













In one aspect of the invention, the payment data further includes the remaining time before the current vehicle parked in the parking space becomes a violation.

In a further aspect of the invention, the payment data further includes the policy in effect for the vehicle currently parked in the parking space, where the policy in effect includes information as to whether a vehicle is subject to an exempt or reduced rate payment structure, where the exemption includes a handicapped placard or a city vehicle.

In yet another aspect of the invention, the payment data further includes a broken meter status, a jammed meter status, no communication meter status, expired meter status, paid meter status, meter under maintenance status, or unable to accept payment meter status.

According to another aspect of the invention, a paid status is determined based on an in-car wireless mobile platform, where the paid status is entered into the wireless mobile platform by the PEO.

According to a further aspect of the invention, the central server sends information to each wireless mobile platform, where the information can include the current locations of one or more other wireless mobile platforms, the information from prior wireless mobile platform observations at given locations, parking policy information, historical parking trends, distance from the wireless mobile platform location to likely violations, predicted travel time from the wireless mobile platform location to likely violations, and providing the wireless mobile platform with views of locations which have a high likelihood of being ticketable violations.

In yet another aspect of the invention, the parking occupancy data and parking payment data further includes guidance information to the PEO for a maximization of citation revenue or other enforcement objectives, where the guidance information can include occupancy levels, occupancy of particular space types, demand for parking spaces in a region, or street traffic in surrounding areas of the parking space.

According to one aspect of the invention, a performance metric is provided to PEO management from the central server, where the performance metric includes a number of tickets written per hour, a total number of tickets written, a percentage of violations visited, or average time between violation and an officer action.

In a further aspect of the invention, the parking payment data further includes an expiration time of payment, or an open-ended payment that includes a user paying for a duration of use of a parking space, where the paying of the duration of use concludes once a time limit is reached or when the user manually terminates the payment.

According to another aspect of the invention, the wireless mobile platform displays removed potential violations, where the potential violations are removed either when the violating vehicle leaves the space or the violation is market by the PEO, where the potential violation includes expired meters, exceeding a time limit for a time-limited parking space, or parking in no parking zone.

In a further aspect of the invention, the status of the potential violation can include the time of visit by the PEO, issuance of a citation, physical verification of whether a car is present and a space is unpaid, presence of exempting permit or placard, and a reason for the PEO not to issue a citation.

According to another aspect of the invention, a user interface of the wireless mobile platform includes a two-level user display, where a first level includes a map disposed to present view of all blocks or sides of blocks in an area showing the value of each based on the current number and seriousness of the potential violations, or on an estimate of the, number and seriousness of actual violations based on the historical breakdown of actual vs. potential violations for that



arrival, sensor delay, occupied, vacant, and/or indeterminate.

In a further aspect of the invention, the payment reporting system provides real-time information relating to the payment for parking spaces managed by the system that can include the quantity of payment or payment and expiration times for the corresponding individual spaces that are being managed by the system, where the payment may be provided by a single or multi-space meter, by a server connected to one or more meters, by a pay-by-cell system, or may be entered into the system by the PEO. The information relating to the payment for parking spaces managed by the system can also include the remaining time before the current vehicle parked in the space becomes a violation, and the policy in effect for the vehicle currently parked in the space such as whether the vehicle is claimed to be subject to any sort of exempt or reduced rate payment structure (for example, handicapped placards, or city vehicles). The information relating to the payment for parking spaces managed by the system can also include accurately time-stamped changes in status of the meters or payment systems for individual spaces under management. Such status information may include broken meter, jammed meter, no communication from the meter, expired meter, paid meter, meter under maintenance, or meter unable to accept payment.

The wireless mobile platforms collect and process data that includes the information from the central server and archive engine, the current locations of one or more wireless mobile platforms (if available), the information from prior wireless mobile platforms data inputs (observations) at given locations, as entered by the PEO, or inferred from PEO actions and locations, parking policy information, historical parking trends, distance and or travel time from the current PEO locations to likely violations and presenting the end-user PEO with views of locations which have a high likelihood of being ticketable violations. The wireless mobile platforms may further accept and archive one or more of user actions or user location in the central DB store.

In a further aspect of the invention, the status of the potential violation can include the time of visit by the PEO, issuance of a citation, physical verification of whether a car is present and a space is unpaid, presence of exempting permit or placard, and a reason for the PEO not to issue a citation.

Other presentations of data by the wireless mobile platforms may also be based on or include a maximization of citation revenue, occupancy levels and demand for spaces in a region, street traffic in surrounding areas, other wireless mobile platforms locations or actions, availability of limited resources, such as handicap spaces, or other goals set by the supervisor. According to other embodiments, further presentations of data by the wireless mobile platforms can include predicted or user-specified locations and/or user-specified or inferred next destinations for other users of the system, a performance metric, for example the number of tickets written per hour, total number of tickets written, percentage of violations visited, or average time between violation and officer actions. In a further embodiment, additional presentations of data by the wireless mobile platforms include space, block, block face, or zone or district level violation counts or heat-maps, dynamic targeting policy such as using historical data to increase the probability of citing handicap violators, fraud likelihood indication, or proper functioning of parking meter(s) for that space.

In a further embodiment of the invention, referencing communication of state or status can include communication of state changes, or periodic communication of the current state.

Referring now to the figures, FIGS. 1a-1b show schematic drawings of the a real-time wireless parking enforcement system 100, which includes remote parking meter monitoring system 102 having a plurality of parking sensors 104 disposed to gather parking occupancy data and parking payment data.

In one embodiment, the remote parking meter monitoring system 102 can include a multi-hopping grid mesh network 106 having a meter-based server 107 connected to one or more meters, where each parking sensor 104 is integrated to the parking meter 105 and has a communication region 108, where the communication region 108 includes a distance of at least to one adjacent parking sensor 104 for low-power operation. As shown, the communication regions



