centre and, when provided with communication capabilities, possibly also to vehicles on the vehicle lift (2), data indicative of date and either duration or start and end times of interventions carried out on vehicles on the vehicle lift (2), and identification data of vehicles subjected to interventions.

13. The self-contained and stand-alone electronic monitoring device (1) of claim 3, wherein the electronic control unit (7) is further configured to control the electronic display device (9) to display date and either duration or start and end times of interventions carried out on vehicles on the vehicle lift (2), and the light indicator(s) (10) to provide a visual indication of the operating state of the vehicle lift (2).

14. The self-contained and stand-alone electronic monitoring device (1) of claim 3, wherein the electronic control unit (7) is further configured to receive, via the electronic communication device (6), data and/or commands from the remote service centre and/or from vehicles on the vehicle lift (2), and to control the electronic display device (9) to display received data, as well as to execute received commands and to control operation of the electronic monitoring de-

vice (1) accordingly.

15. A vehicle lift (2) comprising the self-contained and stand-alone electronic monitoring device (1) of any one of the preceding claims.



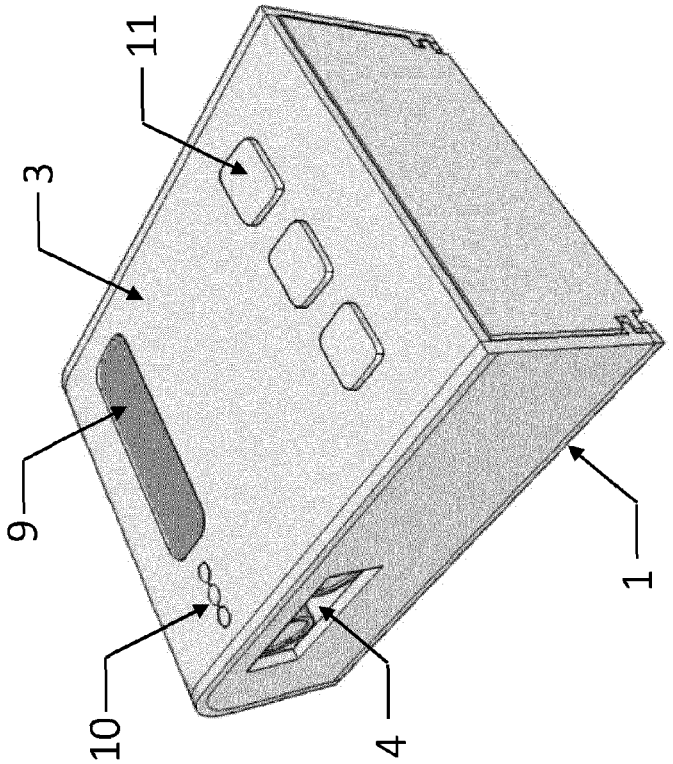


Fig. 1

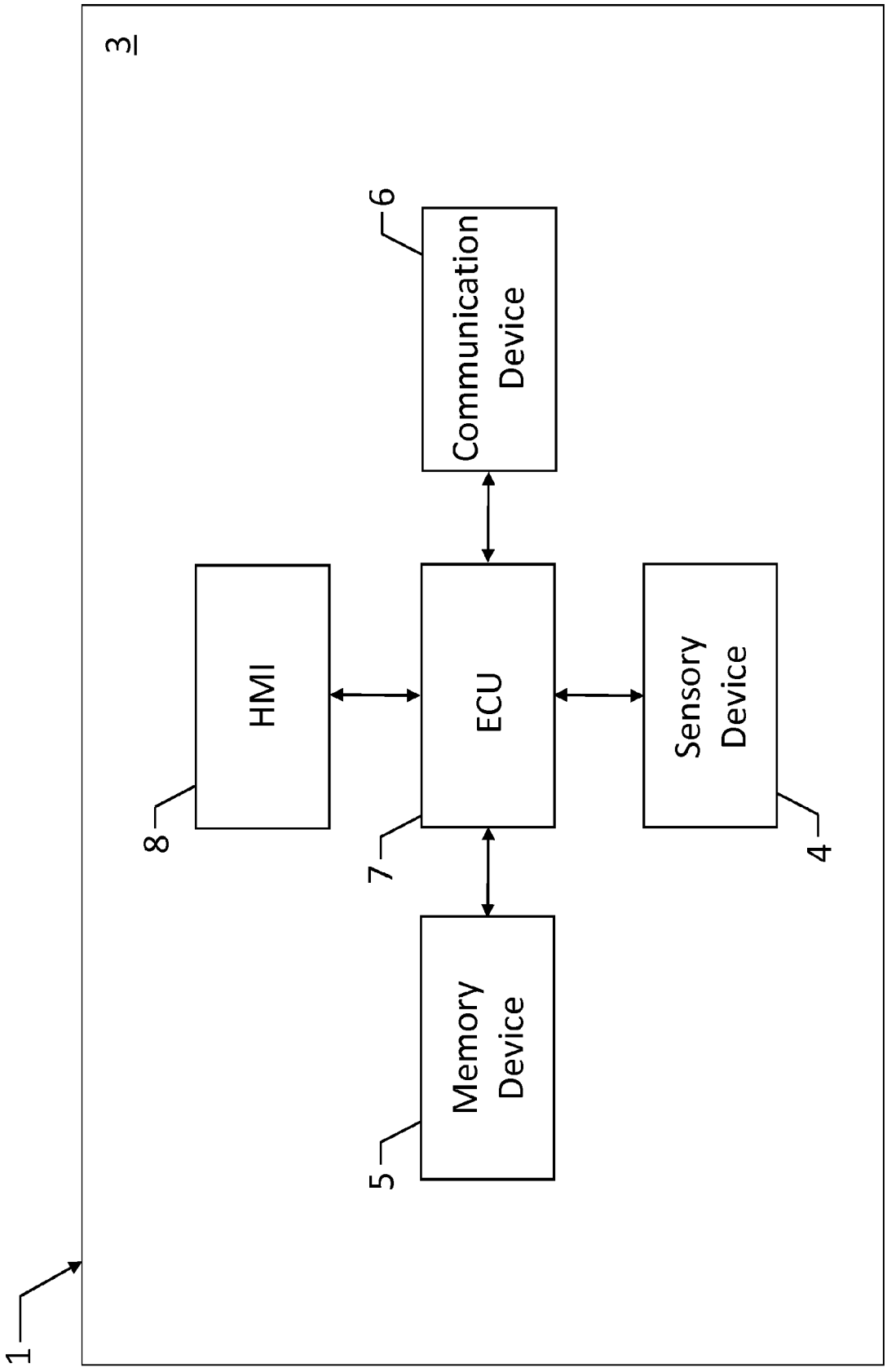

3
6
Communication Device
HMI
ECU
Sensory Device
8
7
4
Memory Device
5
1

Fig. 2

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 19 16 2372

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	WO 2015/163757 A1 (STERTIL BV [NL]) 29 October 2015 (2015-10-29) * abstract * * figures * * page 1, line 20 - line 33 * * page 5, line 15 - page 6, line 19 * * page 10, line 30 - page 11, line 9 * * claims 1, 9, 10, 11 *	1-15	INV. B66F7/10 B66F9/075 B66F9/24
Y	US 2013/240300 A1 (FAGAN JOHN E [US] ET AL) 19 September 2013 (2013-09-19) * paragraph [0036] - paragraph [0038] * * paragraph [0043] * * paragraph [0046] - paragraph [0047] * * paragraph [0052] - paragraph [0053] * * paragraph [0057] - paragraph [0058] * * paragraph [0071] * * paragraph [0075] - paragraph [0081] * * paragraph [0088] - paragraph [0090] * * paragraph [0092] * * paragraph [0105] * * claim 2 * * claims 1, 3 * * figures *	1-15	TECHNICAL FIELDS SEARCHED (IPC) B66F G05D G06Q
Y A	WO 2015/005771 A1 (STERTIL BV [NL]) 15 January 2015 (2015-01-15) * page 4, line 21 - line 31 *	1 2-5, 12-15	F15B G07C G06K G08C
A	WO 2015/005772 A1 (STERTIL BV [NL]) 15 January 2015 (2015-01-15) * abstract * * figures 1, 2, 5, 7, 8a, 8b, * * page 2, line 34 - page 5, line 7 * * claim 1 *	1-5, 12-15	

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	21 June 2019	Guthmuller, Jacques

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Application Number
EP 19 16 2372

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