TRANSPORT MANAGEMENT METHOD

TECHNICAL FIELD

This invention relates generally to a method for managing transportation service and commute planning.

Background

Commuters and transportation service providers are both parties to problems associated with daily commute between locations. Especially so for the commuter waiting at a boarding location for transportation service, for example a bus stop, it is ideal if the commuter can be notified on the arrival of the bus they are waiting for. Although current mobile device-based applications are available for estimating arrival time of a particular bus service at a scheduled location, the applications do not provide an accurate indication of the arrival of the bus and still leaves the commuter in long anticipation for fear of missing the bus.

US Patent Application 20020019759 describes a transportation planning method and apparatus that is more suited for freight-based implements. US Patent 5774827 describes a commuter route selection system enabling a commuter to preselect and a store commuter routes so that current travel time and current traffic condition associated with the commuter route may be obtained. However, the commuter using such a system will still be left wondering when the transport service will arrive at the location of the commuter due to the lack of an approach for doing so. Therefore, there exists a transport management method for addressing the foregoing problems.

Summary

In accordance with a first aspect of the invention, there is disclosed a transport management method comprising obtaining trip data comprising a start location and an end location associated with a commuter. The method further comprises selecting at least one of a plurality of vehicles. Each of the plurality of vehicles has vehicle data associated therewith and the vehicle data being associated with each of the plurality of vehicles comprising a

vehicle identifier and planned travel path. Each of the start location and the end location substantially coincides with the planned travel path associated with one of the selected at least one of the plurality of vehicles. The method further comprises providing the vehicle identifier of each of the selected at least one of a plurality of vehicles for access by the commuter.

In accordance with a second aspect of the invention, there is disclosed a transport management method comprising obtaining trip data comprising the trip data comprising a start location and an end location associated with a commuter. The method further comprises selecting one of a plurality of vehicles. Each of the plurality of vehicles has vehicle data associated therewith with the vehicle data associated with each of the plurality of vehicles comprising a vehicle identifier and planned travel path. Each of the start location and the end location substantially coinciding with the planned travel path associated with the selected one of the plurality of vehicles. The method further comprise alerting at least one of the commuter and an operator of the selected one of a plurality of vehicles to the arrival of the selected one of a plurality of vehicles at one of the start location and the end location.

In accordance with a third aspect of the invention, there is disclosed a transport management method comprising obtaining trip data comprising a start location and an end location associated with a commuter. The method further comprises selecting a plurality of vehicles with each of the plurality of vehicles having vehicle data associated therewith. The vehicle data associated with each of the plurality of vehicles comprising a vehicle identifier and planned travel path. Each of the start location and the end location substantially coinciding with the planned travel path associated with one of the selected at least one of the plurality of vehicles. The method further comprises providing the vehicle identifier of each of the selected at least one of a plurality of vehicles for access by the commuter.

Brief Description of the Drawings

FIG. 1 shows a system diagram of a transport management in accordance with an aspect of the invention;

FIG. 2 shows a process flow diagram of a transport management method according to a second aspect of the invention and utilized by the transport management system of FIG. 1; and

FIG. 3 shows a process flow diagram of a step of obtaining trip data in the transport management method of FIG. 2.

Detailed Description

An exemplary embodiment of the present invention, a transport management method 100 utilised by a transport management system 20, is described hereinafter with reference to FIG. 1 and FIG. 2. The transport management system 20 comprises a central controller 22 and a storage module 24 in communication with the central controller 22 for managing a plurality of vehicles 26. Each of the plurality of vehicles 26 has vehicle data associated therewith. The vehicle data comprises a vehicle identifier and a planned travel path to be taken by the vehicle 26. The vehicle identifier of each of the plurality of vehicles 26 at least one of uniquely identifies the vehicle 26 and indicates the planned travel path to be taken thereby. It is preferred that the vehicle data is stored in the storage module 24 for retrieval by the central controller 22.

In an implementation of the transport management system 20, the transport management method 100 initiates with obtaining trip data associated with a commuter 42 in a step 110. The trip data comprises a start location 44 and an end location 46. Next in a step 112, at least one of the plurality of vehicles 26 is selected. The selected at least one of the plurality of vehicles 26 is selected on the basis that each of the start location 44 and the end location 46 substantially coinciding with the planned travel path associated with one of the selected at least one of the plurality of vehicles 26. Once the at least one of the plurality of vehicles 26 is selected in the step 112, the vehicle identifier associated with each thereof is provided for access by the commuter 42 in a step 114. The start location 44 and the end location 46 can be vehicle stops, bus stops, waiting bays, building locations, landmarks, institutions and the like locations identifiable by the transport management system 20.

The commuter 42 is preferably pre-registered with the transport management system 20. As such, the trip data associated with the commuter 42 is obtained in the step 110 when proximity of the commuter 42 from the start location 44 is detected in a step 116. In response to proximity of the commuter 42 being detected in the step 116, activity profile associated with the commuter 42 is retrieved in a step 118. The activity profile is preferably stored in the storage module 24 of the transport management system 20.

Alternatively, the activity profile is stored on a computing device 50, for example a smart phone, a tablet or a personal transponder, associated with and preferably used by the commuter 42 or on a third party system in data communication with the transport management system 20. The activity profile is indicative of the expected commute activities and behavior of the commuter 42 and can be further indicative of the vehicle identifier and planned travel path of the preferred or most often used one or more of the plurality of vehicles 26. With reference to the start location 44, the end location 46 is generatable from the activity profile of the commuter 42 in a step 120. The activity profile of the commuter 42 can be specific to the time of day, day of the week, week of the month, month of the year, season, weather condition and operating schedule of institutions frequented by the commuter 42.

The step 116 of detecting proximity of the commuter 42 from the start location 44 can be effected by detecting proximity of the location of the computing device 50 from the start location 44 through location services or GPS transponder tracking of the computing device 50. Alternatively, the step 116 of detecting proximity of the commuter 42 from the start location 44 can be effected via detecting biometric signature of the commuter 42, for example facial recognition and thumbprint recognition, using a sensor or an image capture device 52 at the start location 44.

Alternatively or additionally, a kiosk system 54 is providable at the start location 44. The kiosk system 54 can comprise an input interface for sensing the computing device 50, for example by near field communication, for capturing keystroke input by the commuter for providing a commuter identifier for identifying the commuter 42. If the commuter is not previously registered with the transport management system 20 or if no data relating to the commuter 42 is retrievable from the storage module 24 or any third party system, the commuter 42 can proceed to use the kiosk system for entering the end location 46 and the like trip data in a step 122.

If the kiosk system 54 is used to capture the end location 46 and the like trip data from the commuter 42, the vehicle identifier will be provided to the kiosk system 54 in the step 114. This can be done by displaying the vehicle identifier on a visual display device. Alternatively or in addition, the previously unregistered commuter 42 may also provide contact details, for example a phone number, so that the vehicle identifier may be sent by messaging to the mobile device of the commuter 42. The kiosk system 54 does not exclude use thereof by commuters 42 who are pre-registered.

From the plurality of vehicles 26, for example public buses, there more than one or more than one combination of the vehicles 26 that can be selected in the step 112 for bringing the commuter 42 from the start location 44 to the end location 46. For such instances, there must be selection criteria that can be imposed. Therefore in step 112 of selecting at least one of a plurality of vehicles 26, the transport management system 20 have to first identify multiple combination of the plurality of vehicles 26 by identifying a plurality of vehicle sets in a step 124. Each of the plurality of vehicle sets can group one or more of the plurality of vehicles 26 for potentially bringing the commuter 42 from the start location 44 to the end location 46. Hence, each of the start location 44 and the end location 46 must coincide with the planned travel path of one or more of the plurality of vehicles 26 for each of the plurality of vehicle sets.

Next, status parameters 60 are generated or computed for each of the plurality of vehicle sets in a step 126. The status parameters 60 for each of the plurality of vehicle sets comprises at least one of current location of each of the one or more of the plurality of vehicles 26 in the respective one of the plurality of vehicle sets, estimated travel duration between the start location 44 and the end location 46 based upon the planned travel path of each of the one or more of the plurality of vehicles 26 in the respective one of the plurality of vehicle sets, number or quantity of scheduled stops between the start location 44 and the end location 46 based upon the planned travel path of each of the one or more of the plurality of vehicles 26, estimated arrival time of the commuter 42 at the end location 46 for the respective one of the plurality of vehicle sets, estimated occupancy rate of each of the

one or more of the plurality of vehicles 26 in the respective one of the plurality of vehicle sets between the start location and the end location, and traffic condition along the planned travel path of each of the one or more of the plurality of vehicles 26 between the start location 44 and the end location 46.

To obtain the status parameters 126 for each of the plurality of vehicle sets, the transport management system 20 further comprises and employs vehicle location tracking arrays and devices 62, for example having GPS modules and communication links on each of the plurality of vehicles 26 for updating the location of each of the plurality of vehicles 26 in substantially real-time to the central controller 22. Further, the traffic condition may be determined based on relative speed of travel for each of the plurality of vehicles 26, from image capture systems monitoring traffic at various locations and from third party traffic condition updates or data feed.

Next in a step 128, one of the plurality of vehicle sets is selected based on the status parameters 60 associated with the selected one of the plurality of vehicle sets satisfying commuter selection criteria. The one or more of the plurality of vehicles 26 grouped by the selected one of the plurality of vehicle sets is the at least one of the plurality of vehicles 26 selected in the step 112.

The commuter selection criteria is defined by the commuter 42 and generated from activity profile associated with the commuter 42 with the activity profile being indicative of the expected commute activities and behavior of the commuter 42. Although commute preference may be derived from the activity profile of the commuter 42, the commuter 42 may specifically indicate preference or select and prioritise the status parameters 60 using the computing device 50 associated therewith or during interaction thereof with the kiosk system 54. IF no selection has been made and more than one of the vehicle set 58 exists, a default selection criteria with a default weightage for each of the status parameter can be imposed by the central controller 22 to effect a selection in the step 128.

In the step 114 of providing the vehicle identifier of each of the selected at least one of a plurality of vehicles 26 for access by the commuter 42, the vehicle identifier of each of the selected at least one of a plurality of vehicles 26, for example the bus service number, is provided to the computing device 50 of the commuter 42 for display thereby. Alternatively or in addition, the vehicle identifier of each of the selected at least one of a plurality of vehicles 26 is provided for display by the kiosk system 54. For clarity, the central controller 22 can interact with the computing device 50 through messages sent to and received from the computing device 50, through a software application or mobile app operating on the computing device 50 or through web access via the computing device 50 through cloud services.

The transport management method 100 further comprises alerting the commuter 42 to the arrival of one of the selected at least one of a plurality of vehicles 26 at one of the start location 44 and the end location 46 in a step 130. This can be performed by sending a message to the computing device 50 or activating audible or vibratory alerts on the computing device 50. The alert is provided in the step 130 may be set to go off when the selected at least one of a plurality of vehicles 26 is within a pre-specified distance from one of the start location 44 and the end location 46. For the commuter 42 waiting for, for example a bus, at the start location 44, the alert enables the commuter 42 to not be constantly on the lookout for arrival of the bus when the bus is still a distance away and allows freedom to be engaged in other activities while waiting for the bus with reduced possibility of missing the bus. For the commuter 42 on, for example the bus, the alert also greatly reduces the possibility of the commuter 42 missing the intended stop for alighting at when being engaged in other activities while on the bus or if the commuter 42 is unfamiliar with the end location 46.

Alternatively or in addition, the traffic monitoring system 100 further comprises alerting an operator 66 of one of the selected at least one of a plurality of vehicles 26 in a step 132 prior to arrival thereof at one of the start location 44 and the end location 46. The operator 66 is preferably a bus driver with the alert being sent to a mobile communication device carried

by the bus driver or located within the bus. Alternatively, the operator 66 could be a remote human or automated pilot of the selected at least one of the plurality of vehicles 26.

When the transport management method 100 is applied to a pool of public vehicles or private hire vehicles, there is usually a possibility that more than one vehicle service is required to take the commuter 42 from the start location 44 to the end location 46. As such, there will be at least one interchange location for the commuter 42 to alight at for boarding onto the next vehicle upon arrival thereof.

Hence, the transport management method 100 further comprises identifying at least one interchange location 68 where the planned travel path of one coincides with the planned travel path of another of the plurality of vehicles 26 in a step 134, and provides the at least one interchange location 66 for access by the commuter 42.

At least one of the commuter 42 and an operator 66 of at least one of the selected plurality vehicles 26 is alerted to the arrival of at least one of the selected plurality vehicles 26 at the at least one interchange location 68.

The step 132 of providing the alert to the operator 66 of the vehicle 26 or bus enables the vehicle 26 or bus to stop at the start location 44 or the at least one interchange location 68 without physical flagging thereof by the commuter 42. The step 132 of providing the alert to the operator 66 of the vehicle 26 or bus also enables the vehicle 26 or bus to stop at the end location 46 or at least one interchange location 68 without active signaling, for example by ringing a bell in the bus, to the operator 66 of the vehicle 26 that the commuter wishes to alight.

The activity monitoring method 100 can be implemented in the form of a set of computer readable media storing program instructions that when executed cause an automated system having a processing unit, a memory, a plurality of sensors and a controller system to: obtaining the trip data associated with the commuter 42 in the step 110, select at least one of

the plurality of vehicles 26 in the step 112, and providing the vehicle identifier associated with each thereof for access by the commuter 42 in the step 114.

The set of computer readable media storing program instructions, when executed cause the automated system to further alert the commuter 42 to the arrival of one of the selected at least one of a plurality of vehicles 26 at one of the start location 44 and the end location 46 in the step 130 and alert the operator 66 of one of the selected at least one of a plurality of vehicles 26 in the step 132 prior to arrival thereof at one of the start location 44 and the end location 46.

Some of the attributes and further features of the transport management system 20 utilising the transport management method 100 is described hereinafter. The transport management system 20 can further use wireless sensors, which can be any type of sensors such as, PIR, temperature, proximity, etc. installed at a specific location in order to detect the presence of the user at that specific location. Also a camera, which can be of CCD, CMOS, IR, etc. can be used to detect the presence of the user. A cloud computing system is incorporated for use herein for implementing portions or modules of the transport management system 20. This particular cloud computing system, which is combined with an artificial intelligent system, performs real-time calculations in order to build a profile for each particular user, using each particular user's travelling pattern data and to build a profile for vehicles based on the travelling pattern data / the activity profile. For example, for a commuter, the time, date and bus number which a particular user travels each day, whether in a weekday, weekend and public holiday.

Preferably, the wireless communication between the user and the particular vehicle or vehicles is performed between one or more communication controllers. A boarding-point controller is locatable at the user's location or locations and an on-board communication controller which is locatable inside the vehicle or vehicles. The communication medium can be any type of wireless communication method such as, 3G, 4G, dedicated Wi-Fi network, etc.

When the presence of the user is detected by one or more wireless sensor or camera, the boarding-point controller will send a request to the remote database to check whether the detected user has a profile from the specific boarding point (the processing of data can be centralized or locally,onsite). If a profile exists, the profile data is received by the boarding-point controller and analysed. When the analysing is complete, the boarding-point controller sends a notification to the user's mobile communication device based application notifying the user, whether he/she wants to hail the particular vehicle which is related to the his/her travelling profile. In addition, other types of vehicles are also displayed in the notification, regardless the user has a previous profile from the specific boarding-point or not. The mobile communication device can be any type such as, smartphone, tablet, etc. If there is no specific profile for the user generated from that particular boarding-point, the data is sent to the cloud computing system in order to start building a profile.

Alternatively or additionally, the profile checking can be performed in a cloud computing system or can be performed locally at the boarding-point communication controller in which the data is stored locally inside the boarding-point communications controller. Further, when the user hails a particular vehicle, a notification will be sent from the boarding-point communication controller to the on-board communication controller which is located inside the vehicle. The panel inside the vehicle will notify the driver that a commuter is hailing the vehicle. This notification to stop the vehicle at the next boarding-point is sent to the vehicle when the vehicle is at a pre-set distance from the user's location. At the same time, the on-board communication controller will transmit the data which consists of the coordinates of the specific location which the requests received from, the total number of requests, date and time to a transportation operations command centre.

For instances where multiple vehicles receive the same notification, the on-board communication controllers communicate with each other in order to determine the suitable vehicle to stop at the requested location. When determining the suitable vehicle the on-board communication controller inside the vehicles initiates the optimization algorithm to select the most suitable vehicle. For example, when a commuter requests to board a bus

from a particular bus stop, the buses which have the same bus number/service number will receive the request. Once the request is received, the buses' on-board communication controllers initiate the optimization algorithm and communicate wirelessly with each other in order to determine which bus is most suitable to serve the request.

The boarding-point controller at the specific location requests, at a configurable time period, the location coordinates of the particular vehicle which the user has hailed. The on-board communication controller of the vehicle transmits, at a configurable time period, the location coordinates upon receiving the request from the boarding-point communication controller. Once the location coordinates are received, the boarding-point controller will perform real-time calculations in order to determine the remaining time for the vehicle to arrive at the requested user's location. When the vehicle arrives at the vicinity of the specific location of the user, where the area can also be configured, the boarding point communication controller is used to determine the presence of the vehicle in the area and the vehicle's on-board communication controller transmits the information to the boarding-point communication controller. The boarding-point communication controller transmits the notification to the mobile communication device of the user notifying that the vehicle is in the vicinity of the user's location. When a commuter is near to the location which he/she intends to alight, a notification is sent to the particular commuter. The notification is sent to the commuter's mobile communication device or the notification is displayed on the vehicle's on-board display.

For users without any type of mobile communication device, an input device such as a touch screen, keyboard, voice recognition is installed at a specific location which the user can perform the same steps as when using the mobile communication based application. Also the specific location is installed with a speaker where the user has the option to notify his/her the arrival of the reserved vehicle via the installed speaker or the mobile communication device. The user can choose the method of notification via the device based application or via the installed input device.

As apparent from the foregoing description of aspects of the invention, one of the main advantages of the present invention's process is the ability to notify the user the arrival of a vehicle. For example, when using the invention in a bus transportation system, when the commuter arrives at a bus stop and when the commuter selects the bus which the commuter needs to travel from the mobile based application, the invention's process will notify the commuter before the bus arrives the vicinity of the bus stop. This particular capability enables the commuter a higher level of convenience so that the commuter doesn't have to constantly check for the arrival of the bus.

Another advantageous feature in the present invention is that the user has the ability to hail an incoming vehicle. For example, when waiting for the bus, the commuter can notify the bus driver that he is waiting for the particular bus. This capability not only provides ease of travel for the commuter but also enables the transportation service provider to efficiently and cost effectively plan the usage of the respective resources which in turn helps to significantly decrease the operating cost. For example, accurately plan the number trains, buses, etc. required during the peak hours and non-peak hours.

Aspects of particular embodiments of the present disclosure address at least one aspect, problem, limitation, and/or disadvantage associated with existing transport management methods and systems. While features, aspects, and/or advantages associated with certain embodiments have been described in the disclosure, other embodiments may also exhibit such features, aspects, and/or advantages, and not all embodiments need necessarily exhibit such features, aspects, and/or advantages to fall within the scope of the disclosure. It will be appreciated by a person of ordinary skill in the art that several of the above-disclosed structures, components, or alternatives thereof, can be desirably combined into alternative structures, components, and/or applications. In addition, various modifications, alterations, and/or improvements may be made to various embodiments that are disclosed by a person of ordinary skill in the art within the scope of the present disclosure, which is limited only by the following claims.

Claims

1. A transport management method comprising:

obtaining trip data associated with a commuter, the trip data comprising a start location and an end location;

selecting at least one of a plurality of vehicles, each of the plurality of vehicles having vehicle data associated therewith, the vehicle data associated with each of the plurality of vehicles comprising a vehicle identifier and planned travel path, each of the start location and the end location substantially coinciding with the planned travel path associated with one of the selected at least one of the plurality of vehicles; and

providing the vehicle identifier of each of the selected at least one of a plurality of vehicles for access by the commuter.

2. The transport management method as in claim 1, obtaining trip data associated with a commuter comprising:

detecting proximity of the commuter from the start location;

retrieving activity profile associated with the commuter in response to the commuter being within proximity of the start location, the activity profile being indicative of the expected commute activities and behavior of the commuter; and

generating the end location from the activity profile.

3. The transport management method as in claim 2, detecting proximity of the commuter from the start location comprising at least one of:

detecting proximity of a computing device from the start location, the commuter being a user of the computing device; and

detecting biometric signature of the commuter at the start location.

4. The transport management method as in claim 1, obtaining trip data associated with a commuter comprising:

receiving the trip data from a kiosk system at the start location, the trip data being capture by the kiosk system during interaction by the commuter therewith.

5. The transport management method as in claim 4, providing the vehicle identifier of each of the selected at least one of a plurality of vehicles for access by the commuter comprising:

providing the vehicle identifier of each of the selected at least one of a plurality of vehicles to the kiosk system for display thereby.

6. The transport management method as in claim 1, selecting at least one of a plurality of vehicles comprising:

identifying a plurality of vehicle sets, each of the plurality of vehicle sets comprising one or more of the plurality of vehicles, each of the start location and the end location coinciding with the planned travel path of one or more of the plurality of vehicles for each of the plurality of vehicle sets;

generating status parameters for each of the plurality of vehicle sets, the status parameters of each of the plurality of vehicle sets comprising at least one of:

current location of each of the one or more of the plurality of vehicles;

estimated travel duration between the start location and the end location based upon the travel path of each of the one or more of the plurality of vehicles;

quantity of scheduled stops between the start location and the end location based upon the travel path of each of the one or more of the plurality of vehicles;

estimated arrival time of the commuter at the end location;

estimated occupancy rate of each of the one or more of the plurality of vehicles between the start location and the end location; and

traffic condition along the travel path of each of the one or more of the plurality of vehicles between the start location and the end location, and

selecting one of the plurality of vehicle sets based on the status parameters associated therewith satisfying commuter selection criteria, the one or more of the plurality of vehicles of the selected one of the plurality of vehicle sets being the selected at least one of the plurality of vehicles.

7. The transport management method as in claim 6, the commuter selection criteria being one of defined by the commuter and generated from activity profile associated with the commuter, the activity profile being indicative of the expected commute activities and behavior of the commuter.

8. The transport management method as in claim 1, providing the vehicle identifier of each of the selected at least one of a plurality of vehicles for access by the commuter comprising:

providing the vehicle identifier of each of the selected at least one of a plurality of vehicles to a computing device for display thereby, the commuter being a user of the computing device.

9. The transport management method as in claim 1, further comprising:

alerting the commuter to the arrival of one of the selected at least one of a plurality of vehicles at one of the start location and the end location.

10. The transport management method as in claim 1, further comprising:

alerting an operator of one of the selected at least one of a plurality of vehicles prior to arrival thereof at one of the start location and the end location.

11. A transport management method comprising:

obtaining trip data associated with a commuter, the trip data comprising a start location and an end location;

selecting one of a plurality of vehicles, each of the plurality of vehicles having vehicle data associated therewith, the vehicle data associated with each of the

plurality of vehicles comprising a vehicle identifier and planned travel path, each of the start location and the end location substantially coinciding with the planned travel path associated with the selected one of the plurality of vehicles; and

alerting at least one of the commuter and an operator of the selected one of a plurality of vehicles to the arrival of the selected one of a plurality of vehicles at one of the start location and the end location.

12. A transport management method comprising:

obtaining trip data associated with a commuter, the trip data comprising a start location and an end location;

selecting a plurality of vehicles, each of the plurality of vehicles having vehicle data associated therewith, the vehicle data associated with each of the plurality of vehicles comprising a vehicle identifier and planned travel path, each of the start location and the end location substantially coinciding with the planned travel path associated with one of the selected at least one of the plurality of vehicles; and

providing the vehicle identifier of each of the selected at least one of a plurality of vehicles for access by the commuter.

13. The transport management method as in claim 12, further comprising:

alerting at least one of the commuter and an operator of at least one of the selected plurality vehicles to the arrival of one of the selected plurality vehicles at one of the start location and the end location.

14. The transport management method as in claim 12, further comprising:

identifying at least one interchange location where the travel path of one coincides with the travel path of another of the plurality of vehicles; and

providing the at least one interchange location for access by the commuter.

15. The transport management method as in claim 14, further comprising:

alerting at least one of the commuter and an operator of at least one of the selected plurality vehicles to the arrival of at least one of the selected plurality vehicles at the at least one interchange location.