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(54) Access control system in restricted access areas

(57) The present invention relates to a system for the control of accesses in restricted access parking spaces, finding a particular application in the management of loading and unloading areas. The invention is characterized by the capacity to detect the presence of vehicles in the space or spaces under control and the subsequent management of the time of stay of the vehicle in the parking space. The incorporation of subsequent services such as the user stay control, the power supply of batteries in electric vehicles or the management of complaints and notifications when acting outside the pre-established parameters is also an object of this invention.

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Description

Object of the Invention

[0001] The present invention relates to a system for the control of accesses in restricted access parking spaces, finding a particular application in the management of loading and unloading areas, although it can also be applied to any other parking area with restricted or privileged access, such as for example curb cuts, spaces reserved for disabled people, bus or taxi stops, spaces reserved for administrative authorities, sanitary vehicles, vehicles of security forces, vehicles of different municipal services, company vehicles, etc., which require special treatment (authorization and/or authentication) to assure the suitable use of the parking spaces. The invention is characterized by the capacity to detect the presence of vehicles in the space or spaces under control and the subsequent management of the time of stay of the vehicle in the parking space.

[0002] The incorporation of subsequent services such as the identification of the user, the power supply of batteries in electric vehicles or the management of complaints and notifications when acting outside the pre-established parameters is also an object of this invention.

Background of the Invention

[0003] The management of road traffic has become in recent years a need of our society, due to the constant increase of vehicles of all types in the number of vehicles in cities. This leads to public space being increasingly scarce. Performing an effective management of these vehicles in public roads has been a priority of the administrations to make it possible for citizens, professionals and vehicles to co-exit in their daily activity. An important aspect in this field of the art is that of the control of parking spaces for authorized vehicles.

[0004] All types of signs and devices for managing traffic in an efficient and automated manner are increasingly observed in the street furniture of cities, from traffic lights and horizontal and vertical signs, indicator panels, blue and green parking areas, and public parking lots, to more complex vehicle flow control systems, for example those determining the times during which the traffic lights in a city are in control.

[0005] In the management of road space, municipal authorities perform the assignment of spaces to different uses, from completely free spaces (with or without payment) to spaces reserved for certain allowed uses, subjected to different types of licenses or authorizations. The correct management of this restricted access parking spaces becomes a matter of great importance: suitably managing areas of restricted use so that in practice the uses are suitable for the purpose of facilitating the objectives of organization and of good operation of public road spaces.

[0006] Specifically, loading and unloading areas are usually the object of a number of violations when used by unauthorized private vehicles, or by the loading and unloading operators themselves who exceed the authorized times.

[0007] A considerable number of systems for the management of parking spaces are known in the current state of the art, almost all of them based on sensors, for example magnetic sensors, which are arranged in the floor of a parking space. For example, patent US7388517 describes a magnetic sensor of the presence of an automobile in a parking space, and a radio transmitter-receiver for emitting the detected signal. The described device is designed to be used in systems for the management of parking spaces. The system can also include a light-emitting device to indicate the occupied or free status of the space.

[0008] Spanish patent application number P200930612, which describes a system for the management of parking spaces according to the preamble of claim 1, can be mentioned as the closest state of the art.

[0009] A particular application of the present invention is providing a method for the management of loading and unloading areas inside cities by means of controlling the parking time (limited time) in a completely automated manner. The present invention must allow speeding up traffic in cities and improving logistic distribution tasks.

Description of the Invention

[0010] For such purpose, the object of the present invention is an access control system in restricted access areas, comprising:

- *a sensor associated with a parking space for detecting the presence (occupied space) or absence (free space) of a vehicle in said parking space,*
- *a control unit for processing and managing the information coming from the sensor,*

When the sensor detects the presence of a vehicle, it transmits an occupied space signal to the control unit such that the latter is capable of taking subsequent actions.

[0011] According to the invention, the control unit additionally comprises means for controlling the time of stay of the parked vehicle (v) in the space (p) when it is occupied. These means allow individually assigning for each parking space (p) a time of stay and allow the management to be automated.

[0012] Additionally, the system can incorporate identification means where in an embodiment of the invention they consist of an identification card carried by the user of the vehicle which serves for the system to be capable of knowing the identity of said user.

[0013] In this particular case, the system makes use of a register in which at least the authorized vehicles are recorded so that the control unit can determine whether the identified vehicle is authorized to occupy said parking

space or not. The determination is carried out by comparison between the identified vehicle and the vehicles registered in the register.

[0014] The particular embodiments resulting from the dependent claims 2 to 15 are incorporated by reference to this description.

[0015] A second aspect of the invention consists of the method for the management of the area controlled by the system of the first aspect of the invention and which is included in independent claim 16 which is incorporated by reference in this description.

[0016] When the system detects that the user does not comply with any of the parameters established as suitable, for example, he exceeds the time of stay in the parking space (p), or when the identification that said identification is negative is required, an alarm is emitted which can consist of a notification to the competent authority so that it can make a complaint. This notification can be communicated by means of an SMS message or by means of Internet connection.

Description of the Drawings

[0017] These and other features and advantages of the invention will be more clearly shown from the following detailed description of a preferred embodiment, given only by way of an illustrative and non-limiting example, with reference to the attached drawings.

Figure 1. This figure shows a schematic view according to an embodiment of the invention in which a post has at least the essential elements of the system and allows the communication with a plurality of sensors.

Figure 2. This figure shows a view similar to Figure 1, in this case a second particular embodiment is shown in which each post has its respective incorporated or associated sensor.

Figure 3. This figure shows the outer appearance of an embodiment of a post serving as street furniture for housing the system.

Figure 4. This figure shows a block diagram of the components of a post according to the second embodiment incorporating the control unit and the vehicle detection sensor.

Detailed Description of the Invention

[0018] Embodiments of systems for the management of parking spaces (p) in which there is a restricted use will be described with the support of the figures. The restriction is temporary such that the system manages in an individualized manner the stay of a vehicle (v) when it is parked in a parking space (p).

[0019] In Figures 1 and 2 it can be seen that the system of the embodiments of the invention comprises at least of sensor elements (1) and control units (3), which have a microprocessor (31) (Figure 4) for the management of the information and of peripherals. Each parking space (p) has a sensor (1). In relation to the control units (3), the latter are contained in a piece of street furniture (8) preferably adopting the form of a post (see Figure 3).

[0020] Two configurations can be used, there may be a single centralized control unit (3) communicating with the sensors (1) (Figure 1), or there is a control unit (3) for each parking space (p) (Figure 2) which in turn has a single sensor (1) associated therewith. In the first case, the communication between the sensors (1) and the control unit (3) is preferably wireless and each sensor is supplied with power by means of an internal battery. In the second case, when the sensor (1) is included in the piece street furniture (8) itself, for example a post, containing the control unit (3), the sensor (1) is preferably powered from the same energy management system (10) as the set of components incorporated in the piece of street furniture (8). The energy management system (10) will be described in greater detail below. Likewise, the communication between the sensor (1) and the control unit (3) is preferably by means of wiring.

[0021] The sensors (1) detect the presence (occupied space) or absence (free space) of a vehicle (v) in a corresponding parking space (p) associated with the sensor (1). When the sensor (1) detects the presence of a vehicle (v), it communicates it to the control unit (3) by means of an "occupied space" signal.

[0022] The system of the embodiment, once the parking space (p) has been occupied, establishes a period of time of stay and starts deducting in order to perform a control of the remaining time. If the vehicle (v) exceeds the assigned time of stay, it emits an alarm.

[0023] The assigned time for each space may be different.

[0024] Additionally, the system of the embodiment comprises registering means for registering authorized vehicles. Thus, when the user of the parked vehicle detected by the sensor (1) carries out the identification, the system compares said identification with the registered vehicles. The result of this comparison determines whether the vehicle (v) is authorized to park in the parking space (p) or not.

[0025] The system of the registering means can be a radio frequency identification, RFID, system comprising an RFID tag in an identifying card which the driver of the vehicle (v) has and an RFID tag reader (2) arranged in the piece of street furniture (8) where the control unit (3) is located. The system authenticates the vehicle (v) parked in the parking space (p) the sensor (1) of which has sent an "occupied space" signal. If the system validates the identification code as authorized, it generates an "authorized vehicle" signal. The system generates an "unauthorized vehicle" signal in the opposite case of non-validation.

[0026] In this embodiment the control units (3) are communicated through internet (6) (or another WAN) with a server (4) depicted in this embodiment in connection with a database (5) for the centralized remote management of the information coming from the control units

(3) and from the sensors (1), among others, of the "authorized vehicle" and "unauthorized vehicle" signals.

[0027] The communication of the control units (3) with the server (4) through internet (6) is carried out in this embodiment by means of a GPRS 20 communications block.

[0028] In the event of having a piece of street furniture (8) in the form of a post with a respective control unit (3), the sensor (1) of the corresponding parking space (p) is arranged in a detection block (50) of the control unit (3), and associated with a magnetic sensor (14) (Figure 4) which is the one allowing the detection. In this embodiment the magnetic sensor (14) makes use of AMR ("Anisotropic Magneto Resistive") technology although it is possible to make use of another type of commercial technology such as a magnetic loop. The detection block (50) communicates with the microprocessor (31) indicated above, which is in turn communicated with the user interface (60) incorporating, for example, an LCD monitor (16), LEDs-indicators (17) and a push-button (18) for data input.

[0029] The user interface (60) is connected to a communications device (40) incorporating the RFID reader (2) for the card of the user, a radio frequency receiving block (19) for reading the signal of the sensors (1); and the mentioned GPRS communications block (20).

[0030] The microprocessor (31) is connected to an electric power supply block (30) which can comprise photovoltaic cells (7) for the charging of batteries (12), which charging is managed by an energy management system (10), for example a microcontroller, and a power control (11). There may also be a power supply source (13) in parallel to the batteries (12). If there is access to the electric network, the charging of the batteries (12) can also be performed through the network.

[0031] In an embodiment of the invention, the piece of street furniture (8) has a connector (70) for the connection of an electric vehicle and allowing its recharging. This connector (70) is in connection with the energy management system (10) which will supply power to the electric vehicle preferably from the electric network. If there is a control of the consumption, it will preferably be managed by means of the energy management system (10) and by the microprocessor (31).

[0032] Figure 3 shows an example of the piece of street furniture (8) in the form of a post in which the RFD card reader (2) with an inlet slot at mid-height is observed. A possible location of the sensor (1), in this case in the floor, and a possible upper location of the photovoltaic cells (7), are also shown.

[0033] In Figures 1 and 2 it can be seen that a person (9), user of the system or a surveillance officer, can connect to the system through GSM/GPRS mobile telephony or the like, for example with a PDA or similar device. The system has a central software implemented in the data server (4) and is associated with an SMS sending system and integrated in a telematic payment system.

[0034] A possible example of operation of the system, applied to loading and unloading areas is the following:

- The vehicle (v) parks in a parking space (p) of the restricted access area, for example a loading and unloading area.
- The system detects the vehicle (v) or the occupation of that space.
- The user of the vehicle (v) has a maximum of 30 minutes to remain parked in the parking space (p). Once the time is assigned, the system counts the time elapsed.

  o If the user leaves the parking space (p) and there is still time remaining from the assigned time, nothing happens and the time is no longer counted.
  o If the assigned time is used up and the sensor (1) of the system continues to detect the presence of the vehicle (v), an alarm is emitted.

Claims

1. An access control system in restricted access areas, comprising:

  • a sensor (1) associated with a parking space (p) for detecting the presence (occupied space) or absence (free space) of a vehicle (v) in said parking space (p),
  • a control unit (3) for processing and managing the
  information coming from the sensor (1),
  characterized in that the control unit (3) comprises means for controlling the time of stay of the parked vehicle (v) in the space (p) when it is occupied.

2. The system according to claim 1, **characterized in that** it additionally comprises:

  • identification means for identifying a vehicle (v) when it is detected in the parking space (p) associated with the sensor (1); and,
  • access means for accessing a register where the data of a
  set of authorized vehicles (v) are stored,
  wherein the control unit (3) is adapted to determine whether the identified vehicle (v) is authorized to occupy said parking space (p) or not by the comparison between the identified vehicle (v) and the vehicles registered in the register.

3. The system according to claim 2, **characterized in that** the means for controlling the time can be activated when the parked vehicle (v) is identified as authorized.

4. The system according to claim 1, **characterized in**

that the control unit (3) manages a plurality of sensors (1) for detecting the presence of vehicles (v), each of which is associated with a parking space (p).

5. The system according to claim 2, **characterized in that** the identification means are RFID radio frequency identification means comprising:

- an identifying RFID card for the driver of the vehicle; and
- an RFID card reader (2) arranged in the control unit (3).

6. The system according to claim 1 or 2, **characterized in that** it has a server (4) for the centralized management of the information coming from the control units (3) and in particular from the register of authorized vehicles.

7. The system according to claim 6, **characterized in that** the communications between the server (4) and the control unit (3) is carried out through LAN or WAN network, in particular through Internet (6), and preferably by means of a GPRS communications block (20).

8. The system according to claim 1, **characterized in that** the control unit (3) is housed in a piece of street furniture (8).

9. The system according to claim 8, **characterized in that** the piece of street furniture (8) adopts the form of a post.

10. The system according to claim 8 or 9, **characterized in that** the piece of street furniture (8) contains both the control unit (3) and the sensor (1) associated with said control unit (3); and wherein the piece of street furniture (8) is located in such a way with respect to the parking space (p) associated with the sensor (1) that said sensor (1) is capable of detecting the presence of a vehicle (v) in the parking space (p).

11. The system according to claim 8, 9 or 10, **characterized in that** the electric power supply system of the different devices comprises photovoltaic cells (7) for the charging of batteries (12), which charging is managed by an energy management system (10) and power control (11).

12. The system according to claim 1, **characterized in that** the communication between the control unit (3) and the sensor (1) is wireless.

13. The system according to claim 1 or 6, **characterized in that** it comprises means for transmitting information from the server (4) to a user (9) of the system or surveillance officer through GSM/GPRS mobile telephony or the like.

14. The system according to claim 1 or 6, **characterized in that** it comprises a telematic payment system.

15. The system according to any of claims 1 to 3 and claim 7, **characterized in that** the piece of street furniture (8) has a connector (70) for allowing the power supply of electric vehicles (v).

16. A method for the management of the access in restricted access areas by means of a system according to any of the previous claims, **characterized in that** it comprises the following steps:

- after the detection of the presence of a vehicle (v) in a parking space (p), a time period (t_1) is established during which the vehicle (v) is allowed to stay
- if the time (t_1) is exceeded and the vehicle (v) remains parked, an alarm is emitted.

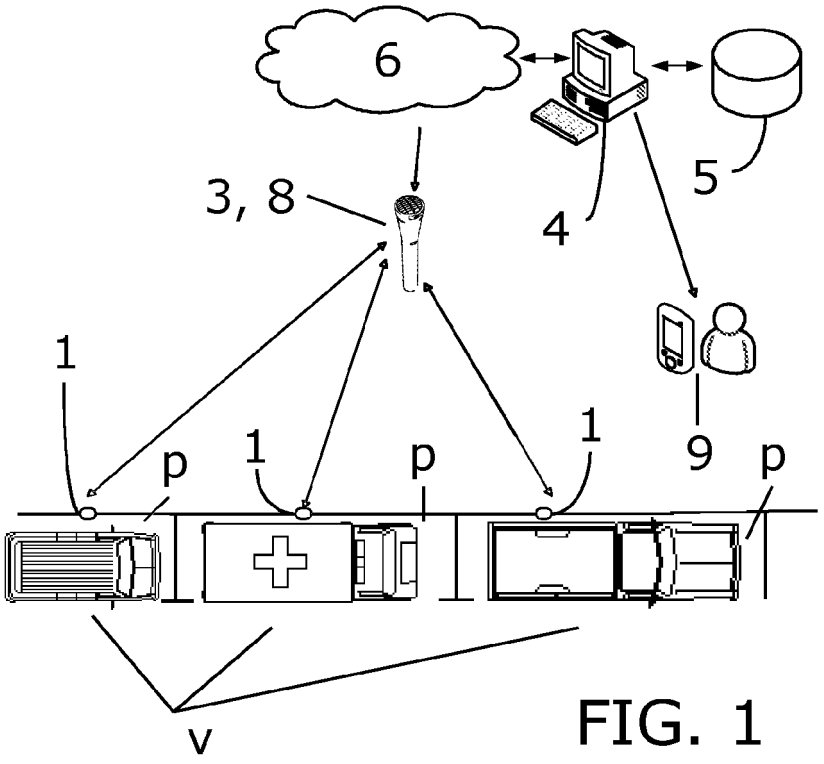

FIG. 1

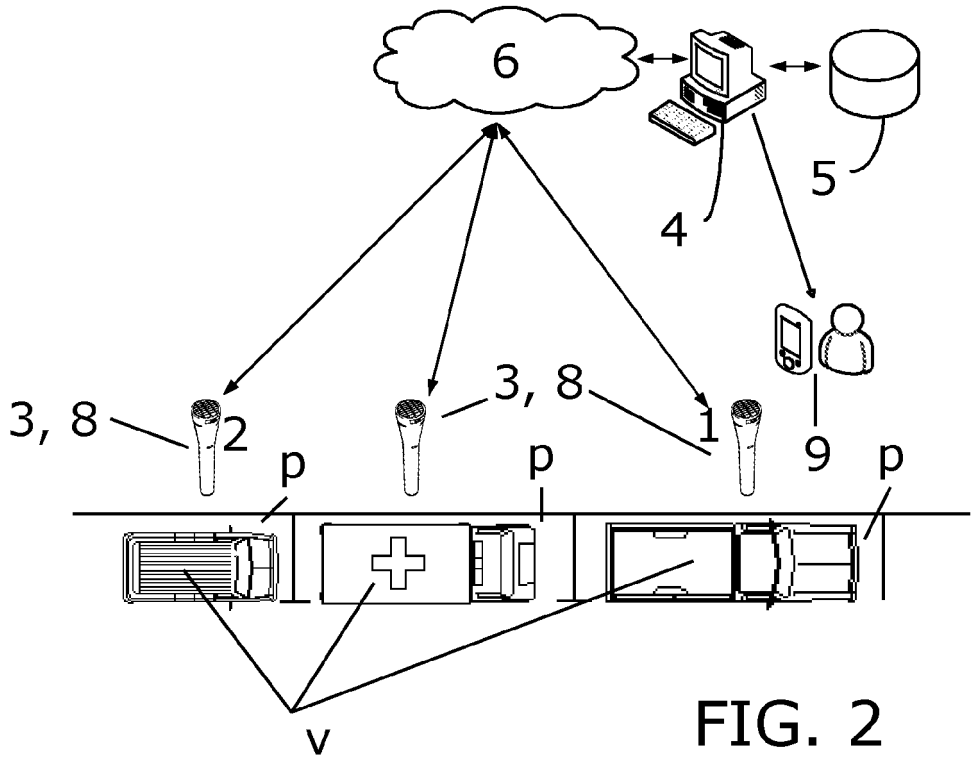

FIG. 2

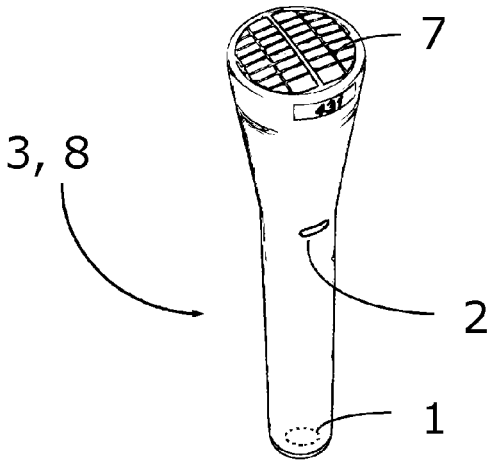

FIG. 3

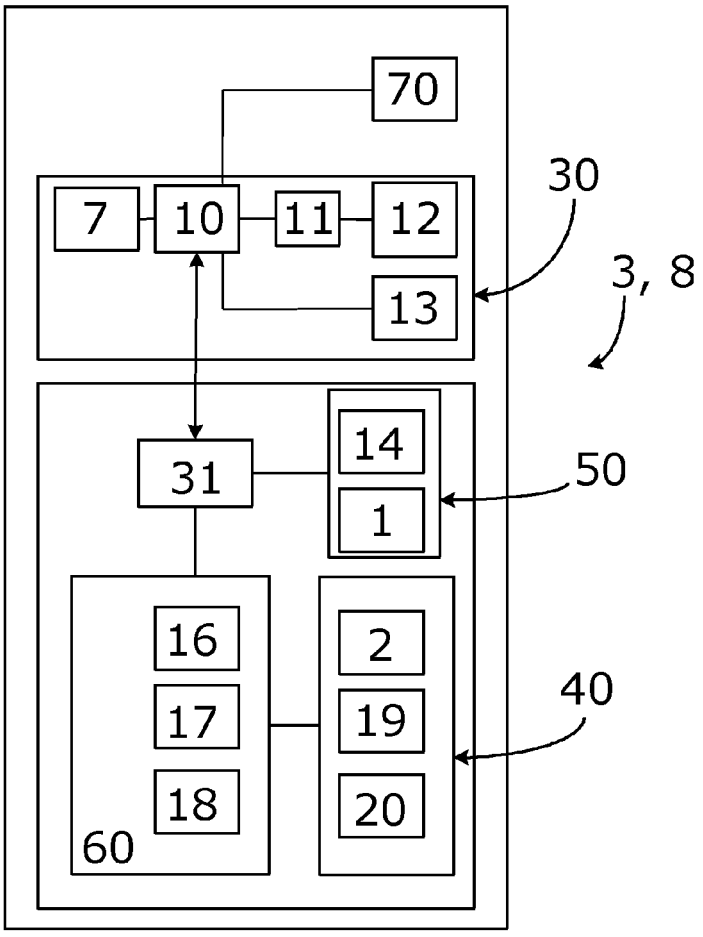

FIG. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 09 38 2219

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 Y A	EP 2 015 257 A1 (SEMCO S A R L [FR]) 14 January 2009 (2009-01-14) * abstract * * column 6, line 46 - column 48 * * column 7, line 19 - column 11, line 8; figures 1-3 * -----	1,4 2-3,6-9, 11-14 5,10	INV. G08G1/14 ADD. G08G1/017
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TECHNICAL FIELDS SEARCHED (IPC)
G08G
G07B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	10 March 2010	Heß, Rüdiger

CATEGORY OF CITED DOCUMENTS

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10-03-2010

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

REFERENCES CITED IN THE DESCRIPTION

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