

Device for Monitoring a Vehicle Parking Space

This application claims the priority of the European Patent Application No. 11 450 037.4, the disclosure of which is
5 herein incorporated by reference.

The present invention pertains to a device for monitoring a parking space for a vehicle, with a camera unit assigned to the parking space and mounted thereon, to record a picture of a frontal license plate of the vehicle. The invention further
10 pertains to a parking lot with a plurality of vehicle parking spaces which are each equipped with such a device.

Parking lot monitoring systems are known in large numbers of variants. From US 2006/0179671 A1 it is known to project surface markings by means of vertical light fans in order to
15 direct the driver onto the parking space. In US 6 107 942 A a system for occupancy detection of parking spaces on a parking lot is disclosed, wherein on the surface of each parking space a plurality of differently aligned marking lines are painted and each parking space is provided with a camera, which opti-
20 cally detects an occupancy by a vehicle by a covering of the marking lines. To be able to reliably detect a covering of the surface marking, such a camera is mounted as central and as high as possible above the parking space and is thereby not suited to recognize a frontal license plate of the vehicle and
25 thus to monitor the correct parking space usage. Document DE 10 2007 052 819 A1 describes a parking lot where each parking space is equipped with cameras for OCR (Optical Character Recognition) reading the vehicle license plate number of the license plate of the parked vehicle. Such cameras are mounted ap-
30 proximately central on the front side of the parking space to be able to identify a license plate and thereby the vehicle using the parking space. However, they are unable to optically detect the correct parking of the vehicle. Other systems, like induction loops embedded into the floor, require a higher con-

struction effort compared to optical systems and do not give enough accuracy, especially in the parking space boundary area.

It is an object of the invention to create a device for monitoring a parking space, which by means of only one camera unit can monitor the correct parking of the vehicle on the parking space as well as to enable a vehicle identification.

This aim is achieved with a device of the introductorily mentioned type which is characterized by

a lighting unit assigned to the parking space and mounted thereon for projecting a light fan lying in a substantially vertical plane along a boundary of the parking space as a surface marking,

wherein the camera unit lies substantially in the plane of the light fan such that by means thereof an interruption or shadowing of the surface marking is detectable, and has an opening angle which covers both the surface marking and the license plate.

The projected light fan thereby creates a boundary of the parking space in an easy manner; is this boundary interrupted on any position, e.g. by a parking vehicle, the projected surface marking too is interrupted in any case. Such an interruption of the surface marking can be detected by a camera unit which approximately lies in the plane of the light fan and which, compared to the state of the art, is not subject to any significant restrictions relating to its alignment and adjustment on the parking space. Thereby a camera unit known per se can be aligned in such manner that at the same time the license plate of the vehicle parking on the parking space lies in its opening angle and can be recorded. In this way, a monitoring of the parking position of a vehicle on the parking space and a recording of the license plate can be accomplished with only one camera unit and a simple lighting unit.

The lighting unit can project a light fan in an invisible wavelength range, infrared or ultraviolet,

whereby an irritation of the driver of the vehicle as well as the danger of an interference with other light sources is reduced, although preferably the light fan projected by the lighting unit is in the visible wavelength range. Thereby the projected surface markings themselves and a parking in the light fan are recognizable for the driver of the vehicle, too, by means of the interrupted surface markings; also additional painted surface markings can be omitted.

To be able to record the license plate well, the camera unit is preferably mounted at a height between 10 and 120 cm, particularly preferred between 25 and 50 cm.

It is especially advantageous if the lighting unit is mounted above the camera unit. In this manner even higher located parts and superstructures of the vehicle interrupt the light fan if the vehicle is not parked correctly on the parking space.

According to another advantageous embodiment of the invention the camera unit is configured to OCR-read a vehicle license plate number from the license plate. Thereby, especially in the case of parking violations, the registration data of the vehicle is electronically recordable and can be forwarded to further automatic processing.

In a second aspect the invention creates a parking lot with a plurality of parking spaces for vehicles, each parking space being equipped with one of the aforementioned devices, wherein each light fan delimits two neighboring parking spaces from each other. In case of two or more directly adjoining parking spaces on a parking lot one of said devices suffices per parking space to separate the parking spaces from each other and also on both sides.

In a third aspect the invention creates a parking lot with a plurality of parking spaces, each parking space being equipped with one of the aforementioned devices with a camera unit for OCR-reading, for vehicles having license plates with OCR-readable license plate numbers and onboard units with radio

IDs (identifications) that can be read out via radio, which parking lot is characterized by a central computer for storing parking space reservations each comprising a parking space, a license plate number and an assigned radio ID, a radio beacon
5 common to the parking spaces that is positioned at an entrance of the parking lot and serves for reading out the radio ID of an entering vehicle via radio and signaling the radio ID to the central computer, and for every parking space each said device to signal the OCR-read license plate number of a vehicle park-
10 ing thereon to the central computer, wherein the central computer is configured to check whether for a radio ID signaled to the central computer the vehicle license plate number assigned thereto in a stored parking space reservation is subsequently signaled by the camera unit of this parking space, and to log
15 instances in which this is not the case.

The camera units used on the parking spaces can therefore not only serve for an optically checking of the correct parking position of a parking vehicle and for OCR-reading the vehicle license plate number, but additionally enable, in connection
20 with a radio beacon that is able to read out radio onboard units (radio OBUs) of the vehicles at the entrance, a fully automated reservation, clearance and monitoring of a plurality of parking spaces in a parking lot management system. The identification of an entering vehicle takes place via radio, and
25 therefore in a way that is forgery-proof and immune to interference, while the localization and validation of the vehicle in the parking space is once again realized with a high reliability for locating by means of optical recognition (OCR). The combination of centralized radio ID and decentralized optical
30 localization and validation allows a fully automated and highly secure operation of the parking lot that is also immune to interference. In this case, it is also possible to make all known technical functionalities available, such as advance reservations via the Internet, automatic billing of the parking fees,

automatic actions against parking violations, and statistical evaluations.

It is favorable if the camera unit, together with the central computer, detects and logs a covering of the surface marking by a vehicle parking thereon. Thereby a vehicle, which is not parked correctly, is not only detected, but such an incident can also be recorded centrally, be considered in the reservation system and, if necessary, be prosecuted.

A preferred embodiment of the invention is characterized in that an additional camera for OCR-reading the license plate number of an entering vehicle and signaling the license plate number to the central computer is mounted at the entrance, and in that the central computer is further configured to check whether a signaled radio ID and a vehicle license plate number signaled by the additional camera unit are assigned to one another in a parking space reservation, as well as to log instances in which this is not the case. This makes it possible to realize an additional validation stage at the entrance that further increases the protection against misuse of the parking lot.

In order to quickly inform the user, a display panel controlled by the central computer is mounted at the entrance and the central computer is configured to display the parking space that is assigned to a radio ID signaled to the central computer in a parking space reservation on the display panel.

The parking lot according to the invention is suitable for interacting with any type of onboard unit that can be read out via radio such as, e.g., transponders carried by vehicles, RFID chips, etc. The radio beacon preferably is a DSRC radio beacon for reading out onboard units of a DSRC (dedicated short-range communication) road toll system via radio. Due to their limited communication range, which can be restricted to the region of the parking lot entrance, DSRC radio beacons provide an increased immunity to interference and a definite allocation and localization of the onboard unit currently being read out.

According to another aspect, the inventive parking lot solution is particularly suitable for equipping the parking spaces with electric vehicle charging stations ("power service stations") controlled by the central computer, wherein the central computer is further configured to unlock the charging station for charging the vehicle after successfully checking the vehicle license plate number signaled by the camera unit of this parking space. Due to the inventive combination of radio ID and OCR localization of the vehicle, a highly reliable validation of the vehicle located in a parking space is achieved such that the improper use of charging stations such as, e.g., the charging station of an adjacent (unreserved) parking space, is precluded.

The parking space reservation preferably also contains charging parameters that are specific to the vehicle and transmitted to the charging station by the central computer. Such charging parameters may, for example, be input into the central computer during the reservation of the parking space by the user or -preferably - be read out from the onboard unit by the radio beacon and automatically added to the parking space reservation. For this purpose, charging parameters that are specific to the vehicle are correspondingly stored in the onboard unit such that they can be read out via radio.

This feature is particularly advantageous if the user did not reserve a parking space in advance, but rather directly makes an "ad-hoc" parking space reservation at the entrance, e.g., in order to immediately utilize a currently available parking space with a charging station. All charging parameters that are specific to the vehicle are stored locally in the onboard unit and therefore are immediately available to the charging station. This eliminates the need to query any user data from remote superordinate centers, e.g., via data lines, since such queries would be disadvantageous for an ad-hoc parking space reservation due to the fact that they usually require a longer period of time.

The utilization of a camera unit for the localization of a vehicle in a parking space equipped with a charging station by means of OCR also provides the option of simultaneously using the camera unit for monitoring the charging process, in that the camera unit records a thermal image of the vehicle during the charging process in order to trigger an alarm if a maximum temperature is exceeded. This makes it possible to prevent dangerous overheating caused, e.g., by defective vehicle batteries or faulty charging processes.

The invention is described in greater detail hereinafter with reference to exemplary embodiments that are illustrated in the attached drawings. In the drawings

Fig. 1 shows a schematic perspective view of an inventive parking lot, together with electrical components that are illustrated in the form of a block diagram;

Fig. 2 shows a schematic top view of adjoining parking spaces of the parking lot of Fig. 1, each equipped with a device according to the invention; and

Fig. 3 shows a schematic side view of one of the parking spaces of Fig. 2.

Figure 1 shows a parking lot 1 with a plurality of parking spaces 2 for one respective vehicle 3. The parking spaces 2 can be reached from an adjacent traffic area 4 through a common entrance 5. For example, the entrance 5 is provided with a barrier 6, but this barrier is not absolutely imperative. The individual parking spaces 2 are respectively partitioned or separated from one another by surface markings 7, 7'. For example, the surface markings 7 may be applied on the ground with paint or-like the surface markings 7' - projected on the ground in the form of light markings by one or more lighting units 8, e.g., in the form of light fans 9 as will be discussed in more detail later.

Each of the vehicles 3 that use the parking lot 1 conventionally has one or more license plates 10 on which its license plate number 11 is printed in an optically readable fashion.

The vehicles 3 furthermore carry onboard units (OBUs) 12 that can be queried via radio and consist, for example, of onboard units that are used in electronic road toll systems and respectively have a distinct radio ID 14 (OBU-ID) that can be read out via radio. The radio ID 14 usually identifies (only) the onboard unit 12, but may also directly correspond to or contain the license plate number 11 of the vehicle. The onboard units 12 may consist of separate devices or respectively form part of the electronic system of the vehicles 3.

In addition, a radio beacon 15 is arranged at the entrance 5 in order to read out (arrow 16) the radio ID 14 of the onboard unit 12 of an entering vehicle 3 via radio. The radio beacon 15 preferably has a radio coverage area 13 that is restricted to the region of the entrance 5.

It goes without saying that the radio beacon 15 may also have several distributed radio units, e.g., for an entrance 5 with several lanes, to which a separate radio unit with a radio coverage area restricted to this lane is respectively assigned.

The radio communication 16 for reading out the radio ID 14 via radio preferably takes place in accordance with the DSRC standard (dedicated short-range communication), wherein the radio beacon 15 accordingly consists of a DSRC radio beacon and the onboard unit 12 consists of a DSRC OBU. Alternatively, the radio communication 16 could also take place in accordance with other short-range communication standards such as, e.g., WLAN (wireless local area network), WAVE (wireless access in a vehicle environment), Bluetooth®, RFID (radio frequency identification), NFC (near field communication), etc.

A camera unit 17 for optically reading the license plate number 11 of an entering vehicle 3 is furthermore mounted at the entrance 5. The radio beacon 15 and the camera unit 17 of the entrance 5 are connected to a central computer 18 of the parking lot 1. The radio beacon 15 signals a radio ID 14 queried by the radio beacon via radio to the central computer 18

and the camera unit 17 also signals a vehicle license plate number 11 read by the camera unit to the central computer 18.

The vehicle license plate number 11 read by the camera unit 17 is preferably converted into an alphanumerical value by means of optical character recognition (OCR) and signaled to the central computer 18. It goes without saying that the OCR evaluation algorithm may also be executed on the central computer 18; in this case, the corresponding OCR components of the central computer 18 are also considered to be components of the camera unit 17 if they are not directly implemented therein.

If a barrier 6 is provided, it can also be actuated by the central computer 18.

The central computer 18 features a database 19 with parking space reservations 20 that respectively contain a number or a location of a parking space 2, as well as a vehicle license plate number 11 and a radio ID 14 of a vehicle 3 assigned to this license plate number. For example, the parking space reservations 20 can be entered into the database 19 by the user in advance, e.g., via a web interface 21 of the central computer 18 or its database 19.

When a vehicle 3 enters the parking lot, the radio beacon 15 signals the radio ID 14 of the vehicle 3 to the central computer 18 and the central computer determines the parking space reservation 20 in the database 19 that is associated with the radio ID 14. If the (optional) camera unit 17 is provided, this camera unit can also signal the vehicle license plate number 11 read by means of OCR to the central computer 18 and the central computer can cross-check the vehicle license plate number 11 with the vehicle license plate number stored in the parking space reservation 20.

After a parking space reservation 20 has been validated for the signaled radio ID 14 and the vehicle license plate number 11 optionally has been successfully cross-checked, the central computer 18 actuates the barrier 6 such that it opens-if such a barrier is provided in the first place. Furthermore, the

central computer 18 can display the parking space reservation 20 to the user of the vehicle 3 on a display panel 22 at the entrance 5, e.g., in order to provide the user of the vehicle with visual information concerning the number or the location of the parking space 2. One or more display panels 22 may also be arranged at the parking spaces 2 in order to direct the driver to the respectively reserved parking space.

Instead of the described validation of an "advance" parking space reservation, it would alternatively also be possible to directly make an "ad-hoc" parking space reservation at the entrance 5. In this case, the radio beacon 15 signals the radio ID 14 queried via radio to the central computer 18 and the camera unit 17 signals the vehicle license plate number 11 read by means of OCR to the central computer, wherein the central computer then determines an available parking space 2 and assigns the radio ID 14, the vehicle license plate number 11 and the number of the parking space 2 to one another in a parking space reservation 20 in the database 19.

If the radio ID 14 directly corresponds to or contains the vehicle license plate number 11, a parking space reservation 20 can already be generated based on the radio ID 14 signaled to the central computer 18 only; in this case, the (optional) camera unit 17 can be used for cross-checking the vehicle license plate number 11 indicated in the radio ID 14 with the vehicle license plate number 11 in the central computer 18 that was read by means of OCR.

The user subsequently drives the vehicle 3 to the respectively reserved parking space 2. Each parking space 2 is equipped with its own camera unit 23 that reads the license plate number 11 of the vehicle parking in the respective parking space (or entering the parking space, which is considered to also be encompassed by the term "parking" in this context) by means of OCR. The camera units 23 of the parking spaces 2 respectively signal the vehicle license plate numbers 11 read by means of OCR to the central computer 18, wherein the OCR al-

gorithms may also be executed on the central computer 18 since it is also to be encompassed by the term "OCR camera units" 23.

After the radio beacon 15 signals a radio ID 14, the central computer 18 is programmed for checking whether the camera unit 23 of the parking space 2 indicated in the parking space reservation 20 together with this radio ID 14 subsequently also signals the vehicle license plate number 11 indicated in this parking space reservation 20—preferably within a predetermined period of time. If this is the case, the respective car is properly parked and the parking fees can also be correspondingly calculated, e.g., by the central computer 18. If this is not the case, the vehicle 3 obviously has reached an incorrect parking space 2 and this fact is at least logged by the central computer 18; optionally, corresponding alarms, warning messages, or warning announcements can be output with loudspeakers or displayed on information panels 24 of the parking spaces 2.

The readout 16 of the radio ID 14 via radio by means of the radio beacon 15 therefore ensures identification of an entering vehicle 3, which [identification] is immune to interference, and the OCR camera units 23 of the parking spaces 2 ensure a precise localization and validation of the parked vehicle 3.

The camera units 23 may furthermore be used for checking the correct parking position or parking state of the vehicles 3 in the parking spaces 2 in that they optically monitor and evaluate the surface markings 7, 7'.

According to Figs. 2 and 3 a lighting unit 8, 8', 8" is mounted on a parking space 2, especially above the camera unit 23. It casts a light fan 9 along one of the boundaries of the parking space 2 to which it is assigned, in this case to its lateral boundaries, in an approximately vertical plane onto the surface of the parking lot 1. The light fan 9 can be generated by the lighting unit 8, 8', 8" e.g. by a filament lamp or a light emitting diode where a slit aperture or cylindrical lens, respectively, is connected downstream thereof or can be gener-

ated by a laser scanner. Depending on the wavelength used, the lighting unit 8, 8', 8" projects a visible or invisible surface marking 7' onto the boundary of the parking space 2. Additionally to the projected surface marking 7' a surface marking 7 can, if desired, be applied onto the surface of the parking lot 1 with paint.

Every opaque object in the light fan 9, e.g. a vehicle 3 parked therein, leads to an interruption of the light fan 9 and thereby to an - at least partial - shadowing or interruption, respectively, of the surface marking 7'. To detect such an interruption or shadowing of the surface marking 7', the camera unit 23 lies approximately in the plane of the light fan 9 and has at least such an opening angle α and such an orientation, that it records the image of the surface marking 7' in e.g. one border area of its opening angle α , while at the same time it records the frontal license plate 10 of the vehicle 3 parked on the parking space 2 e.g. in the other border area of its opening angle α . If applicable, the camera unit 23 could also be tilted for this purpose, so that its image recording depicts the horizontal sloped. To be able to record the image of a vehicle license plate number 10 well, the camera unit 23 lies preferably on approximately the height of a usual license plate 10, i.e. at a height between 10 and 120 cm, preferably between 25 and 50 cm.

In the present disclosure the "opening angle α " of the camera unit 23 comprises both the horizontal as well as the vertical extent is also comprised within. The opening angle α can define a cone-shaped solid angle; in the field of optical image recording with cameras often a rectangular image section is pictured so that the opening angle α usually defines a pyramid-shaped field of view with a rectangular base, in whose apex the camera unit 23 lies. In this case the vertical and horizontal extents of the opening angle α can differ from each other, even though this is not compulsory. In any case, the opening angle α is given by the focal width of the camera optics of the

camera unit 23; the choice of the focal width suitable for this purpose is known to the person skilled in the art of camera technology.

5 If the camera unit 23 - if applicable together with the central computer 18 - detects a shadowing or interruption, respectively of the surface marking 7' by a vehicle 3 parking thereon, this can be logged or reported, respectively. Such a report can comprise an optical and/or acoustic signal at the parking space 2, e.g. on an information panel 24 or via speak-
10 ers, so that the driver of the vehicle can change the position or respectively the orientation of his/her vehicle 3 on the parking space 2. The report can be sent from the camera unit 23 to the central computer 18, which in turn can mark the parking space 2 as occupied and, if applicable, sanction an incorrect
15 parking on the basis of the OCR-read vehicle license plate number 10.

As evident from Fig. 2, for a parking lot 1 with a plurality of parking spaces 2 one device each with a camera unit 23 and a lighting unit 8, 8', 8" suffices to delimit two neigh-
20 bouring parking spaces 2 from each other.

Figs. 2 and 3 show that the lighting unit 8, 8', 8" is mounted as lighting unit 8 approximately directly above the camera unit 23; as lighting unit 8' approximately central of the parking space; or as lighting unit 8" at the end of the
25 parking space 2 opposite to the camera unit 23 or at a different position above the boundary of the parking space 2, preferably above the camera unit 23. There can also be two or more lighting units 8, 8', 8" for each parking space 2, which all project their lighting fans 9 approximately in the same verti-
30 cal plane as surface markings 7' and each work with different wavelengths and/or are individually and alternately timed in succession to differentiate them from one another.

One or more parking spaces 2 may furthermore be equipped with charging stations 25 ("power service stations") for elec-
35 trically charging the parking vehicles 3 via a charging cable

26. In this case, the central computer 18 may be programmed for releasing the charging station 25 in order to charge the vehicle 3 after a successful radio ID and OCR localization and validation of the vehicle 3 in the parking space 2, i.e., if the
5 radio ID 14, the vehicle license plate number 11 and the parking space number are assigned to one another in the parking space reservation 20.

For this purpose, the radio beacon 15 may also read charging parameters that are specific to the vehicle such as the
10 charging current, the charging characteristics, etc., from the onboard unit 12 via radio and signal these charging parameters to the central computer 18, which in turn transmits said parameters to the corresponding charging station 25. Alternatively, charging parameters that are specific to the vehicle may also
15 be fed into the database 19, e.g., via the web interface 21, and added to the parking space reservations 20. If the user already is a registered customer of the parking lot, the data may have already been stored in the database 19 of the central computer 18 when the OBU was issued to the user.

20 In parking spaces 2 with charging stations 25, the camera units 23 assigned to the parking spaces 2 can also be used for monitoring the charging process of the vehicle 3, particularly for detecting overheating or fires. For this purpose, the camera units 23 may optically detect, e.g., a development of excessive light (fire) or additionally record a thermal image of
25 the parked vehicle 3 in order to trigger an alarm and/or immediately shut off the charging station 25 when a maximum temperature is exceeded in the thermal image.

The invention is not limited to the illustrated embodiments
30 but encompasses all variations and modifications which fall within the scope of the appended claims.

Claims:

1. Device for monitoring a parking space for a vehicle, having a camera unit assigned to the parking space and mounted thereon to record a picture of a frontal license plate of the vehicle, characterized by

a lighting unit (8, 8', 8") assigned to the parking space (2) and mounted thereon for projecting a light fan (9) lying in a substantially vertical plane along a boundary of the parking space (2) as a surface marking (7'),

wherein the camera unit (23) lies substantially in the plane of the light fan (9) such that by means thereof an interruption or shadowing of the surface marking is detectable, and has an opening angle (α) which covers both the surface marking (7, 7') and the license plate.

2. Device according to claim 1, characterized in that the light fan (9) projected by the lighting unit (8, 8', 8") is in the visible wavelength range.

3. Device according to claim 1 or 2, characterized in that the camera unit (23) is mounted at a height between 10 and 120 cm, preferably between 25 and 50 cm.

4. Device according to one of the claims 1 to 3, characterized in that the lighting unit (8, 8', 8") is mounted above the camera unit (23).

5. Device according to one of the claims 1 to 4, characterized in that the camera unit (23) is configured to OCR-read a vehicle license plate number (11) from the license plate (10).

6. Parking lot with a plurality of parking spaces (2) for vehicles (3), each parking space (2) being equipped with a device according to one of the claims 1 to 5, wherein each light fan (9) delimits two neighboring parking spaces (2) from each other.

7. Parking lot with a plurality of parking spaces, each parking space being equipped with a device according to claim

5, for vehicles that have license plates (10) with OCR-readable license plate numbers and onboard units with radio IDs that can be read out via radio, characterized by

5 a central computer (18) for storing parking space reservations (20) each comprising a parking space (2), a license plate number (11) and an assigned radio ID (14),

10 a radio beacon (15) common to the parking spaces (2) that is positioned at an entrance (5) of the parking lot (1) and serves for reading out (16) the radio ID (14) of an entering vehicle (3) via radio and correspondingly signaling the radio ID (14) to the central computer (18), and

for every parking space (2) each said device to signal the OCR-read license plate number (11) of a vehicle (3) parking thereon to a central computer (18),

15 wherein the central computer (18) is configured to check whether for a radio ID (14) signaled to the central computer the vehicle license plate number (11) assigned thereto in a stored parking space reservation (20) is subsequently signaled by the camera unit (23) of this parking space (2), and to log
20 instances in which this is not the case.

8. Parking lot according to claim 7, characterized in that the camera unit (23) together with the central computer (18) detects and logs a covering of the surface marking (7, 7') by a vehicle (3) parking thereon.

25 9. Parking lot according to claim 7 or 8, characterized in that an additional camera unit (17) for OCR-reading the license plate number (11) of an entering vehicle (3) and signaling the license plate number (11) to the central computer (18) is mounted at the entrance (5), and in that the central com-
30 puter (18) is further configured to check whether a signaled radio ID (14) and a vehicle license plate number (11) signaled by the additional camera unit (17) are assigned to one another in a parking space reservation (20), and to log instances in which this is not the case.

10. Parking lot according to one of the claims 7 to 9, characterized in that a display panel (22) controlled by the central computer (18) is mounted at the entrance (5), and in that the central computer (18) is configured to display the parking space (2) that is assigned to a radio ID (14) signaled to the central computer (18) in a parking space reservation (20) on the display panel (22).

11. Parking lot according to one of the claims 7 to 10, characterized in that the radio beacon (15) is a DSRC radio beacon for reading out (16) onboard units (12) of a DSRC road toll system via radio.

12. Parking lot according to one of the claims 7 to 11, characterized in that at least one parking space (2) is equipped with an electric vehicle charging station (25) controlled by the central computer (18), wherein the central computer (18) is further configured to unlock the charging station (25) for charging the vehicle after successfully checking the vehicle license plate number signaled by the camera unit (23) of this parking space (2).

13. Parking lot according to claim 12, characterized in that the parking space reservation (20) for said parking space (2) contains charging parameters that are specific to the vehicle and transmitted to the charging station (25) by the central computer (18).

14. Parking lot according to claim 13, characterized in that the vehicle-specific charging parameters are read from the onboard unit (12) by the radio beacon (15) and added to the parking space reservation (20).

15. Parking lot according to one of the claims 12 to 14, characterized in that the camera unit (23) of said parking space (2) also records a thermal image of the vehicle (3) during the charging process in order to trigger an alarm if a maximum temperature is exceeded.