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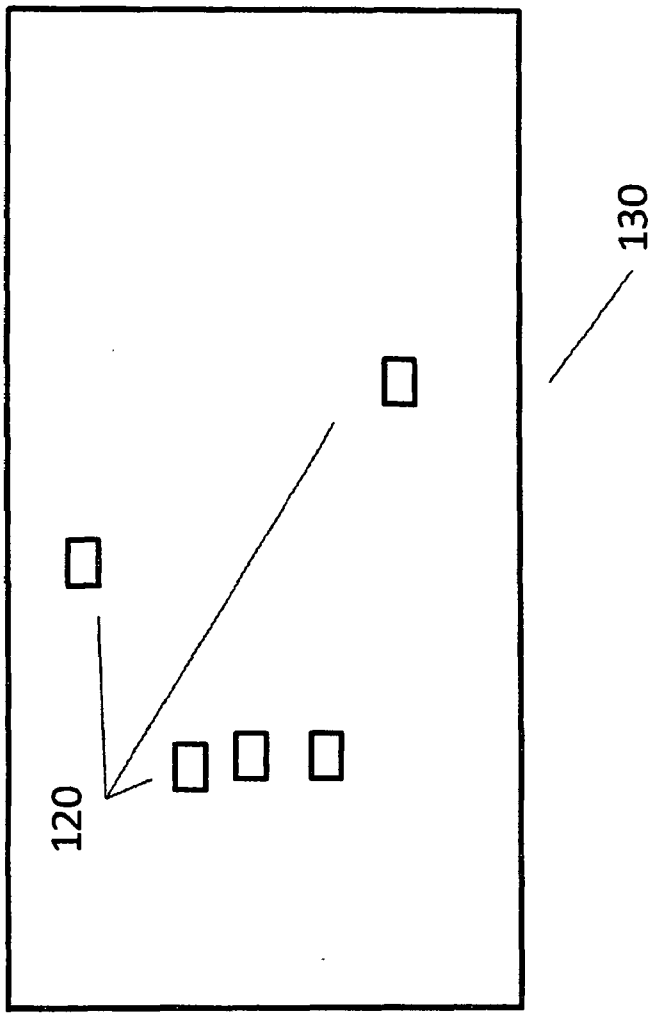

FIG. 1

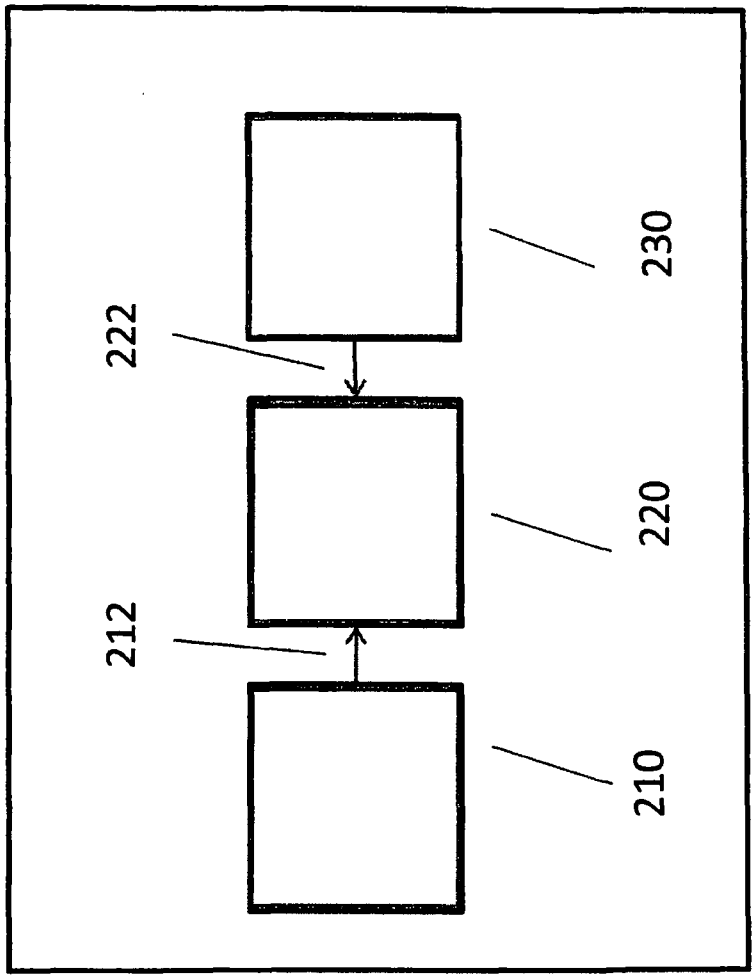

FIG. 2

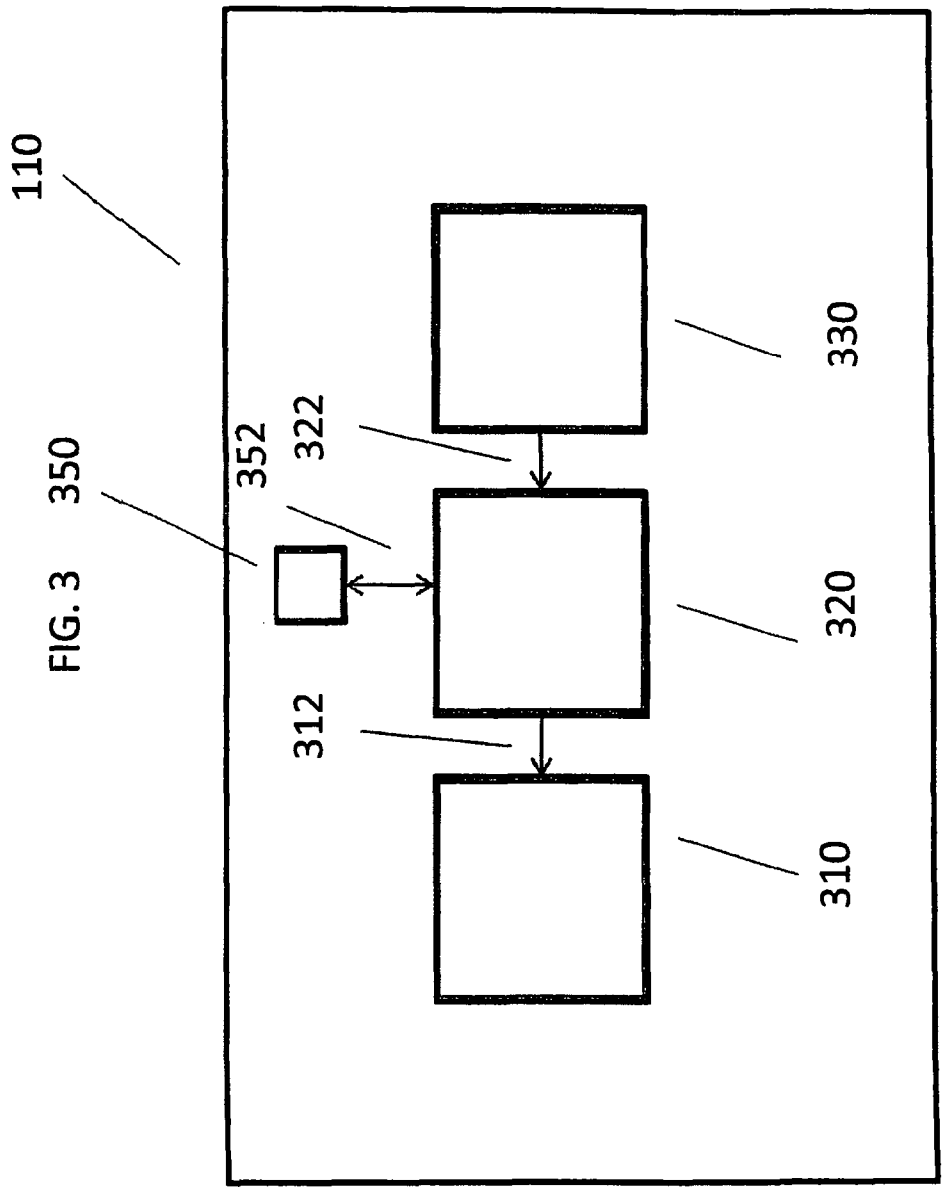

FIG. 3

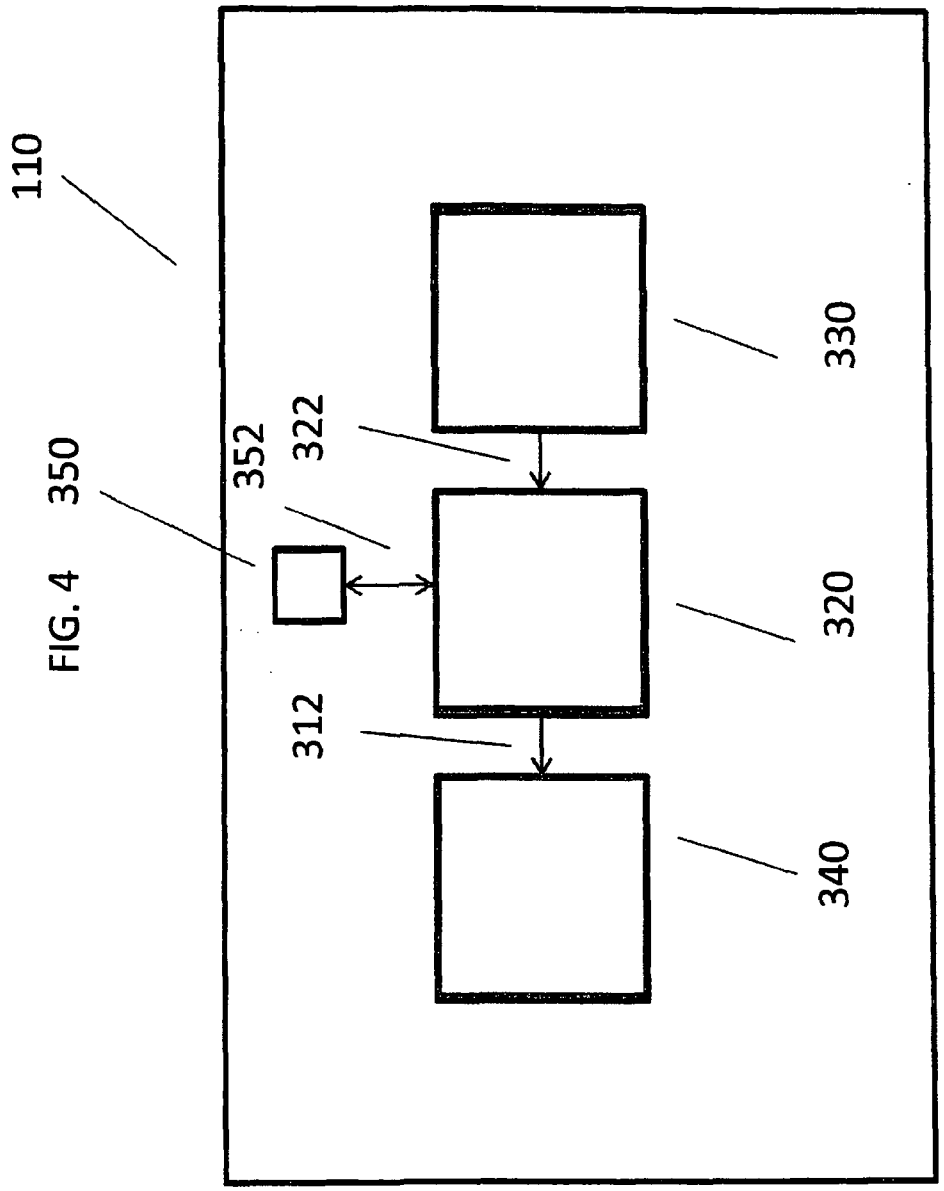

FIG. 4

VEHICLE MONITORING SYSTEMS AND METHODS

Cross-Reference to Related Applications

[0001] This application claims priority from U.S. provisional application number 61/992,503, filed May 13, 2014, which is incorporated by reference herein in its entirety, and U.S. non-provisional application number 14/700,910 filed April 30, 2015, which is incorporated by reference herein in its entirety.

Technical Field/Field of the Disclosure

[0002] The present disclosure relates to vehicle management systems.

Background of the Disclosure

[0003] Automobile dealerships often have horizontally-spread inventory of new and/or used vehicles across a car lot, many of which may appear similar but have different options packages. Further, the location of these vehicles may change, for instance, due to turnover in inventory, customer test drives, or other vehicle movement. In addition, as vehicles remain on the lot, there may be a need to perform limited maintenance to assure the vehicle remains ready for purchase.

Summary

[0004] According to one aspect of the present invention, there is provided a vehicle management system as defined in claim 1 hereinafter.

[0005] According to another aspect of the present invention, there is provided a process as defined in claim 19 hereinafter.

[0006] An embodiment includes a lot management system. The lot management system includes a transmitter comprising a location determination module having a GPS data pathway to an RF transmission module and a receiver including an RF antenna and a receiver processor.

[0007] Another embodiment is directed to a process. The process includes providing a vehicle management system. The vehicle management system includes a transmitter in electrical contact with a vehicle, wherein the transmitter comprises a location determination module having a GPS data pathway to an RF transmission module and a vehicle information module having a vehicle information data pathway to the RF transmission module. The vehicle management system further includes a receiver having an RF antenna, a receiver processor, and a receiver database. The receiver database includes a non-transitory, tangible computer readable storage medium. The process further includes determining a location of the transmitter using the location determination module and transmitting the location of the transmitter using the RF transmission module. In addition, the process includes receiving the location of the transmitter using the RF antenna and storing the location of the transmitter in the receiver database.

Brief Description of the Drawings

[0008] The present disclosure is best understood from the following detailed description when read with the accompanying figures. It is emphasized that, in accordance with the standard practice in the industry, various features are not drawn to scale. In fact, the dimensions of the various features may be arbitrarily increased or reduced for clarity of discussion.

[0009] FIG. 1 is a schematic of a lot management system consistent with at least one embodiment of the present disclosure.

[0010] FIG. 2 is a schematic of a transmitter of a lot management system consistent with at least one embodiment of the present disclosure.

[0011] FIG. 3 is a schematic of a receiver of a lot management system consistent with at least one embodiment of the present disclosure.

[0012] FIG. 4 is a schematic of a receiver of a lot management system consistent with at least one embodiment of the present disclosure.

Detailed Description

[0013] It is to be understood that the following disclosure provides many different embodiments, or examples, for implementing different features of various embodiments. Specific examples of components and arrangements are described below to simplify the present disclosure. These are, of course, merely examples and are not intended to be limiting. In addition, the present disclosure may repeat reference numerals and/or letters in the various examples. This repetition is for the purpose of simplicity and clarity and does not in itself dictate a relationship between the various embodiments and/or configurations discussed.

[0014] Certain embodiments of the present disclosure are directed to systems and methods for locating vehicles on a car lot. The embodiments may include at least one receiver station and one or more transmitters. FIG. 1 is a schematic of one embodiment of lot management system 100 consistent with the present disclosure.

[0015] FIG. 1 depicts receiver 110 and a plurality of transmitters 120. Transmitters 120 may be associated with individual vehicles. Transmitters 120 and associated vehicles are shown in FIG. 1 as located on car lot 130.

[0016] As shown in FIG. 2, transmitters 120 include location determination module 210 and transmission module 220. Location determination module 210 may be any module capable of determining the location of the vehicle on car lot 130 within 9.144 m (30 feet), 6.096 m (20 feet) or 3.048 m (10 feet) of the actual location of transmitter 120. In certain non-limiting embodiments, location determination module 210 is a GPS locator module which is configured to receive a GPS signal and may calculate or determine a GPS location based on that signal. Transmission module 220 as shown in FIG. 2 is a radio frequency (RF) transmitter. Transmission module 220 receives GPS location information from location determination module 210 through location GPS data pathway 212. Transmission module 220 is configured to transmit the GPS location only while transmitter 120 is located within car lot 130.

Transmission module 220 may transmit in the UHF bandwidth. In some embodiments, transmission module 220 does not transmit a cellular signal. In certain non-limiting embodiments of the present disclosure, transmission module 220 may transmit signals that conform to the JenNet or ZigBee® protocol.

[0017] In certain embodiments, transmitter 120 may further include vehicle information module 230. In other embodiments (not shown), transmitter 120 does not include vehicle information module 230. Vehicle information module 230 may be adapted to communicate with one or more computer systems of the vehicle. Vehicle information module 230 may gather vehicle information from the vehicle and pass that information to transmission module 220 through vehicle information data pathway 222.

[0018] In some non-limiting embodiments, vehicle information module 230 is configured to meet OBD-II standards in terms of, for example, diagnostic connector and its pinout, electrical signaling protocols and messaging format. In certain embodiments of the present disclosure, vehicle information module 230 may receive power from the vehicle's battery through a power pin connector (not shown). Power pin connector may be configured in accordance with OBD-II standards. Vehicle information module 230 may gather information such as, but not limited to VIN, battery voltage, alternator voltage, fuel level, engine RPMs, vehicle speed, distance traveled since codes last cleared, run time since engine start and other parameters, such as those specified in the OBD-II standard. Vehicle information module 230 may be configured in accordance with OBD-II standards to plug into or be removed from a vehicle's OBD-II port. When so configured, transmitter 120 may be removable from the vehicle, for instance, when the vehicle is purchased, and reused on a different vehicle.

[0019] Transmitter 120 may be associated with a particular identifier, such as a serial number, that may be transmitted via transmitter module 220 to receiver 110. The particular identifier may be stored in a transmission module processor or memory associated with a transmission module processor. In certain embodiments, vehicle information module 230, transmitter module 220 and location determination

module 210 may be powered by the vehicle battery, such as through the power pin connector. In other embodiments, vehicle information module 230, transmitter module 220 and location determination module 210 are powered with a battery other than that of the vehicle battery. In still other embodiments, vehicle information module 230, transmitter module 220 and location determination module 210 are powered by the vehicle battery and a battery other than that of the vehicle battery.

[0020] Transmission module 220 may contain a transmission module processor that controls and processes data received from, for instance, location determination module 210 and vehicle information module 230, which is described below. The transmission module processor of transmission module 220 may include in the processor or memory associated with the transmission module processor code instructions to transmit information to receiver station 110 continuously, at pre-determined times, or may use the information obtained from location determination module 210 or vehicle information module 230 to determine when to transmit information to receiver station 110. The code instructions may be stored on a non-transitory, tangible computer readable storage medium. As an example, when vehicle information module 230 communicates to transmission module 220 that the measured voltage is such that the engine of the vehicle is running, transmission module may transmit vehicle location more frequently than if the measured voltage is such that the engine of the vehicle is not running. As another example, if the engine of the vehicle is running, transmission module 220 may transmit location information every two seconds, every five seconds, or every 10 seconds. If the engine of the vehicle is not running, transmission module 220 may transmit location information once every two hours, once every hour, or once every 30 minutes, for example. Similarly, the duration of the transmission of vehicle information by transmission module 220 may be for a set time or based on vehicle information.

[0021] In some embodiments, transmitter 120 may be limited in range in that the signal of transmitter 120 may be received less than a mile, less than 762 m (2500 feet) or less than 457.2 m (1500 feet) from transmitter 120.

[0022] FIG. 3 is a schematic of receiver 110 in accordance with certain embodiments of the present disclosure. Receiver 110 includes RF antenna 330. RF antenna 330 receives the RF signal from transmitter 120. RF antenna 330 provides data received from transmitter 120 through receiver data path 322 to receiver processor 320. Receiver processor 320 stores, manipulates, and/or prepares data received through receiver data path 322 for display and/or query from a user. As recognized by one of ordinary skill in the art with the benefit of this disclosure, receiver processor 320 may be any electronic equipment capable of storing, manipulating, and/or preparing data received through receiver data path 322. In certain non-limiting embodiments, receiver processor 320 may be a laptop or desktop computer, a handheld device such as a PDA or smartphone, or tablet. Receiver processor 320 may provide output to display 310 through display data path 312 for display to a user. In an alternative embodiment, such as that shown in FIG. 4, receiver processor 320 may provide data and accept queries from remote processor 340. Remote processor 340 may be a device, for instance, carried by a user for use in locating or determining other information about the vehicle to which transmitter 120 is attached. Remote processor 340 may also be a laptop or other computer located remotely from processor 320. Remote processor 340 may communicate with a display. In still other embodiments, remote processor 340 may be a remote controller, such as that described as "remote controller **54**" in U.S. Patent No. 7,342,494, filed January 27, 2004, which is hereby incorporated fully by reference. In these embodiments, receiver processor 320 may query remote processor 340 for such information that may be provided by "remote controller 54" as described in U.S. Patent No. 7,342,494 and further described below. In some non-limiting embodiments, remote processor 340 may include multiple processors, such as for instance, multiple handheld devices, handheld devices and a remote controller, or handheld devices and a laptop or other computer. Remote controller **54** may include a graphical user interface (GUI) such that a user may, through such means as a touch screen, request and receive data regarding the location or vehicle data regarding a vehicle.

[0023] Receiver processor 320 or remote processor 340 may communicate with receiver database 350 through processor data path 352. Receiver database 350 may include data relating to location information

and vehicle information associated with transmitters 120. Receiver database 350 may include a non-transitory, tangible computer readable storage medium.

[0024] Data may be transferred along data paths 212, 222, 312, 322, and 352 using any appropriate methods, including, but not limited to wired connection, wireless connection, internet connection, RF connection or combinations thereof. When data is transferred along processor data path 352 through the internet, location information and vehicle information may be obtained by remote processor 340 through such methods as a web browser or mobile application.

[0025] In certain embodiments, receiver processor 320 may communicate to display 310 or remote processor 340 location or vehicle information upon certain events based on information received or previously received by RF antenna 330 from transmitter 120. In non-limiting examples, receiver processor 320 may communicate to display 310 or remote processor 340 if transmitter 120 has been outside the perimeter of lot 130 for a pre-determined period a time, if transmitter 120 is outside the perimeter of lot 130 after a pre-determined time of day, if the amount of fuel in the vehicle is below a certain level, or if the charge level of a vehicle battery is lower than a set voltage. This communication may be, for instance, by text or e-mail.

[0026] In certain embodiments, receiver processor 320 may aggregate data received from multiple transmitters 120 and communicate aggregate location data and vehicle information to display 310 or remote processor 340. Non-limiting examples of such aggregate data compilation include reports of which vehicles have low fuel, which vehicles have low battery voltage, or transmitters 120 that have not reported for a pre-determined period of time, such as 24 hours.

[0027] In some embodiments, processor 320 or remote processor 340 or databases associated with receiver processor 320 or remote processor 340 may have stored a map of lot 130. In these embodiments, the location of transmitter 120 may be displayed on a map of lot 130 on display 310 or remote processor 340. Map 130 may be created, for instance, by physically mapping the GPS coordinates of the edges of

lot 130 or by determining the edges of lot 130 from a previously constructed map of the lot site, such as through an internet mapping site.

[0028] Database 350 may be configured such that only transmitters 120 associated with a pre-determined set of identifiers that are transmitted by transmission module 220 are stored in processor 320 or are communicated to display 310 or remote processor 340.

[0029] In embodiments where at least one remote processor 340 is a remote controller such as that described as "remote controller **54**" in U.S. Patent No. 7,342,494, filed January 27, 2004, additional information may be communicated to display 310 or another interactive remote processor 340. As transmitters 120 may be associated with particular vehicles, processor 320 may query remote controller **54** to determine vehicle details regarding that particular vehicle including such information as make, model, color, options installed, year of vehicle, body style, condition, cylinder type, mileage, stock number, VIN, and other information that may be stored in remote controller **54**. Processor 320 may then communicate this information to remote processor 340, such as a handheld device, laptop or other computer or to display 310. Thus, location, vehicle information and vehicle details are made available to a user. Further, in certain embodiments, vehicle location and vehicle information may be communicated to remote controller **54**; remote controller **54** may make such information available to a user when the vehicle key is made available to the user.

[0030] The foregoing outlines features of several embodiments so that a person of ordinary skill in the art may better understand the aspects of the present disclosure. Such features may be replaced by any one of numerous equivalent alternatives, only some of which are disclosed herein. One of ordinary skill in the art should appreciate that they may readily use the present disclosure as a basis for designing or modifying other processes and structures for carrying out the same purposes and/or achieving the same advantages of the embodiments introduced herein. One of ordinary skill in the art should also realize that such equivalent constructions do not depart from the spirit and scope of the present disclosure and that

they may make various changes, substitutions, and alterations herein without departing from the scope of the present disclosure.

[0031] When used in this specification and claims, the terms "comprises" and "comprising" and variations thereof mean that the specified features, steps or integers are included. The terms are not to be interpreted to exclude the presence of other features, steps or components.

Claims

1. A vehicle management system comprising:

    a transmitter comprising:

        a transmission module, the transmission module being an RF transmission module;

        a location determination module, the location determination module having a GPS data pathway to the RF transmission module; and

        a vehicle information module, the vehicle information module having a vehicle information data pathway to the RF transmission module, the vehicle information module including a diagnostic connector including a power pin connector configured in accordance with OBD-II standards and configured to plug into an OBD-II port of a vehicle, wherein the vehicle information module is adapted to communicate with at least one computer system of the vehicle to gather at least one vehicle parameter; and

    a receiver comprising an RF antenna and a receiver processor, wherein the RF transmission module is configured to only transmit GPS location information when the location determination module is within a car lot.

2. The vehicle management system of claim 1, wherein the at least one vehicle parameter is selected from a group consisting of battery voltage, fuel level, engine RPMs, distance traveled since codes last cleared, run time since engine start, and VIN.

3. The vehicle management system of claim 1 or claim 2, wherein the vehicle information module is configured to communicate with the at least one computer system of the vehicle using OBD-II standards.

4. The vehicle management system of claim 3, wherein the vehicle information module is in electrical contact with a vehicle battery.

5. The vehicle management system of claim 4, wherein the electrical contact is made through the power pin connector.

6. The vehicle management system of claim 4 or claim 5, wherein the vehicle information module is in electrical contact with the RF transmission module and the location determination module.

7. The vehicle management system of any one of the previous claims, wherein the transmitter is powered by a battery.

8. The vehicle management system of any one of the previous claims, wherein the location determination module is a GPS locator module.

9. The vehicle management system of any one of the previous claims, wherein the receiver processor has a processor data path to a receiver database.

10. The vehicle management system of claim 9, wherein the receiver database includes a non-transitory, tangible computer readable storage medium.

11. The vehicle management system of claim 10, wherein a map of a car lot is stored on the non-transitory, tangible computer readable storage medium of the receiver database.

12. The vehicle management system of claim 10 or claim 11, wherein location information associated with the transmitter is stored in the receiver database.

13. The vehicle management system of any one of the previous claims, wherein the processor has a display data path to a remote processor.

14. The vehicle management system of any one of the previous claims, wherein the remote processor is a remote controller.

15. The vehicle management system of any one of the previous claims, wherein the receiver is adapted to receive an RF transmission transmitted by the RF transmission module.

16. The vehicle managements system of claim 15, wherein the RF transmission is in the UHF band.

17. The vehicle managements system of claim 15 or claim 16, wherein the RF transmission utilizes the JenNet or ZigBee® protocol.

18. The vehicle management system of any one of the previous claims, wherein the transmitter is configured to be removable from a vehicle.

19. A process comprising:

providing a vehicle management system comprising:

a transmitter comprising:

a transmission module, the transmission module being an RF transmission module;

a location determination module, the location determination module having a GPS data pathway to the RF transmission module; and

a vehicle information module, the vehicle information module in electrical contact with a vehicle, the vehicle information module including a diagnostic connector including a power pin connector configured in accordance with OBD-II standards and configured to plug into an OBD-II port of a vehicle, the vehicle information module having a vehicle information data pathway to the RF transmission module; and

a receiver comprising an RF antenna, a receiver processor, and a receiver database, the receiver database including a non-transitory, tangible computer readable storage medium;

determining a location of the vehicle information module using the location determination module;

transmitting the location of the vehicle information module using the RF transmission module only when the vehicle information module is within a car lot;

receiving the location of the vehicle information module using the RF antenna;
storing the location of the vehicle information module in the receiver database;
collecting vehicle information from the vehicle using the vehicle information module;
transmitting vehicle information using the RF transmission module;
receiving the vehicle information using the RF antenna; and
storing the vehicle information in the receiver database.

20. The process of claim 19, wherein the location information is the GPS coordinates of the transmitter.

21. The process of any one of claim 19 or claim 20, wherein the RF transmission module transmits in the UHF bandwidth.

22. The process of any one of claims 19-21, wherein the RF transmission module transmits the location information less than 762 m (2500 feet).

23. The process of any one of claims 19-22, wherein the vehicle information is selected from the group consisting of VIN, battery voltage, alternator voltage, fuel level, engine RPMs, vehicle speed, distance traveled since codes last cleared, run time since engine start, or a combination thereof.

24. The process of any one of claims 19-23 further comprising:
determining whether an engine of the vehicle is running; and
transmitting the location of the vehicle information module using the RF transmission module more often when the engine of the vehicle is running than when the engine of the vehicle is not running.