SYSTEM AND METHOD FOR MANAGING OPERATIONS IN WORKSHOP FOR AUTOMOTIVE VEHICLES

TECHNICAL FIELD

The present disclosure relates generally to management of workshop operations; and more specifically, to systems for managing operations in a workshop for at least one automotive vehicle. Furthermore, the present disclosure also relates to methods of managing operations in a workshop for at least one automotive vehicle.

BACKGROUND

In recent times, sector relating to movement and navigation has been significantly advanced with advent of automotive vehicles. Typically, the automotive vehicles are motor vehicles that are propelled by an internal combustion engine and/or an electric motor. For efficient functioning of the automotive vehicles, the automotive vehicles require servicing and maintenance at regular intervals. Generally, the servicing and maintenance of the automotive vehicles is performed at workshops.

However, there exists significant limitations in management of operation and performance of the workshops for automotive vehicles. Traditionally, maintenance of the workshops was easy owing to few automotive vehicles and small workforce. However, with increased number of automotive vehicles, a need for maintenance of the workshops, optimizing output of the workshop, managing workers and process flow has arisen. Typically, the workshops are managed by servicing personnel by either maintaining records manually or in an extensive data sheet. However, such records do not provide real-time visibility related to progress of servicing to the servicing personnel or owner of the automotive vehicle. Moreover, the servicing personnel rely on limited visual and recorded information regarding the

automotive vehicle and the activities of the workers which leads to productivity issues such as delay in delivery, inconsistency among workers and so forth. Additionally, the servicing personnel rely either on announcements made in the workshop or on service log of the workshop. Consequently, the increased workload for the workers leads to poor compliance, lower adoption and higher error rates.

Conventionally, the automotive vehicles are tracked using tracking devices such as Bar-code scanners, Quick-Response Scanners, Radio-Frequency Identification (RFID) and so forth availability of the servicing personnel is demined using time sheet of the servicing personnel. However, such systems involve large amount of human intervention and depend on the accuracy of reported timestamps to track the movement of the automotive vehicles. Additionally, such systems require servicing personnel in the service station to actively report vehicle movement and workflow triggers. Consequently, the increased workload for the workers leads to poor compliance, lower adoption and higher error rates. Subsequently, the aforementioned problems hamper the productivity and make the system vulnerable to misreporting. Furthermore, such system tracks the location of the automotive vehicle, but provides no real time update regarding the service status of the automotive vehicle.

Therefore, in light of the foregoing discussion, there exists a need to overcome the aforementioned drawbacks associated with the conventional workshop management systems.

SUMMARY

The present disclosure seeks to provide a system for managing operations in a workshop for at least one automotive vehicle. The present disclosure also seeks to provide a method for managing operations in a workshop for at least one automotive vehicle. The

present disclosure seeks to provide a solution to the existing problem of poor throughput, delays and overall inefficient management of workshops. Moreover, the present disclosure seeks to provide a solution to the existing problem of determining a most suitable servicing personnel for a job on the automotive vehicle, allocating the available servicing personnel to job and communicating allocation to the servicing personnel. An aim of the present disclosure is to provide a solution that overcomes at least partially the problems encountered in prior art, and provides a system that can enable a user to manage a given automotive workshop efficiently and provide transparency related to progress of servicing process to owner of the automotive vehicle.

In one aspect, an embodiment of the present disclosure provides a system for managing operations in a workshop for at least one automotive vehicle, the system comprising:

- an identification module that, when in operation, identifies the at least one automotive vehicle and location of the at least one automotive vehicle in the workshop, wherein the identification module is detachably attached to the at least one automotive vehicle in the workshop;
- a service request module that, when in operation, receives a service request from an owner of the automotive vehicle;
- a plurality of tracking modules that, when in operation, tracks the at least one automotive vehicle and one or more asset, in the workshop, wherein the plurality of tracking modules is arranged in the workshop and receive a first information from the identification module;
- a data processing arrangement that, when in operation, receives a second information related to status of the automotive vehicle and a third information related to servicing of the automotive vehicle, wherein the third information comprises at least the service request received from owner of the automotive vehicle; and

- a server arrangement communicably coupled to the plurality of tracking modules and the data processing arrangement, wherein the server arrangement, when in operation:

- determine a location of the automotive vehicle in the workshop, based on the first information received by the plurality of tracking modules;

- generate a service analytics report based on the second information related to status of all automotive vehicles and all assets, and the third information related to servicing of the at least one automotive vehicle in the workshop;

- determines a servicing strategy pertaining to the at least automotive vehicle based on the generated service analytics report;

- allocates the service request to the one or more asset; and

- communicates the allocation details to the one or more asset.

In another aspect, an embodiment of the present disclosure provides a method of managing operations in a workshop for at least one automotive vehicle, the method comprising:

- receiving a first information from an identification module at least one of a plurality of tracking modules, wherein the identification module is detachably attached to an automotive vehicle and the plurality of tracking modules are arranged in the workshop;

- receiving a service request from an owner of the automotive vehicle, the service request is received using a service request module;

- receiving information of one or more asset in the workshop at the plurality of tracking modules;

- receiving a second information related to status of the automotive vehicle and a third information related to servicing of the automotive vehicle, wherein the third information comprises at least the service request by an owner of the automotive vehicle;

- determining a location of the automotive vehicle in the workshop, based on the first information received at the plurality of tracking modules; and

- generating a service analytics report based on the second information related to status of all automotive vehicles and the third information related to servicing of the at least one automotive vehicle in the workshop;

- determining a servicing strategy pertaining to the at least one automotive vehicle, based on the generated service analytics report;

- allocating the service request to the one or more asset; and

- communicating the allocation details to the one or more asset.

Embodiments of the present disclosure substantially eliminate or at least partially address the aforementioned problems in the prior art, and enables the aforesaid system for managing operations in an automotive workshop to be implemented by a user in order to optimise the output and workflow of the automotive workshop in a reliable and efficient manner. Furthermore, the system provides transparency related to progress of servicing to the owner of the automotive vehicle.

Embodiments of the present disclosure are advantageous in terms of increasing the efficiency of the workshop by optimized allocation of the workshop area and servicing personnel.

Additional aspects, advantages, features and objects of the present disclosure would be made apparent from the drawings and the detailed description of the illustrative embodiments construed in conjunction with the appended claims that follow.

It will be appreciated that features of the present disclosure are susceptible to being combined in various combinations without

departing from the scope of the present disclosure as defined by the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The summary above, as well as the following detailed description of illustrative embodiments, is better understood when read in conjunction with the appended drawings. For the purpose of illustrating the present disclosure, exemplary constructions of the disclosure are shown in the drawings. However, the present disclosure is not limited to specific methods and instrumentalities disclosed herein. Moreover, those in the art will understand that the drawings are not to scale. Wherever possible, like elements have been indicated by identical numbers.

Embodiments of the present disclosure will now be described, by way of example only, with reference to the following diagrams wherein:

FIG. 1 is a schematic illustration of a system for managing operations in a workshop for at least one automotive vehicle, in accordance with an embodiment of the present disclosure; and

FIG. 2 is an illustration of steps of a method for managing operations in a workshop for at least one automotive vehicle, in accordance with an embodiment of the present disclosure.

In the accompanying drawings, an underlined number is employed to represent an item over which the underlined number is positioned or an item to which the underlined number is adjacent. A non-underlined number relates to an item identified by a line linking the non-underlined number to the item. When a number is non-underlined and accompanied by an associated arrow, the non-underlined number is used to identify a general item at which the arrow is pointing.

DETAILED DESCRIPTION OF EMBODIMENTS

The following detailed description illustrates embodiments of the present disclosure and ways in which they can be implemented. Although some modes of carrying out the present disclosure have been disclosed, those skilled in the art would recognize that other embodiments for carrying out or practicing the present disclosure are also possible.

The present invention relates to a system for performing operations. The system may be specially constructed for the required purpose or it may comprise a general-purpose computer as selectively activated or reconfigured by a computer program stored in the computer. The procedures presented herein are not inherently related to a particular computer or other apparatus. Various general-purpose machines may be used with programs written in accordance with the teachings herein, or it may prove more convenient to construct more specialized apparatus to perform the required method steps. The required structure for a variety of these machines will appear from the description given.

In one aspect, the present disclosure seeks to provide a system for managing operations in a workshop for at least one automotive vehicle, the system comprising:

- an identification module that, when in operation, identifies the at least one automotive vehicle and location of the at least one automotive vehicle in the workshop, wherein the identification module is detachably attached to the at least one automotive vehicle in the workshop;
- a service request module that, when in operation, receives a service request from an owner of the automotive vehicle;
- a plurality of tracking modules that, when in operation, tracks the at least one automotive vehicle and one or more asset, in the workshop, wherein the plurality of tracking modules is arranged in the workshop and receive a first information from the identification module;

- a data processing arrangement that, when in operation, receives a second information related to status of the automotive vehicle and a third information related to servicing of the automotive vehicle, wherein the third information comprises at least the service request received from owner of the automotive vehicle; and

- a server arrangement communicably coupled to the plurality of tracking modules and the data processing arrangement, wherein the server arrangement, when in operation:

- determine a location of the automotive vehicle in the workshop, based on the first information received by the plurality of tracking modules;

- generate a service analytics report based on the second information related to status of all automotive vehicles and all assets, and the third information related to servicing of the at least one automotive vehicle in the workshop;

- determines a servicing strategy pertaining to the at least automotive vehicle based on the generated service analytics report;

- allocates the service request to the one or more asset; and

- communicates the allocation details to the one or more asset.

In another aspect, the present disclosure seeks to provide a method of managing operations in a workshop for at least one automotive vehicle, the method comprising:

- receiving a first information from an identification module at least one of a plurality of tracking modules, wherein the identification module is detachably attached to an automotive vehicle and the plurality of tracking modules are arranged in the workshop;

- receiving a service request from an owner of the automotive vehicle, the service request is received using a service request module;

- receiving information of one or more asset in the workshop at the plurality of tracking modules;

- receiving a second information related to status of the automotive vehicle and a third information related to servicing of the automotive vehicle, wherein the third information comprises at least the service request by an owner of the automotive vehicle;
- determining a location of the automotive vehicle in the workshop, based on the first information received at the plurality of tracking modules; and
- generating a service analytics report based on the second information related to status of all automotive vehicles and the third information related to servicing of the at least one automotive vehicle in the workshop;
- determining a servicing strategy pertaining to at least one automotive vehicle, based on the generated service analytics report;
- allocating the service request to the one or more asset; and
- communicating the allocation details to the one or more asset.

The present disclosure provides the aforesaid system and the aforesaid method for managing operations in a workshop for automotive vehicles. Beneficially, the system provides a low energy and cost effective solution for obtaining a location associated with at least one of: an automotive vehicle, a tracked asset and a servicing personnel, within a workshop with high accuracy and minimal human intervention during movement of the automotive vehicle, the tracked asset or the servicing personnel within the workshop. Essentially, the system provides a platform to the user to update and track the progress of the servicing of the automotive vehicle. Typically, the progress of the servicing of the automotive vehicle may be updated by a user performing the service. In such a case, the continuous update regarding the progress of the servicing of the automotive vehicle may enable servicing personnel to identify productivity issues. Furthermore, the system allows the servicing personnel of the workshop to improve the asset utilization and throughput at the workshop by enhancing the transparency of the

progress of servicing. By closely tracking the automotive vehicle, the system identifies waiting time, progress, and delivery delays of the service. Consequently, the system enables the servicing personnel to fulfil the delivery standards as per expectations. Furthermore, the live progress of the automotive vehicle can be extended to owner of automotive vehicle or customer to enhance visibility into the service process from a customer point of view. Furthermore, the provided service process enables to achieve greater customer satisfaction. Apart from information related to the status and servicing of the automotive vehicle, the system also stores the information associated with an automotive vehicle in order to eliminate manual paper based data collections methods. Furthermore, the system analyses the information related to the operation of workshop and provides a retrospective and predictive analytics that can help the servicing personnel of the workshop to identify key problem areas and root causes of delays. Subsequently, the analytics report may provide operational benefits and further play a crucial part in capital investment decisions for the workshop by identifying the difficulties faced by the workshop. Additionally, the system also reduces ineffectual workforce by tracking the servicing personnel. This tracking data associated with the servicing personnel enables the servicing personnel to manage work load, evaluate performance and schedule work and investments.

It will be appreciated that the aforesaid system for managing operations in a workshop for automotive vehicles is not limited to a predefined number of automotive vehicles, and can be employed to operate in continuation for the consistent incoming and outgoing behaviour of the automotive vehicles.

Throughout the present disclosure the term *"workshop"* relates to a place or a site or an establishment, wherein a plurality of automotive vehicles undergoes activities such as servicing, maintenance, repair and

so forth. Typically, the automotive vehicle relates to a self-propelled wheeled vehicle, wherein the automotive vehicle is usually propelled by an internal combustion engine or an electric motor or a combination of both. For example, the automotive vehicle may include, but is not limited to, bicycles, motorcycles, cars, trucks, buses. Furthermore, the workshop relates to a repair shop or a garage, wherein the automotive vehicles are serviced by servicing personnel. Specifically, the servicing personnel relates to mechanics and technicians skilled in a variety of automobile makes and/or a specific area of a variety of automobile makes and/or a specific make of an automobile. The workshop performs a plurality of services on the automotive vehicles such as repair, maintenance, testing and quality check, washing and so forth. Furthermore, the automotive vehicles undergo at least one of the aforesaid operations carried by or supervised by at least one servicing personnel.

The identification module is detachably attached to an automotive vehicle in the workshop. In an embodiment, the identification module may be pasted on the automotive vehicle. In another embodiment, the identification module may be coupled to the automotive vehicle. Throughout the present disclosure, the term *"identification module"* relates to a device that is capable of identifying the automotive vehicle through a course of action of the automotive vehicle in the workshop. The identification module may be in a machine-readable format, or may be in a human readable format or a combination thereof. The identification module generally corresponds to obtaining a first information associated therewith, wherein the first information is used for identification of the automotive vehicle. Furthermore, the identification module is detachably attached to the automotive vehicle such that the identification module may be removed once the job is completed. Subsequently, the identification module can further be

coupled to another automotive vehicle for obtaining a first information associated with another automotive vehicle.

In an embodiment, the identification module may be a Bluetooth Low Energy (BLE) beacon detachably attached to an automotive vehicle. In such a case, a given BLE beacon is operable to transmit signals such that a first information associated with the given BLE beacon may be received. Consequently, the automotive vehicle, with the given BLE beacon attached thereto, is identified based on the received first information associated with the given BLE beacon. In another embodiment, the identification module may be a readable code such as a barcode or a QR code. In such a case, the readable code is scanned using a computing device such that a first information associated with the readable code may be obtained. In yet another embodiment, the identification module may be a Radio-frequency Identification (RFID) tag. In such a case, the RFID tag is read to obtain a first information associated with the RFID tag.

The service request module is in the workshop, wherein service request module is operable to receive the service request form the owner of the automotive vehicle and the identificationinformation from the identification module. Specifically, service request module is arranged in the workshop in a manner that a service request is created by the owner.

More specifically, the location of the automotive vehicle in the workshop is identified based on a reception module, from amongst the plurality of reception modules, receiving the first information. In an example, a reception module arranged in a wheel alignment area of the workshop may receive the first information from the identification module attached to an automotive vehicle. Consequently in such example, the location of the automotive vehicle in the workshop is identified as the wheel alignment area.

Throughout the present disclosure, the term *"plurality of tracking modules"* relates to devices operable to receive information from the identification module, the owner of the automotive vehicle and/or scan the identification module to acquire information therefrom. Furthermore, the plurality of tracking module are operable to convert the received or acquired information into desired output information. In other words, the tracking module utilises the identification module to determine a desired output information. Examples of the tracking modules include, but are not limited to, antennas, Radio Frequency (RF) readers, tuners, detectors, code readers, BLE chipsets, and Arduino BLE shields.

In an embodiment, the plurality of tracking modules may be affixed at strategic locations in the workshop. In another embodiment, the plurality of tracking modules may be portable computing devices, wherein servicing personnel in the workshop are provided with such portable computing devices for manual reception of the first information from the identification module.

In an embodiment, the identification module may be a BLE beacon. In such a case, the plurality of reception modules may be BLE chipsets. Furthermore, the plurality of reception modules are affixed at strategic locations in the workshop such that at least one of the BLE chipsets acquire first information (namely, signals) transmitted by the BLE beacons. Consequently, the desired output information (namely, information related to the automotive vehicle) is determined based on the first information transmitted by the BLE beacons. In another embodiment, the identification module may be a readable code such as a barcode or a QR code. In such a case, the plurality of reception modules may be code readers, wherein the code reader may also be installed in a computing device. Furthermore, the barcode may be

positioned or pasted at various locations on the automotive vehicle in order to increase the accessibility of the barcode.

The identity module is detachably attached to the one or more asset in the workshop, wherein the one or more asset may include but not limited to servicing personnel, tools, suoolies and so forth. Specifically, a given tracking module is detachably attached to a given servicing personnel to determine various attributes associated with the at least one servicing personnel (such as, a location, skill set and time availability) of the given servicing personnel in the workshop and with respect to the automotive vehicle. Consequently, such location of the given servicing personnel may be utilized to determine a type of servicing operation performed by the given servicing personnel. Optionally, examples of the tracking module may be, but are not limited to, a tag such as a bar code tag, a QR tag and so forth, a Bluetooth device, and a Radio Frequency Identification module, a GPS module.

In an example, the tracking module may be a Bluetooth device, detachably attached to a servicing personnel. In such a case, the Bluetooth device is operable to transmit signals which may be received by a plurality of Bluetooth reception modules. The Bluetooth reception modules may further provide the received signals to the server arrangement.

The data processing arrangement is operable to receive a second information related to status of the automotive vehicle and a third information related to servicing of the automotive vehicle. The third information comprises at least a service request by an owner of the automotive vehicle. Throughout the present disclosure, the term ‘data processing arrangement’ as used herein relates to programmable and/or non-programmable components configured to execute one or more software application for storing, processing and/or share data and/or set of instruction. Optionally, the data processing arrangement

can include, for example, a component included within an electronic communications network. Furthermore, the data processing arrangement includes hardware, software, firmware or a combination of these, suitable for storing and processing various information and services accessed by the one or more user using the one or more user equipment. Optionally, the data processing arrangement include functional components, for example, a processor, a memory, a network adapter, a display and so forth. Furthermore, the data processing arrangement may comprise a user interface rendered on the display thereof. Moreover, the data processing arrangement is operable to execute an application programming interface (API) thereon. Examples of the data processing arrangement include, but are not limited to, a mobile phone, a smart telephone, a Mobile Internet Device (MID), a tablet computer, an Ultra-Mobile Personal Computer (UMPC), a phablet computer, a Personal Digital Assistant (PDA), a web pad, a Personal Computer (PC), a handheld PC, a laptop computer, a tablet computer, and a desktop computer.

Optionally, the data processing arrangement is operable to receive the second information related to status of the automotive vehicle and the third information related to servicing of the automotive vehicle, wherein the second information and the third information may be provided by a user or extracted from a database. Specifically, the user is a person having knowledge pertaining to at least one of: automotive vehicle, business administration of the workshop, quality standards related to the automotive vehicles and/or the workshop. More optionally, the user may be an independent servicing personnel or a servicing personnel employed by the workshop. Such a servicing personnel may or may not be certified by at least one regulatory authority of automotive vehicles. Therefore, the user may input the second information related to status of the automotive vehicle and a third information related to servicing of the automotive vehicle using the user-interface of the data processing

arrangement. Specifically, the third information comprises at least a service request by the owner of the automotive vehicle. Alternatively or additionally, the user may input identification details (for example, such as a registration number of the automotive vehicle) in the data processing arrangement and the second information related to the status of the automotive vehicle may be extracted from the database based on the identification details.

Optionally, the data processing arrangement may be a portable or stationary, programmable or non-programmable device. More optionally, the data processing arrangement may be positioned at various vital locations in the workshop. In an example, the data processing arrangement may be positioned at vital locations in the workshop such as a vehicle reception stall, a repair stall, a maintenance stall, a testing and quality check stall, a washing stall and so forth. Optionally, the data processing arrangement may receive the second information related to status of the automotive vehicle at a location such as the vehicle reception stall. Furthermore, the data processing arrangement may receive the third information related to servicing of the automotive vehicle at various service stations in the workshop such as the repair stall, the maintenance stall, the testing and quality check stall, the washing stall and so forth.

Optionally, the data processing arrangement may receive the second information related to status of the automotive vehicle and the third information related to servicing of the automotive vehicle by employing a user interface, wherein the user interface may execute an application programming interface (API) that allows for interaction between the user and the data processing arrangement. The user interface is generally rendered upon a display screen of a data processing arrangement and allows for the data processing arrangement to receive input(s) from and/or provide output(s) to the user.

Optionally, the second information related to status of the automotive vehicle comprises at least one of: data related to an owner of the automotive vehicle, fuel information of the automotive vehicle, mileage of the automotive vehicle, physical condition of the automotive vehicle, operating condition of the automotive vehicle. The second information related to status of the automotive vehicle is provided by the owner of the automotive vehicle at the time of vehicle reception. The data related to the owner may include, but is not limited to, a name associated with the owner, a contact detail associated with the owner, and a financial detail associated with the owner. Moreover, the contact detail associated with the owner may be an electronic mail address, a postal address, a telephone number and so forth. Additionally, the financial detail associated with the owner may be an account number, a link for digital wallet and so forth. Furthermore, the fuel information of the automotive vehicle may be an indication of a level of fuel stored in the automotive vehicle. Moreover, the mileage of the automotive vehicle may be a number associated with the number of miles or an average distance that the automotive vehicle can travel on a specified quantity of fuel. Furthermore, the physical condition of the automotive vehicle may comprise information relating to state of a plurality of physical components in the automotive vehicle. Additionally, the plurality of physical components may be at least one of: exhaust, air filter, wheel, engine, bumper, tyre, coolant, clutch, horn, head-light, turn indicator, operating seat, side mirror, audio unit, central console, steering wheel and so forth. Furthermore, the operating condition of the automotive vehicle may comprise information relating to the malfunctions or deformities associated with the automotive vehicle. Moreover, the operating condition of the automotive vehicle may depend on a plurality of physical conditions. Additionally, the plurality of physical conditions may be at least one of: dent, paint, rust, brake fluid, surface conditions, spotting, engine-oil level and so forth.

Optionally, the second information related to status of the automotive vehicle may further comprise information pertaining to maintenance records, information related to past ownership and so forth.

Optionally, the third information related to servicing of the automotive vehicle comprises at least one of: estimated delivery time, estimated servicing cost, a type of a service required for the automotive vehicle. The third information also relates to the nature of service requests by the customer. It will be appreciated that the third information related to servicing of the automotive vehicle may be provided by a user at various service stations of the workshop. Notably, the service request by the owner of the automotive vehicle relates to a specified service to be performed on the automotive vehicle. In an example, the service request by the owner of the automotive vehicle may include request to rectify malfunctions faced by the automotive vehicle such as removal of dents. In another example, the service request by the owner of the automotive vehicle may include regular maintenance and quality check of the automotive vehicle. In another example, the service request by the owner of the automotive vehicle may include a plurality of services such as repair services, washing services, maintenance services and so forth. Typically, the estimated delivery time relates to a tentative date and an approximate time by which the services requested by the owner of the automotive vehicle and/or general servicing may be performed on the automotive vehicle. It will be appreciated that the estimated delivery date and delivery time are an uncertain date and time. However, the actual delivery date and delivery time may differ from the estimated delivery date and delivery time. Furthermore, the estimated servicing cost relates to an approximate monetary value associated with the services performed on the automotive vehicle. Additionally, the estimated servicing cost may differ from the actual invoice generated at the end of the services performed on the automotive vehicle. Furthermore, it will be appreciated that the invoice relates to a

statement generated at the time of delivery of the automotive vehicle. Specifically, the invoice comprises a cost related to one or more services performed on the automotive vehicle. Furthermore, the third information related to servicing of the automotive vehicle comprises the type of a service required for the automotive vehicle. Typically, the type of service required for the automotive vehicle may be an index a table, a list, a file or a directory that inherits one or more services to be performed on the automotive vehicle. Furthermore, the type of service required for the automotive vehicle may be deduced by the understanding the services requested by the owner of the automotive vehicle and interpretations made by the servicing personnel by analysing the physical conditions of the automotive vehicle and the operating condition of the automotive vehicle.

In an exemplary implementation, the third information related to servicing of the automotive vehicle such as the estimated delivery time and estimated servicing cost associated with the automotive vehicle may be calculated by the server arrangement, as explained in more detail hereinafter, using computing algorithms or mathematical tools or a combination thereof. In another example, the third information related to servicing of the automotive vehicle such as the estimated delivery time and estimated servicing cost associated with the automotive vehicle may be manually calculated and further provided to the server arrangement.

Optionally, the third information related to servicing of the automotive vehicle may further comprise information relating to progress in the servicing of the automotive vehicle. Furthermore, the information related to the progress in the servicing of the automotive vehicle may be continuously updated by the user associated with at least one of: the automotive vehicle and the service station.

Optionally, the data processing arrangement comprises a document management module to manage the second information related to status of the automotive vehicle. It will be appreciated that the document management module organizes, maintains and processes data to meet the needs of the on-going information lifecycles. Optionally, the document management module may manage the second information related to status of the automotive vehicle. Notably, the document management module may be used to extract the information regarding the automotive vehicle in the subsequent visits of the automotive vehicle at the workshop. Furthermore, the second information related to status of the automotive vehicle may be processed by the data processing arrangement to obtain a desired information pertaining to the automotive vehicle such as the data related to the owner of the automotive vehicle, the physical condition of the automotive vehicle, the operating condition of the automotive vehicle and so forth. In an example, the document management module may be communicably coupled to the data processing arrangement. In another example, the document management may be positioned inside the data processing arrangement.

The server arrangement is communicably coupled to the aforementioned trackingmodules and the data processing arrangement. Throughout the present disclosure, the term "*server arrangement*" relates to an arrangement of at least one server that, when operated, performs the aforementioned steps to obtain the location of the automotive vehicle and generates the service analytics report, determines a servicing strategy pertaining to the automotive vehicle based on the generated service analytics report, determines a servicing strategy pertaining to the automotive vehicle based on the generated service analytics report, maps the service analytics report, allocates the service request to the one or more asset and communicates the allocation details to the one or more asset.

The term "*server arrangement*" generally refers to an application, program, process or device in a client-server relationship that responds to requests for information or services by another application, program, process or device (a client) on a communication network. The term "*server arrangement*" also encompasses software that makes the act of serving information or providing services possible. Moreover, the term "*client*" generally refers to an application, program, process or device in a client-server relationship that requests information or services from another application, program, process or device (the server) on the communication network. Importantly, the terms "*client*" and "*server*" are relative since an application may be a client to one application but a server to another application. The term "*client*" also encompasses software that makes the connection between a requesting application, program, process or device and a server possible, such as an FTP client. Furthermore, the server arrangement is communicably coupled to the plurality of reception module and the data processing arrangement using a communication network. It will be appreciated that the communication network can be an individual network, or a collection of individual networks that are interconnected with each other to function as a single large network. The communication network may be wired, wireless, or a combination thereof. Examples of the individual networks include, but are not limited to, Local Area Networks (LANs), Wide Area Networks (WANs), Metropolitan Area Networks (MANs), Wireless LANs (WLANs), Wireless WANs (WWANs), Wireless MANs (WMANs), the Internet, radio networks, telecommunication networks, and Worldwide Interoperability for Microwave Access (WiMAX) networks.

In an example, the aforementioned trackingmodules may operate as a client to the server arrangement. In such a case, the server arrangement is coupled either directly, or via the communication network to the plurality of reception modules and is further operable to perform computing algorithms on the first information received from the

plurality of reception modules. In another example, the data processing arrangement may operate as a client to the server arrangement. In such a case, the server arrangement is coupled either directly, or via the communication network to the data processing arrangement and is further operable to perform computing algorithms on the second information related to status of the automotive vehicle and the third information related to servicing of the automotive vehicle received from the data processing arrangement.

Optionally, the server arrangement is operable to receive the tracking information of the servicing personnel from the tracking module. In such a case, the tracking module, detachably attached to the servicing personnel provides a real-time location associated with the user.

Optionally, the system is operable to process the tracking information of the servicing personnel to determine a type of servicing operation performed by the servicing personnel. Typically, the location associated with the servicing personnel enables the user to identify a zone of operation or a service area of the servicing personnel. The zone of operation or the service area related to the servicing personnel further enables the user to conclude a type of service and the automotive vehicle associated with the servicing personnel. Additionally, the tracking module also enables the user to keep a check on the productivity of the servicing personnel.

In an example, the tracking module may be a Bluetooth device, detachably attached to a servicing personnel. In such a case, the Bluetooth device is operable to transmit signals which may be received by a plurality of Bluetooth reception modules. The Bluetooth reception modules may further provide the received signals to the server arrangement. Consequently, the server arrangement is operable to analyse the received signals and identify a location associated with the servicing personnel. The location associated with the servicing

personnel may be repair zone. Notably, the location associated with the servicing personnel may be used to identify the working zone of the servicing personnel. Furthermore, the working zone of the servicing personnel can be used to conclude the service provided by the servicing personnel. The servicing personnel may provide an engine repair service. Furthermore, the server arrangement may consequently identify a location associated with an automotive vehicle in the working zone of the servicing personnel. Additionally, the server arrangement may thus identify the automotive vehicle being serviced by the servicing personnel.

Optionally, the server arrangement is operable to employ the processed tracking information of all servicing personnel in the workshop, to select the at least one servicing personnel for performing the at least one servicing operation that is to be performed for the automotive vehicle. In such a case, the availability of servicing personnel can be ascertained so that the desired servicing operation may be implemented by the servicing personnel. In case if there is shortage of servicing personnel due to on-going servicing operations then the server arrangement may also schedule and/or adapt the servicing strategy accordingly for the automotive vehicles for which a servicing request has been raised. Optionally, the system comprises a sensor arrangement comprising a plurality of sensors that are arranged in a plurality of bays within the workshop, wherein the server arrangement is communicably coupled to the sensor arrangement. The sensors arranged on bays may include ultrasonic sensors. The server arrangement is operable to receive sensor data from the plurality of sensors and process the sensor data to detect whether or not there exist vacant bay(s) within the plurality of bays. Such a system is beneficial in identifying available vacant bays that may be employed for servicing of automotive vehicle, further optimizing the service strategy pertaining to subsequent automotive

vehicles and thereby managing the workshop operation in an efficient and effective manner.

Optionally, the server arrangement is operable to optimize the servicing strategy pertaining to the subsequent automotive vehicles in the workshop based upon the selected at least one servicing personnel and a number of the detected vacant bay(s) within the plurality of bays. Such a system provides an optimal servicing strategy wherein the server arrangement, using computing algorithms or mathematical tools or a combination thereof, factors in the availability of vacant bay(s) within the plurality of bays, selects the servicing personnel based on processed tracking information of the servicing personnel, thereby managing operations in the workshop in an effective manner. Based on the processed information, an estimate time for delivery of the subsequent automotive vehicles may also be provided.

The server arrangement is operable to determine the location of the automotive vehicle in the workshop, based on the first information received by the at least one of the plurality of tracking module. Notably, the server arrangement is operable to perform at least one of: a computing algorithm, a mathematical calculation on the first information received from any of the aforementioned trackingmodules. Furthermore, the computing algorithm and/or the mathematical calculation is based on the architectural plan of the workshop and positioning of the plurality of tracking modules in the workshop.

In an embodiment, the identification module detachably attached to the automotive vehicle may be a BLE beacon. In such a case, the plurality of reception modules may be BLE chipsets. Consequently, at least one of the plurality of reception modules receives a first information from the identification module. Furthermore, the first information received by the at least one of the plurality of reception modules is provided to the server arrangement. Essentially, the server arrangement computes

a strength associated with the acquired signal from the plurality of reception modules from the identification module associated with the automotive vehicle. Furthermore, the strength associated with the acquired signal is interpreted to determine a location of the automotive vehicle. Furthermore, the identification module (namely, the BLE beacon) may transmit the signal periodically (for example, such as at periods of 5, 10, 15 20, 25, 30 seconds) to be received by at least one of the plurality of reception modules. In an example, the first information provided by the identification module detachably attached to the automotive vehicle may be received by one or more reception modules arranged in multiple service stations in the workshop. Examples of the service station may include the repair stall, the maintenance stall, and the washing stall. In such example, the signal received by the one or more reception modules in the maintenance stall may comprise a higher signal strength in comparison with the signal strength of signals received by one or more reception modules in the repair stall or the washing stall. Consequently, based on the signal strength of the signals received by the plurality of reception modules in the workshop include the repair stall, the maintenance stall, and the washing stall, the location of the automotive vehicle is determined as the maintenance stall.

In an embodiment, the identification module detachably attached to the automotive vehicle may be a barcode. In such a case, the plurality of reception modules may be barcode readers. Consequently, at least one of the plurality of reception modules receives a first information from the identification module. Specifically, the plurality of reception modules (namely, the barcode readers) may be handheld by the servicing personnel in multiple service stations in the workshop. Additionally or alternatively, the plurality of reception modules may be affixed in the multiple service stations in the workshop. Consequently, based on the location of the reception module reading (namely,

scanning) the barcode attached to the automotive vehicle, the location of the automotive vehicle in the workshop is determined.

The server arrangement is operable to generate the service analytics report based on the second information related to status of all automotive vehicles and the third information related to servicing of all automotive vehicles in the workshop. Throughout the present disclosure, the term *"service analytics report"* relates to an assessment and evaluation report yielded by assessing the second information related to status of all automotive vehicles and the third information related to servicing of all automotive vehicles in the workshop. Furthermore, the analytics report provides a meaningful insight into the operations of the workshop. Moreover, the analytics report provides assessment related to productivity and efficiency of the servicing personnel, utilization and management of resources (such as service stations, spare parts, servicing equipment) and so forth. Additionally, the service analytics report generated can be used to better understand and improve the performance of the workshop. The server arrangement is operable to perform at least one of: a computing algorithm, a mathematical calculation and a computing task to generate the analytics report. The analytics report is required to judge the overall efficiency of the workshop. Furthermore, the analytics report enables the user to draw conclusions to enhance the productivity of the workshop.

Optionally, the service analytics report may include, but are not limited to: a number associated with skilled labours, a number associated with unskilled and skilled labour, a number associated with effective services provided, a number associated with new customers of the workshop, time associated with each service, a number associated with ineffective services, a cause associated with the ineffective services, a method to

optimise the services performed, and a feedback associated with a customer of the workshop.

Optionally, in an example, the analytics report may be in form of a brief summary. In another example, the analytics report may be in form of a tabular report. In yet another embodiment, the analytics report may be in form of a matrix report.

Optionally, the server arrangement is operable to store, at the data repository, the second information related to status of all automotive vehicles and the third information related to servicing of all automotive vehicles in the workshop. Notably, information from the data repository is extracted and utilized for analysis of operation of the workshop, acquiring second information related to the status of the automotive vehicle at a time of re-servicing thereof and so forth.

Throughout the present disclosure, the term *"data repository"* refers to an organized body of digital information regardless of the manner in which the data or the organized body thereof is represented. Optionally, the data repository may be hardware, software, firmware and/or any combination thereof. For example, the organized body of related data may be in the form of a table, a map, a grid, a packet, a datagram, a file, a document, a list or in any other form. The data repository includes any data storage software and systems, such as, for example, a relational database like IBM DB2 and Oracle 9. Additionally, the database may be populated by data elements. Furthermore, the data elements may include data records, bits of data, cells, and all intended to mean information stored in cells of the data repository. The term "data repository" may be used interchangeably with the term "database".

In an embodiment, the server arrangement is operable to store the second information related to status of all automotive vehicles and the

third information related to servicing of all automotive vehicles in the workshop in the data repository, wherein the data repository is communicably coupled with the server arrangement. Alternatively, the server arrangement may comprise the data repository therein. Furthermore, the information stored in the data repository may be referred to for future applications. Additionally, the stored information enables a user to maintain a record of the services provided to each of the plurality of automotive vehicles. Moreover, the record maintained by the user enables the user to recognize previous services provided to an automotive vehicle in its subsequent visits. In an example, the user may refer the record to identify a consistent problem associated with the automotive vehicle. In another example, the user may refer the record to identify a regular customer. In another example, the user may refer the record to comprehend a maintenance history of the automotive vehicle.

Optionally, the server arrangement is further operable to communicate at least one of: the second information related to status of the automotive vehicle, the third information related to servicing of the automotive vehicle, ~~and~~ the location of the automotive vehicle in the workshop, the servicing strategy pertaining to the automotive vehicle, a current servicing status of the automotive vehicle, to a computing device associated with the owner of the automotive vehicle. Notably, the second information related to status of the automotive vehicle, the third information related to servicing of the automotive vehicle, and the location of the automotive vehicle in the workshop enables the owner of the automotive vehicle to be updated regarding the progress of the service of the automotive vehicle. Additionally, the aforesaid information pertaining to the automotive vehicle enables the owner to achieve a transparent perspective regarding the workshop. Furthermore, such aforesaid information can help the owner to draw conclusion regarding the regulation, efficiency and effectiveness of the

workshop. The owner can also keep a check on the services that are actually being performed on the automotive vehicle and if the workshop has charged accurately for the services provided.

Optionally, the server arrangement is operable to render at least one of: the second information related to status of the automotive vehicle, the third information related to servicing of the automotive vehicle, and the location of the automotive vehicle in the workshop on a computing device associated with the owner of the automotive vehicle. Specifically, the computing device associated with the owner of the automotive vehicle may be an electronic device that may be used for voice and/or data communication over a wired or wireless communication network. Additionally, the computing device includes a casing, a memory, a processor, a network interface card, a microphone, a speaker, a keypad, and a display. Furthermore, the display of the computing device is operable to render a user-interface to display the second information related to status of the automotive vehicle, the third information related to servicing of the automotive vehicle, and the location of the automotive vehicle in the workshop. Examples of the computing device may be, but are not limited to a mobile phone, a smart telephone, a Mobile Internet Device (MID), a tablet computer, an Ultra-Mobile Personal Computer (UMPC), a phablet computer, a Personal Digital Assistant (PDA), a web pad, a Personal Computer (PC), a handheld PC, a laptop computer, a tablet computer, and a desktop computer.

Optionally, the sever arrangement can communicate the second information related to status of the automotive vehicle, the third information related to servicing of the automotive vehicle, and the location of the automotive vehicle in the workshop, either directly or via a wireless network. Examples of the network may include, but are not limited to, , Local Area Networks (LANs), Wide Area Networks (WANs),

Metropolitan Area Networks (MANs), Wireless LANs (WLANs), Wireless WANs (WWANs), Wireless MANs (WMANs), the Internet, radio networks, telecommunication networks, and Worldwide Interoperability for Microwave Access (WiMAX) networks.

The server arrangement is operable to determine a servicing strategy pertaining to subsequent automotive vehicles in the workshop, based upon the generated analytics report. Throughout the present disclosure, the term *"servicing strategy"* relates to a plan of action pertaining to the subsequent automotive vehicles, based on the generated analytics report. The servicing strategy is determined by the server arrangement. Optionally, servicing strategy pertaining to the subsequent automotive vehicles in the workshop comprises at least one servicing operation that is to be performed by at least one servicing personnel, for the subsequent automotive vehicles. Optionally, the server arrangement is operable to predict an estimated time of executing the servicing strategy pertaining to the automotive vehicle. Such prediction can be based upon – time duration of executing the at least one servicing operation, availability of the at least one servicing personnel, experience of the servicing personnel, and servicing requirement of the automotive vehicles.

Optionally, the servicing strategy pertaining to the subsequent automotive vehicle comprises at least one servicing operation that is to be performed by at least one servicing personnel, for the subsequent automotive vehicles.

The present description also relates to the method as described above. The various embodiments and variants disclosed above apply mutatis mutandis to the method.

Optionally, the method further comprises employing the processed tracking information of all servicing personnel in the workshop to select the at least one servicing personnel for performing the at least one servicing operation that is to be performed for the automotive vehicle.

Optionally, the method further comprises:

- receiving sensor data from a plurality of sensors, wherein the plurality of sensors are arranged in a plurality of bays within the workshop; and
- processing the sensor data to detect whether or not there exist vacant bay(s) within the plurality of bays.

More optionally, method further comprises optimizing the servicing strategy pertaining to the subsequent automotive vehicle based upon the selected at least one servicing personnel and a number of the detected vacant bay(s) within the plurality of bays.

Optionally, the method further comprises communicating at least one of: the second information related to status of the automotive vehicle, the third information related to servicing of the automotive vehicle, the location of the automotive vehicle in the workshop, the servicing strategy pertaining to the automotive vehicle, a current servicing status of the automotive vehicle, to a computing device associated with an owner of the automotive vehicle.

Optionally, the method further comprises managing the second information related to status of the automotive vehicle using a document management module.

Optionally, the method further comprises storing, at a data repository, the second information related to status of all automotive vehicles and the third information related to servicing of all automotive vehicles in the workshop.

Optionally, the second information related to status of the automotive vehicle comprises at least one of: data related to the owner of the automotive vehicle, fuel information of the automotive vehicle, mileage of the automotive vehicle, physical condition of the automotive vehicle, operating condition of the automotive vehicle.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring to FIG. 1, there is shown a schematic illustration of the system **100** for managing operations in a workshop for at least one automotive vehicle, in accordance with an embodiment of the present disclosure. The system **100** comprises an identification module **104** detachably attached to an automotive vehicle **102** in the workshop. The system **100** further comprises a service request module **116** and a plurality of tracking modules, such as the tracking modules **106**, **108** and **110** arranged in the workshop. Furthermore, at least one of the plurality of tracking modules, such as the tracking modules **106**, **108** and **110**, is operable to receive a first information from the identification module **104** and a service request from the service request module **116**. The system **100** comprises a data processing arrangement **112** operable to receive a second information related to status of the automotive vehicle **102** and a third information related to servicing of the automotive vehicle **102**. Furthermore, the data processing arrangement **112** and the aforementioned tracking modules, such as the tracking modules **106 108** and **110**, are communicably coupled to a server arrangement **114**, wherein the server arrangement **114** is operable to determine a location of the automotive vehicle **102** in the workshop, generate an analytics report based on second information related to status of all automotive vehicles and third information related to servicing of all automotive vehicles in the workshop, and determine a servicing strategy pertaining to subsequent automotive vehicles in the workshop, based upon the generated

analytics report, allocates the service request to the one or more asset and communicates the allocation details to the one or more asset.

Referring to FIG. 2, illustrated are steps of a method **200** for managing operations in a workshop for at least one automotive vehicle, in accordance with an embodiment of the present disclosure. At a step **202,** a first information is received from an identification module at at least one of a plurality of tracking modules. Furthermore, the identification module is detachably attached to an automotive vehicle and the plurality of tracking modules are arranged in the workshop. At a step **204**, a service request from an owner of the at least one automotive vehicle is received. At a step **206**, information of one or more asset in the workshop is received at the plurality of tracking modules. At a step **208** a second information related to status of the automotive vehicle and a third information related to servicing of the automotive vehicle is received. At a step **210**, a location of the automotive vehicle in the workshop is determined, based on the first information received at the at least one of the plurality of tracking modules. At a step **212**, a service analytics report is generated based on second information related to status of all automotive vehicles and third information related to servicing of all automotive vehicles in the workshop. At a step **214,** a servicing strategy pertaining to the at least one automotive vehicles in the workshop is determined, based upon the generated analytics report. At the step **216**, the service request is allocated to the one or more asset, and at the step **218** the allocation details are communicated to the one or more asset.

The steps **202** to **218** are only illustrative and other alternatives can also be provided where one or more steps are added, one or more steps are removed, or one or more steps are provided in a different sequence without departing from the scope of the claims herein**.**

Modifications to embodiments of the present disclosure described in the foregoing are possible without departing from the scope of the present disclosure as defined by the accompanying claims. Expressions such as "including", "comprising", "incorporating", "have", "is" used to describe and claim the present disclosure are intended to be construed in a non-exclusive manner, namely allowing for items, components or elements not explicitly described also to be present. Reference to the singular is also to be construed to relate to the plural.

CLAIMS

1. A system for managing operations in a workshop for at least one automotive vehicle, the system comprising:

- an identification module that, when in operation, identifies the at least one automotive vehicle and location of the at least one automotive vehicle in the workshop, wherein the identification module is detachably attached to the at least one automotive vehicle in the workshop;

- a service request module that, when in operation, receives a service request from an owner of the automotive vehicle;

- a plurality of tracking modules that, when in operation, tracks the at least one automotive vehicle and one or more asset, in the workshop, wherein the plurality of tracking modules is arranged in the workshop and receive a first information from the identification module;

- a data processing arrangement that, when in operation, receives a second information related to status of the automotive vehicle and a third information related to servicing of the automotive vehicle, wherein the third information comprises at least the service request received from owner of the automotive vehicle; and

- a server arrangement communicably coupled to the plurality of tracking modules and the data processing arrangement, wherein the server arrangement, when in operation:

- determine a location of the automotive vehicle in the workshop, based on the first information received by the plurality of tracking modules;

- generate a service analytics report based on the second information related to status of all automotive vehicles and all assets, and the third information related to servicing of the at least one automotive vehicle in the workshop;

- determines a servicing strategy pertaining to the at least automotive vehicle based on the generated service analytics report;

- allocates the service request to the one or more asset; and
- communicates the allocation details to the one or more asset.

2. A system of claim 1, wherein the system further comprises an identity module detachably attached to the one or more asset in the workshop, wherein the identity module is communicably coupled to the data processing arrangement and the server arrangement.

3. A system of claim 2, wherein the the identity module that, when in operation receives the allocation details from the server arrangement.

4. A system of claim 1, wherein the servicing strategy pertaining to the automotive vehicles in the workshop comprises at least one servicing operation that is to be performed by the one or more for the automotive vehicle.

5. A system of any of the claims 1, wherein the system further comprises a sensor arrangement comprising a plurality of sensors that are arranged in a plurality of bays within the workshop, wherein the server arrangement is communicably coupled to the sensor arrangement, and wherein the server arrangement, when in operation:

- receives sensor data from the plurality of sensors; and
- processes the sensor data to detect whether or not there exist vacant bay(s) in the workshop.

6. A system of claim 1, wherein the server arrangement, when in operation, further optimizes the servicing strategy pertaining to the subsequent automotive vehicles in the workshop based upon the selected at least one servicing personnel and a number of the detected vacant bay(s) within the workshop.

7. A system of any of the claims 1 , wherein the server arrangement, when in operation, further communicates at least one of:

the second information related to status of the automotive vehicle, the third information related to servicing of the automotive vehicle, the location of the automotive vehicle in the workshop, the servicing strategy pertaining to the automotive vehicle, a current servicing status of the automotive vehicle, to a computing device associated with an owner of the automotive vehicle.

8. A system of any of the claims 1 , wherein the data processing arrangement comprises a document management module to manage the second information related to status of the automotive vehicle.

9. A system of any of the claims 1 , wherein the server arrangement, when in operation, stores information received from the identification module, the service request module, the plurality of tracking modules, the identity module and the sensor arrangement, at a data repository.

10. A method of managing operations in a workshop for at least one automotive vehicle, the method comprising:

- receiving a first information from an identification module at least one of a plurality of tracking modules, wherein the identification module is detachably attached to an automotive vehicle and the plurality of tracking modules are arranged in the workshop;
- receiving a service request from an owner of the automotive vehicle, the service request is received using a service request module;
- receiving information of one or more asset in the workshop at the plurality of tracking modules;
- receiving a second information related to status of the automotive vehicle and a third information related to servicing of the automotive vehicle, wherein the third information comprises at least the service request by an owner of the automotive vehicle;

- determining a location of the automotive vehicle in the workshop, based on the first information received at the plurality of tracking modules; and

- generating a service analytics report based on the second information related to status of all automotive vehicles and the third information related to servicing of the at least one automotive vehicle in the workshop;

- determining a servicing strategy pertaining to the at least one automotive vehicle, based up the generated service analytics report;

- allocating the service request to the one or more asset; and

- communicating the allocation details to the one or more asset.