Title: METHOD AND SYSTEM FOR OBTAINING ODOMETER DATA OF A VEHICLE

Abstract: A method (100) of obtaining odometer data of a vehicle, comprising: acquiring odometer data from a vehicle data system indicating a travelled distance of the vehicle (102); sending the odometer data to a remote device (106); optionally displaying the odometer data with the remote device (108); wherein at least one of the sending and the displaying is triggered when any condition selected in a predetermined set (COND) is detected (106), the condition relating to refueling of the vehicle.
METHOD AND SYSTEM FOR OBTAINING ODOMETER DATA OF A VEHICLE

TECHNICAL FIELD

[0001] The present disclosure relates to a method of obtaining odometer data of a vehicle and a system for obtaining odometer data of a vehicle. Such method and system may be useful in relation with refueling of vehicles.

TECHNOLOGICAL BACKGROUND

[0002] In many countries, company cars are widely used and the companies may pay for fuel expenses of professional and personal journeys, e.g. through a fuel card or fleet card system. However, for control purposes, filling stations have developed a system that requires the driver to fill in his odometer value to the fuel pump, so that the company can check that the driver does not use the company fuel card to refuel other vehicles.

[0003] When the driver forgets to look at the odometer when he exits the car, he has to go back inside and possibly switch on the car again in case of electronic display. This is inconvenient for the driver and results in a loss of time both for the driver and for people queuing at the filling station.

[0004] Therefore, there is a need for a new type of method and system for obtaining odometer data of a vehicle.

SUMMARY

[0005] In this respect, the present disclosure relates to a method of obtaining odometer data of a vehicle, comprising:

- acquiring odometer data from a vehicle data system indicating a travelled distance of the vehicle;

- sending the odometer data to a remote device;

- optionally displaying the odometer data with the remote device;

wherein at least one of the sending and the displaying is triggered when any condition selected in a predetermined set is detected, wherein the condition relates to refueling of the vehicle.

[0006] The odometer data of a vehicle is easily available on vehicles, and can be acquired in a manner known per se in the art, e.g. by a vehicle internal
data system or the like. Then, the method checks whether any condition selected in a predetermined set is fulfilled, and if this is the case, the odometer data is sent to a remote device and/or displayed on the remote device. The sending may use communication means known per se in the art. On the other hand, if no condition of the predetermined set is to be detected, the odometer data may not be sent to and/or displayed with the remote device. In such cases, the odometer data may not be acquired either, so that the acquiring step is performed only when any condition in the predetermined set is detected.

[0007] Specifically, the above method encompasses the following possibilities after acquisition of the odometer data. As a first possibility, the sending is triggered by detecting a condition of the predetermined set. The odometer data may then be displayed automatically, and/or be processed without being displayed. As a second possibility, the sending is performed on the basis of its own settings, e.g. at regular intervals, and the displaying is triggered by detecting a condition of the predetermined set. As a third possibility, the sending and the displaying are both triggered by detecting a condition of the predetermined set, namely the same condition for both or a different condition for each.

[0008] The condition, or prerequisite, belongs to a predetermined set of conditions that serve as triggers for sending and/or displaying the odometer data on the remote device. Since the conditions of the predetermined set relate to refueling of the vehicle, the odometer data is automatically sent to the remote device and/or automatically displayed thereon when it is detected that the vehicle is e.g. in a state or at a location that requires or facilitates refueling. Thus, each condition of the predetermined set may represent a situation where refueling is needed or may be about to happen.

[0009] Therefore, when the driver or user stands at the fuel pump, he has the odometer data directly with him, via the remote device, without needing to remember to note down the odometer data before leaving the vehicle nor returning back inside the vehicle.
[0010] For instance, the remote device may be a personal digital assistant (PDA), a smartphone, a fuel card, the fuel pump itself, or a display, e.g. a display configured to display the odometer data on a surface of the vehicle, preferably a glass surface such as a window.

[0011] In some embodiments, the sending uses a wireless communication protocol. The wireless communication protocol may be Wi-Fi, Bluetooth, Near Field Communication (NFC), etc. Thus, the sending may occur at any time, even when the remote device is at some distance from the vehicle.

[0012] In some embodiments, the predetermined set includes at least one of the following conditions and/or a combination thereof:

- the vehicle being stopped, preferably with engine turned off;
- the vehicle being located, possibly stopped, within a predetermined distance from any filling station;
- the vehicle being located, possibly stopped, within a predetermined distance from a filling station saved as a favorite in relation with the vehicle;
- an activated low fuel indicator of the vehicle, optionally while the vehicle is located within a predetermined distance from any filling station;
- the fuel lid being open, possibly in conjunction with the vehicle being stopped;
- the user sending a request for obtaining odometer data while the vehicle is stopped. The request may be sent through a switch on the vehicle or a request from the remote device.

[0013] Each of these conditions relates to refueling of the vehicle in that it represents a situation where the user is likely to refuel the car and to need the odometer data.

[0014] It is noteworthy that sending the odometer data when the vehicle is stopped results in a more accurate input to the fuel pump. For the same reason, the above mentioned predetermined distance may be 1 kilometer or less, preferably 100 meters or less.

[0015] Saving filling stations as favorites is a function widely offered by modern built-in navigation systems or navigation applications on smartphones.
Although the filling station is saved as favorite in relation with the vehicle, this
information may be saved on the vehicle itself or on the remote device.

[0016] In some embodiments, the odometer data includes a distance
value and optionally a unit thereof. The distance value, measured directly by
the vehicle odometer, is more accurate that other estimates of the distance
travelled by the vehicle, e.g. a navigation system (e.g. GPS) estimated distance.
Furthermore, the unit of the distance value may be useful to handle cars
originally manufactured for different countries. In the present disclosure,
odometer data may comprise values expressed in units such as kilometers,
miles, yards, other units and their respective subunits.

[0017] In some embodiments, the condition is ignored if the acquired
data is the same as that sent in the latest sending. This feature may be used
especially when detecting a condition of the predetermined set triggers the
sending. In other words, after acquiring the odometer data, the method
includes a comparison of the acquired odometer data with previously sent
odometer data, and by-passes the sending, by ignoring the condition, if the
comparison shows that both data are the same, possibly within a
predetermined margin. Ignoring the condition means that the condition is
considered as not being detected even if it actually occurs. Therefore, useless
sending is avoided and energy is saved.

[0018] In some embodiments, the condition is detected by the vehicle
only, or by the remote device only. In other embodiments, the condition is
detected jointly by the vehicle and by the remote device. Therefore, it is
possible to share tasks so as to optimize the method in terms of energy-
savings, accuracy and time of execution. Further, this makes sure that the
vehicle and the remote device can communicate before triggering the sending.
The detection mode (i.e. detecting jointly or not) may be different for different
conditions.

[0019] The present disclosure also relates to a system for obtaining
odometer data of a vehicle, comprising:
- an acquiring unit configured to acquire odometer data from a vehicle data system indicating a travelled distance of the vehicle;
- a condition detection unit configured to detect any condition selected in a predetermined set, wherein the condition relates to refueling of the vehicle;
- a sending unit configured to send the odometer data to a remote device;
- optionally a display unit configured to display the odometer data with the remote device,

wherein the condition detection unit is configured to trigger at least one of sending by the sending unit and displaying by the display unit when the condition detection unit detects a condition in the predetermined set.

[0020] This system is suitable for carrying out the previously described method. This system may contain additional features for carrying out any of the previously described embodiments. The display unit may belong to the remote device.

[0021] The present disclosure also relates to a computer program including instructions for executing the steps of the previously described method when said program is executed by a computer. This program can use any programming language and take the form of source code, object code or a code intermediate between source code and object code, such as a partially compiled form, or any other desirable form.

[0022] The present disclosure also relates to a recording medium readable by a computer and having recorded thereon a computer program including instructions for executing the steps of a method as defined above.

[0023] The recording medium can be any entity or device capable of storing the program. For example, the medium can include storage means such as a ROM, for example a CD ROM or a microelectronic circuit ROM, or magnetic storage means, for example a diskette (floppy disk) or a hard disk. Alternatively, the recording medium can be an integrated circuit in which the program is incorporated, the circuit being adapted to execute the method in question or to be used in its execution.
BRIEF DESCRIPTION OF THE DRAWINGS

[0024] The disclosure and advantages thereof will be better understood upon reading the detailed description which follows, of embodiments given as non-limiting examples. This description refers to the appended drawings, wherein:

- Fig. 1 is a block diagram of a method of obtaining odometer data of a vehicle according to a first embodiment;
- Fig. 2 is a block diagram of a method of obtaining odometer data of a vehicle according to a second embodiment;
- Fig. 3 is a schematic diagram of a system for obtaining odometer data of a vehicle according to the first embodiment;
- Fig. 4 is a block diagram showing an implementation example of the method of obtaining odometer data;
- Fig. 5 is a block diagram of a method of obtaining odometer data of a vehicle according to a third embodiment.

DETAILED DESCRIPTION OF EMBODIMENTS

[0025] A method 100 of obtaining odometer data of a vehicle according to a first embodiment is illustrated in the block diagram of Fig. 1.

[0026] As previously mentioned, the method comprises an acquiring step 102 of acquiring odometer data from a vehicle data system indicating a travelled distance of the vehicle. The odometer data may comprise a distance value and optionally a unit thereof. Acquisition of the odometer data can be performed by means known per se. For instance, the odometer value is a value that is easily accessible on typical cars and that is usually shared through the whole electronic system of the car.

[0027] The method 100 further comprises, as an option, a comparing step 104 of comparing the acquired odometer data with previously sent odometer data. If the newly acquired odometer data differs from the previously sent odometer data, the method proceeds further to step 106. Otherwise, e.g. if the difference between the newly acquired odometer data and the previously sent odometer data is less than a predetermined margin, update of the
odometer data is considered to be unnecessary and the method 100 terminates. In other words, if the acquired odometer data is about the same as that sent in the latest sending, any condition selected in a predetermined set, to be detailed later, is ignored irrespective of whether it occurs or not.

[0028] It should be noted that the comparing step 104 is provided as an optimization for avoiding unnecessary updates, however the method 100 may not comprise the comparing step 104.

[0029] The method 100 further comprises a detection step 106 for detecting any condition relating to refueling of the vehicle and selected in a predetermined set. If any condition of the predetermined set is detected, the method proceeds to a sending step 108. Otherwise, the method 100 terminates.

[0030] As explained above, the condition represents a situation where the user is likely to refuel the car and to need the odometer data. For instance, the predetermined set may include at least one of the previously mentioned conditions and/or a combination thereof.

[0031] The sending step 108 comprises sending the acquired odometer data to a remote device. In this example, the remote device may be a smartphone. The sending may use a wireless communication protocol, e.g. Bluetooth. A dedicated chip or system may be added to the vehicle for the purpose of this sending.

[0032] After receiving the odometer data, said data may be displayed on the screen of the smartphone or the like, automatically or not, so that the user can read the figures and input them into the fuel pump. If the remote device is another device such as the fuel pump or the fuel card, display may not be necessary.

[0033] The method 100 may terminate after the sending step 108. Besides, the method 100 may be executed by the vehicle and/or the remote device at regular intervals of time, which may depend on the odometer data and/or the level of the vehicle fuel tank.
[0034] Methods 200, 400 of obtaining odometer data of a vehicle according to second and third embodiments are illustrated in the block diagram of Figs. 2 and 5, respectively. In these figures, elements corresponding or identical to those of the first embodiment have the same reference sign and will not be further described.

[0035] The method 200 of the second embodiment differs from that of the first embodiment in that the detecting step 106 takes place before the acquiring step 102. In order to avoid unnecessary acquisitions of odometer data, it is first checked whether any condition relating to refueling of the vehicle and selected in the predetermined set is detected. If no such condition is detected, the method 200 terminates straight away. No odometer data is acquired as such odometer data would anyway not be sent or displayed. Otherwise, if at least one such condition is detected, the method 200 proceeds further to the acquiring step 102.

[0036] The steps of the methods described in reference to Figs. 1 and 2 can be determined by computer instructions. These instructions can be executed on a processor of a system, as represented on figure 3.

[0037] On this figure, a system 300 has been represented. This system comprises a processor 301, an acquiring unit 302, and a memory 303.

[0038] The processor 301 defines a condition detection unit 306, configured to detect any condition relating to refueling of the vehicle and selected in a predetermined set, a sending unit 308 configured to send the odometer data to a remote device when the condition detection unit 306 detects a condition in the predetermined set, and optionally a comparison unit 304 configured to compare the odometer data acquired by the acquiring unit 302 to the latest odometer data sent by the sending unit 308.

[0039] The acquiring unit 302 may comprise a connection interface with other analogic or electronic systems of the vehicle, e.g. a CAN bus. The acquiring unit 302 is configured to acquire odometer data, e.g. the distance value. The acquiring unit 302 may also be configured to acquire other vehicle or environment parameters, such as the level of the fuel tank, the distance to the
closest filling station, the distance to the closest favorite filling station, the
ON/OFF state of the vehicle or of the engine, etc., that may help the condition
detection unit 306 to detect a condition of the predetermined set.

[0040] The memory 303 may be a non-volatile memory and it comprises
a set of instructions (or computer program) INST which can be executed by the
processor 301 to perform e.g. the methods described in reference to Figs. 1
and 2. The set of instructions INST may comprise:

- an instruction 312 to acquire odometer data on the vehicle;
- an instruction 316 to detect any condition selected in a predetermined
  set, wherein the condition relates to refueling of the vehicle;
- an instruction 318 to send the odometer data to a remote device when
  the condition detection unit detects a condition in the predetermined set.

[0041] These instructions may be related to the corresponding units 302,
306, 308 of the system 300.

[0042] The memory 303 may also be used to store the predetermined set
of conditions COND and/or, if applicable, the latest sent odometer data.

[0043] An implementation example of the method of obtaining odometer
data is illustrated in the block diagram of Fig. 4. This example is an
implementation of the method 200 according to the second embodiment. For
purposes of illustration, the condition of the predetermined set that is selected
is an activated low fuel indicator of the vehicle while the vehicle is located
within a predetermined distance from any filling station.

[0044] In this example, the remote device is a device having a navigation
system that is used while driving, e.g. a smartphone. In step 402, the remote
device detects that a filling station is located within a predetermined distance
from a filling station, e.g. 500 meters. Thus, the remote device detects that
refueling may be likely. In step 404, the remote device sends a message to the
vehicle, e.g. via Bluetooth, providing the vehicle with the information that a
filling station is located within the predetermined distance and requesting the
odometer data.
[0045] In step 406, the vehicle checks within the predetermined set of conditions and finds that one possible condition of this set is an activated low fuel indicator of the vehicle while the vehicle is located within a predetermined distance from any filling station. This check may be triggered by receiving the request from the remote device or by the vehicle itself, e.g. at regular time intervals. Further, in step 408, the vehicle checks whether the fuel tank level is less than a predetermined value. Assuming so, in step 410, the vehicle acquires the odometer data, namely the odometer value. In step 412, the vehicle compares the odometer data with the latest sent odometer data. Assuming that the difference exceeds a predetermined range, the vehicle sends the odometer data to the remote device in step 414. The remote device may then display the odometer value in step 416. Thus, the user can read the odometer value directly on his smartphone, without needing to note it down before leaving the vehicle or get back inside the vehicle.

[0046] This implementation example shows how the condition may be detected jointly by the vehicle and by the remote device. However, some conditions may be detected only by the vehicle or only by the remote device.

[0047] As shown in Fig. 5, the method 400 of the third embodiment differs from that of the first embodiment in that the sending step 108 is performed before the detection step 106. Thus, sending the odometer data is performed based on other settings, e.g. at regular intervals of time. Further to the sending step 108 or the comparison step 104, as the case may be, the method 400 proceeds to the detection step 106. If any condition of the predetermined set is detected, the method proceeds to a displaying step 110. Otherwise, the method 100 terminates. In other words, the displaying is triggered when any condition selected in a predetermined set is detected.

[0048] For instance, the remote device may be a display configured to display the odometer data on a surface of the vehicle, preferably a glass surface such as window. The display may be a head-up display or the like. The surface may be a surface in the vicinity of the fuel cap, e.g. a rear window. For instance, during the displaying step 110, the display is switched on for a
predetermined duration, e.g. ten seconds, or until deactivation by the driver or another person. The display may be powered by power from the vehicle or via independent power supply, e.g. a solar cell.

[0049] Corresponding changes may be brought to the system 300 of Fig. 3 to make it able to implement the method 400 of the third embodiment.

[0050] Besides, modifications similar to those between the methods as per the first and second embodiments may be carried out for the method 400 of the third embodiment.

[0051] Although the present disclosure refers to specific exemplary embodiments, modifications may be provided to these examples without the departing from the general scope of the invention as defined by the claims. In particular, individual characteristics of the different illustrated/mentioned embodiments may be combined in additional embodiments. Therefore, the description and the drawings should be considered in an illustrative rather than in a restrictive sense.
CLAIMS

1. A method (100, 200) of obtaining odometer data of a vehicle, comprising:
   - acquiring odometer data from a vehicle data system indicating a travelled distance of the vehicle (102);
   - sending the odometer data to a remote device (108);
   - optionally displaying the odometer data with the remote device (108);
wherein at least one of the sending and the displaying is triggered when any condition selected in a predetermined set (COND) is detected (106), the condition relating to refueling of the vehicle.

2. The method of claim 1, wherein the sending (108) uses a wireless communication protocol.

3. The method of claim 1 or 2, wherein the predetermined set (COND) includes, as a condition, the vehicle being stopped within a predetermined distance from a filling station saved as a favorite in relation with the vehicle.

4. The method of any one of claims 1 to 3, wherein the predetermined set (COND) includes, as a condition, an activated low fuel indicator of the vehicle while the vehicle is located within a predetermined distance from any filling station.

5. The method of any one of claims 1 to 4, wherein the predetermined set (COND) includes, as a condition, the fuel lid being open.

6. The method of any one of claims 1 to 5, wherein the predetermined set (COND) includes, as a condition, the user sending a request for obtaining odometer data while the vehicle is stopped.
7. The method of any one of claims 1 to 6, wherein the odometer data includes a distance value and optionally a unit thereof.

8. The method of any one of claims 1 to 7, wherein the condition is ignored (104) if the acquired data is the same as that sent in the latest sending.

9. The method of any one of claims 1 to 8, wherein the condition is detected jointly by the vehicle and by the remote device.

10. The method of any one of claims 1 to 9, wherein the remote device is a smartphone.

11. The method of any one of claims 1 to 9, wherein the remote device is a display configured to display the odometer data on a surface of the vehicle, preferably a window.

12. A system (300) for obtaining odometer data of a vehicle, comprising:
   - an acquiring unit (302) configured to acquire odometer data from a vehicle data system indicating a travelled distance of the vehicle;
   - a condition detection unit (306) configured to detect any condition selected in a predetermined set (COND), wherein the condition relates to refueling of the vehicle;
   - a sending unit (308) configured to send the odometer data to a remote device;
   - optionally a display unit configured to display the odometer data with the remote device (108),
   wherein the condition detection unit is configured to trigger at least one of sending by the sending unit (308) and displaying by the display unit when the condition detection unit detects a condition in the predetermined set (COND).
13. A computer program including instructions for executing the steps of the method according to any one of claims 1 to 11 when said program is executed by a computer.

14. A recording medium readable by a computer and having recorded thereon a computer program including instructions for executing the steps of the method according to any one of claims 1 to 11.
**INTERNATIONAL SEARCH REPORT**

**International application No**  
PCT/EP2017/083145

**A. CLASSIFICATION OF SUBJECT MATTER**  
INV. G07C5/00 G07C5/08 G01C22/00  
ADD. B60K15/03

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**  
Minimum documentation searched. (classification system followed by classification symbols)  
G07C G01C G08G G06Q B60K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
EPO-Internal, WPI Data

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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<td>US 9 014 876 B2 (TELOGIS INC [US]) 21 April 2015 (2015-04-21) abstract figure 1 column 7, line 10 - line 16 column 17, line 38 - line 51 -----</td>
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[ ] Further documents are listed in the continuation of Box C.  
[ ] See patent family annex.

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**Date of the actual completion of the international search**  
7 August 2018

**Date of mailing of the international search report**  
23/08/2018

**Name and mailing address of the ISA/  
European Patent Office, P.B. 5618 Patentlaan 2  
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**Authorized officer**  
Saraceni, Alessandro
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<td>US 9 778 831 B2 (PENILLA ANGEL A [US]; PENILLA ALBERT S [US]; EMERGING AUTOMOTIVE LLC [ ] 3 October 2017 (2017-10-03) abstract figures 1, 7, 13A column 24, line 64 - line 66 column 34, line 20 - line 26</td>
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