Method and apparatus for a makeshift car park

TECHNICAL FIELD

[001] This invention concerns providing for the management or operation of a makeshift car park on an open or covered space such as a street closed off for the occasion, park, field, or hanger in the event of an exhibition, fair, public gathering and the like. A method for managing the makeshift car park and an apparatus to be used by the method or in the car park are disclosed.

PRIOR ART

[002] A number of prior art documents are available on car parking management or operation, particularly those that involves automating certain processes thereof, such as admittance of car, time-keeping for billing purposes, license plate registration, security clearance and directing to the designated parking lot. Most of these sophisticated methods and apparatuses, however, require some of the machines and devices to be installed permanently at site which makes portability of operation or adapting them to manage a makeshift car park impossible.

[003] In U.S. Patent No. **7,330,131** (Zanotti) provides for an integrated automatic parking system wherein mobile recognition of a car may be made by the system from transponder devices installed in the car (e.g. for public toll payment) using a sensor housed in a pole-like housing which the car passes at admittance. Although there is mentioned of a control centre and networking for data processing, there is no disclosure on monitoring or assigning parking within a designated lot for the car, it is evident that the parking lots are permanent and does not require such features.

[004] The detection and notification of available parking space by remote means, such as GPS navigation, has been disclosed in U.S. Reissue Patent No. **RE 40,013** (Quinn)**.** In this prior art, detector devices are placed at each parking lot which could sense the presence or absence of a car and transmit the lot's location and status to a computer network. With the network linked to a GPS system, a driver searching for a vacant lot in the area may be guided by his GPS navigation device to the particular lot based on an integrated electronic street map which may not be able to be updated impromptu for a makeshift car park.

[005] A sophisticated automated car parking high security system is disclosed in U.S. Patent No. **7,119,674** (Sefton) wherein features such as license plate number imaging and character recognition, time/date stamping of admittance and exit, etc. are provided to manage a car park divided into high security zone, normal security zone and visitors areas. Needless to say, such system can only be implemented in a permanent and highly delineated car park area.

[006] Guidance to a designated or vacant lot by way of directional lighting provided by guidance modules affixed on the ground is disclosed in U.S. Patent No. **6,917,307** (Li). A single electronic display board is placed at the entrance to give the driver a general plan view of the vacant or designated lot. The guidance modules as well as the vehicle sensor at each lot are also installed on a permanent basis and are not suitable for makeshift operation.

SUMMARY OF DISCLOSURE

[007] We endeavour to provide for a method and apparatus for managing a makeshift car park without the aforesaid prior art needs for permanent features at the site. In one aspect of our invention, a method is provided for managing a plurality of parking lots in a makeshift car park, wherein the method comprising the steps of (a) delineating each parking lot boundaries physically with an elongate casing which houses electronic means including sensing means, audio and visual

output means, and radio frequency transceiving means; (b) monitoring said parking lot boundaries by sensing cars being parked within each parking lot with said sensing means; and (c) providing audio and/or visual output in relation to aforesaid monitoring.

[008] In one preferred embodiment, the sensing means includes at least one of a proximity sensing and magnetic sensing. Preferably, the audio and/or visual output includes at least one of emitting alarm sounds and emitting light, including light-emitting diode (LED) displays.

[009] In an alternative embodiment, the method further includes the step of (d) transceiving information arising from said monitoring between said electronic means and a central control unit. Preferably, the transceiving is carried out via radio frequency (RF) transmission.

[010] Another aspect of our invention is to provide an apparatus for managing a plurality of parking lots in a makeshift car park, comprising at least a lot divider unit comprising at least one of a proximity sensor and magnetic sensor, and audio and/or light-generating signal output means; at least a lot indicator unit comprising at least a display capable of displaying a pre-designated lot number and/or status or message in for a driver parking in the designated lot; wherein the lot divider unit senses a car's position in the parking lot, processes the sensed information and generates the appropriate audio and/or light signal output, and/or communicates with said lot indicator unit accordingly.

[011] Preferably, the lot divider unit is substantially encased in a housing sufficiently sturdy to withstand at least a car's curb weight and is capable of generating audio and/or light signal, including any one or combination of buzzer or alarm sound and LED light if the car is sensed not to have been parked properly within the lot.

[012] In one alternative embodiment, the communication between the lot divider unit and the lot indicator unit is conducted via wireless means. In another embodiment, a plurality of said lot divider unit and a plurality of said lot indicator unit are in further communication with a central control unit providing centralized information and control of the parking operation of said makeshift car park.

LIST OF ACCOMPANYING DRAWINGS

[013] Our invention may be better understood when described in detailed with reference to the following accompany drawings depicting various aspects and embodiments of our method and apparatus in an exemplary and non-limiting manner in which:

[014] FIGURE 1 shows an example of a temporary or makeshift car park layout according to our invention;

[015] FIGURE 2(a) and FIGURE 2(b) represent the perspective and elevation views of a lot divider unit according to our invention;

[016] FIGURE 3 shows a schematic representation of a lot indicator unit's display in perspective view;

[017] FIGURE 4 depicts a schematic block diagram of the inputs and outputs of the various devices according to our invention;

[018] FIGURE 5 exemplifies a schematic block diagram of the inputs and outputs of certain devices with a lot indicator unit according to our invention;

[019] FIGURE 6 illustrates a block diagram of wireless communication between the components of our system; and

[020] FIGURE 7 illustrates a second makeshift car park layout according to another embodiment of our invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[021] As a general or basic embodiment of our invention, our method for managing a plurality of parking lots in a makeshift car park comprises, briefly, delineating each parking lot, monitoring the boundaries of the parking lot as the cars are being driven and park therein, and providing audio and/or visual signal to guide the driver and/or inform the car park operator of the status of the car being parked. The delineating step would require the parking lot boundaries to be indicated at least visually, if not in form of a physical presence, to the approaching driver in his car.

[022] As shown in FIGURE 1, wherein an example of a temporary or makeshift car park layout according to our invention is depicted, the boundaries may be established by placing a lot divider unit (10) along the longitudinal boundaries and a lot indicator unit (40) along the latitudinal closed-end boundary. As the longitudinal boundaries are susceptible to overruns by car wheels, the lot divider unit is preferably encased, at least a substantial portion of it, in a housing that is sufficiently sturdy to withstand a typical car's curb weight. FIGURE 2(a) show a proposed elongate housing shape having a trapezoidal profile, as shown in elevation view in FIGURE 2(b), to minimize bumpy effects of car wheels overrunning the lot indicator unit.

[023] The lot divider unit (10) houses electronic means including sensing means, audio and visual output means, and radio frequency transceiving means. The sensing means are meant for detecting the presence or absence of a car in the lot and may include at least one of a proximity sensing and magnetic sensing whereby the metallic material of the car may be detected as a result of changes in inductance values registered by the sensing device. The proximity or magnetic

sensor (12) may be provided at both ends of the lot divider unit housing with openings provided through the housing to enable the detection without being hindered by the thick housing structure. The placing of the sensors (12) at both ends of the lot divider unit (10) may also assist in determining if a car is parked well within the lot.

[024] The trapezoidal profile or cross-section of the lot divider unit housing also determines the direction of exposure of the openings through which the sensors (12) are directed to such that their sensing direction may be determined and thus the position of a parked car with respect to the lot boundary, i.e. as delineated by the lot divider unit housing (10) may be estimated. For example, if the side sensors (16) detects the presence, but the top sensor (14) is unable to detect, the car may be said to be parked well within its lot, such as the vehicle shown in the lower left corner of FIG. 1.

[025] If the top sensor (14) is able to detect as well, the car may be too close to the boundary for comfort or may have in fact bump over the lot divider unit and leave too little room for, or may even have protrude into, the adjacent lot such as the vehicle shown in lower right corner of FIG. 1. When such bad parking is detected, audio and/or visual output means (20) may be provided in the form of alarm sound, buzzer, light-emitting devices such as LED in red or amber to warn the driver to re-park the car. Alternatively, confirmation of good or acceptable parking may also be provided by green light. A simplified schematic block diagram of the inputs and outputs of the various devices in the lot divider unit (10) is shown interacting with a micro-controller in FIGURE 4.

[026] In an alternative embodiment, the parking status information may also be relayed to the lot indicator unit (40) which is a display unit shown graphically in FIGURE 3. Usually, the display of the lot indicator unit (40) may show the lot number. As the driver moves the car into the lot, detection by the sensors (12) of the lot divider unit (10) may be processed and transmitted optionally to switching the lot indicator unit's (40) mode from "LOT # DISPLAY" to "GUIDANCE" so that

visual signal or words may be displayed to within sight of the driver to inform of the status of his parking. Due to the close proximity of the parking lots, it is preferred that the communication between the lot divider unit (10) and the lot indicator unit (40) be wireless but require line of sight such as infra-red transmission of signals. Alternatively, radio frequency (RF) mode may be employed to communicate between the respective RF modules of the lot indicator unit (40) and the lot divider unit (10) as shown in FIGURE 5.

[027] As a preferred embodiment, with multiple units of the lot divider and lot indicator units being used, the monitoring and control of the status of each lot may be better processed with a central control unit or server (45) as illustrated in FIGURE 6. In this configuration, the communication may be further extended to including transceiving information arising from the electronic monitoring means between a number of lot divider units (10) and their respective lot indicator units (40) with the central control unit (45). The transceiving may be conducted over radio frequency. The central control unit (45) may thus process the information received from multiple units and present the information to the operator and would be able to pinpoint the locations where personnel is required to take intervention such as when a car is not being parked properly, etc. and thus manpower needs is reduced and parking capacity maximized.

[028] A further improvement to the invention may be made in respect of reducing the number of hardware pieces required from the present 2 pieces (lot divider and lot indicator) to a single piece wherein the features of both may be integrated in a single integrated housing (70) as shown in FIGURE 7. The integrated housing (70) may incorporates pairs of first parking space sensors (72) spaced apart at a distance equivalent to the latitudinal space (or width) of the parking lot. The first parking space sensors (72) may be designed to detect a space of a distance equivalent to the longitudinal length of the parking lot so that any obstruction detected along the strip of space would indicate that a car was not being parked properly such as in the case of sensor (72a).

[029] A second parking space sensor (74) may be provided at about the centre in between the pairs of first parking space sensors (72). The second parking space sensor (74) may be able to detect the absence or presence of the car in the parking lot. It may also be calibrated to detect the car being parked too far away from it (such as for sensor (74a) would raise an alarm for improper parking, i.e. part of the car might protrude into the driveway.

[030] The parking space sensors (72, 74) may be any one of an induction coil-type sensor, or electromagnetic sensor accustomed to detect using ultrasonic, infrared or microwave spectrums depending on the range and diffusion desired. Moreover, the timing of the detection may also be set so that a certain threshold of detection time range may be set to distinguish between a transient human feet movement and the car's longer stay put position.

[031] For better visibility, poles with LED and lighted display of numbers may be inserted via screw-type or bayonet-type adapter holes provided on housing (70). The poles should be of a height above a typical car's bonnet for good visibility and the LED at the top of the pole may be set to light up in different colours according to status. E.g. it may emit green light to indicate that it is vacant, flashing red if obstruction in between space is detected (indicating that the car is parked improperly) and switched off if the car is detected to have been parked well.

[032] Although our integrated housing (70) is shown as an elongate casing spanning 4 parking lots or longer, it may be designed as modular shorter housing with end-to-end serial connection with some pivotal freedom at the serial joints to cater for terrain contour and laying the modular units around a corner. Another possible variation is to provide the housing for the longitudinal edge of the parking lot so that they may be laid along a street curb for parallel parking, although the foregoing description and drawing illustrate only for straight-in or L-parking. The length of the housing is also to be considered for ease of dismantling, packing and transportation in a truck or van.

[033] Apart from such possible variations, there are many other possible modifications, substitutions, adaptations or additions to the above-described method, devices and components which have not been described herein but which a person skilled in the art may perform to achieve our present invention based on the same working principles and concept. These are to be considered as falling within the letter and scope of the following claims.

CLAIMS

1. A method for managing a plurality of parking lots in a makeshift car park, wherein the method comprising the steps of:

(a) delineating each parking lot boundaries physically with an elongate casing which houses electronic means including sensing means, audio and visual output means, and radio frequency transceiving means;

(b) monitoring said parking lot boundaries by sensing cars being parked within each parking lot with said sensing means; and

(c) providing audio and/or visual output in relation to aforesaid monitoring.

2. A method for managing a plurality of parking lots in a makeshift car park according to Claim 1 wherein the method further includes the step of:

(d) transceiving information arising from said monitoring between said electronic means and a central control unit.

3. A method for managing a plurality of parking lots in a makeshift car park according to Claim 1 wherein the sensing means includes at least one of a proximity sensing and magnetic sensing.

4. A method for managing a plurality of parking lots in a makeshift car park according to Claim 1 wherein the audio and/or visual output includes at least one of emitting alarm sounds and emitting light, including light-emitting diode (LED) displays.

5. A method for managing a plurality of parking lots in a makeshift car park according to Claim 2 wherein the transceiving is carried out via radio frequency (RF) transmission.

6. An apparatus for managing a plurality of parking lots in a makeshift car park, comprising:

- at least a lot divider unit comprising at least one of a proximity sensor and magnetic sensor, and audio and/or light-generating signal output means;
- at least a lot indicator unit comprising at least a display capable of displaying a pre-designated lot number and/or status or message in for a driver parking in the designated lot;

wherein the lot divider unit senses a car's position in the parking lot, processes the sensed information and generates the appropriate audio and/or light signal output, and/or communicates with said lot indicator unit accordingly.

7. An apparatus for managing a plurality of parking lots in a makeshift car park according to Claim 6 wherein the lot divider unit is substantially encased in a housing sufficiently sturdy to withstand at least a car's curb weight.

8. An apparatus for managing a plurality of parking lots in a makeshift car park according to Claim 6 wherein the lot divider unit generates audio and/or light signal, including any one or combination of buzzer or alarm sound and LED light if the car is sensed not to have been parked properly within the lot.

9. An apparatus for managing a plurality of parking lots in a makeshift car park according to Claim 6 wherein the communication between the lot divider unit and the lot indicator unit is conducted via wireless means.

10. An apparatus for managing a plurality of parking lots in a makeshift car park according to Claim 6 wherein a plurality of said lot divider unit and a plurality of said lot indicator unit are in further communication with a central control unit providing centralized information and control of the parking operation of said makeshift car park.

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