

**METHOD TO IMPROVE LIVE TRACKING ACCURACY OF DRIVER LOCATION ON
SUBSCRIBER APPLICATION**

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Technical Field

The invention relates to the online transportation services field, and in particular with regard to the method to improve live tracking accuracy of driver locations on subscriber application.

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Background of the Invention

In the current live tracking vehicle tracking architecture, the driver sends their live location every 10 seconds and subscribers call the system every 5 seconds to acquire this information. This, delays the driver location displayed on the subscriber app for 10 seconds. If translated to a distance it turns out to be approximately 150m in some cases (considering that the driver's speed is approximately 50 km/h). This drawback is worsened when the driver is near the pick-up point. It is therefore necessary to reduce the delay so that subscribers may obtain more accurate driver location.

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Currently, there are several technologies in order to improve the tracking accuracy of driver including US patent US6611755B1 which discloses a vehicle fleet management information system that identifies the location and the movement direction of each vehicle in the fleet in real-time, and automatically reports that information, as well as the status of the predefined events in which the vehicle is used, directly to the fleet manager. Each fleet vehicle has an assigned time slot to transmit its reporting information via the communication network without interrupting the transmission from other vehicles in its respective time slots. Time control phase lock loop (PLL) provides precise time

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synchronization for time correction of the global positioning system-based time reference. Dual-band full-duplex interface from the network having TDMA on one half and broadcast on the other half. The microprocessor time processing unit in the network component synchronizes precise clock. Spatial diversity performed on messages sent by received vehicles avoids data corruption. Different vehicles have different periodic transmission intervals, by dynamically allocating slots for different update level. Additional reporting slots allow fast reporting of critical data by individual vehicle transmitters regardless of slower periodic transmission intervals.

US Patent US10760917B2 discloses a transportation management system that matches drivers with subscribers. After the subscriber has been picked up by the driver, the navigation route from the subscriber pick-up location to the next driver stop is displayed to the driver on the cellular computing device. Before picking up the subscriber, only the initial part of the navigation route is shown to the driver. The number of initial portions displayed to the driver is determined dynamically according to the complexity of the navigation.

International patent publication WO 2016/187069 A1 which discloses a system that operating on a computing device may determine a set of location data points of computing device during the advancement of a transport service, and may transmits a set of location data points to a network service. The system may send, to the network service, a message indicating that the transport service is complete. The system determines whether the determined time duration has elapsed since the delivery of the message indicating that the transport service is complete, where the predetermined message has not been received by the application from the network service. The predetermined message is associated with a confirmation that the transport service has been processed

by the network service. If the determined time duration has elapsed during which the predetermined message has not been received, the system will display the first content opposed to the second content on the computing device.

5 US patent publication US2012158299A1 discloses a system and method which finds the fastest route between two locations on a chart with an efficient multi-sided boundary in time and space. In some embodiments, Dijkstra's algorithm is split into separate universes when a) the multi-edged boundary is reached, and b) along
10 each edge of the multi-edged boundary. In some embodiments, separation is performed for the purpose of finding the fastest (i.e. lowest weight) route to the intersections at the ends of the boundaries. These universes, in some embodiments, are combined or discarded when an intersection at the end of the boundary is found.
15 Using these systems and methods, in some embodiments, the shortest route between two locations of the multi-edged road network may be determined efficiently.

US Patent publication US2014129135A1 which discloses a system and method of providing position information of transit object to
20 the computing devices is provided. Global positioning satellite (GPS) information of the transiting object may be received periodically. For each of the multiple GPS information, one or more candidates of transit system point may be identified based on the GPS information. Using one or more candidate points, the most
25 possible route of travel may be determined. Additional positional points along the most possible route of travel may be extrapolated and sent to the computing device.

Above-mentioned patent publications have shortcomings, live tracking of driver location still having delay of the driver
30 location that is displayed on the subscriber application. Therefore, the technology that able to improve live tracking accuracy of driver location on subscriber application is needed.

Summary of the Invention

The object of the invention is to solve the shortcomings of the delay of driver location displayed on the subscriber application.

Further object of the invention is to improve the live tracking accuracy of driver location on subscriber application.

The technical solutions to achieve the objectives of the invention are as follows.

In one aspect, the present invention provides a system to improve the live tracking accuracy of driver location on subscriber applications by increasing the frequency of driver polling dynamically.

Preferably, a system to improve the live tracking accuracy of driver location on subscriber application includes: DLS (Driver Location Services) unit (5), Kafka Topic unit (6), DLOR (Driver Location on Road) unit (7), live tracking subsystem (8) and database (9).

In another aspect, the present invention provides a method to improve the live tracking accuracy of driver location on subscriber application.

Preferably, the method to improve the live tracking accuracy of driver location on subscriber application is performed by increasing the frequency of driver polling dynamically which performed as long as the booking status is On the Way for Pick-up, which is a few seconds (initial X seconds) after the driver receives the booking and the driver location is close to the pick-up location. These time duration and short distance is based on the configuration on the driver application.

With this dynamic polling, it may to reduce the delay of the driver location displayed on the subscriber application by increasing the frequency of driver ping, thus subscribers may

acquire more accurate driver location.

Brief Description of The Figures

Further, the embodiments of the present invention are described in detail in relation to the accompanying drawings, wherein:

Figure 1 is a block diagram of the system to improve the live tracking accuracy of driver location on subscriber applications according to the present invention;

Figure 2 is a flowchart of the location ping according to the invention;

Figure 3 is a flowchart of the updates of the driver location from the driver application to the subscriber application;

Figure 4 is a chart showing the impact of the increase in the dynamic polling frequency; and

Figure 5 is a chart showing the impact of the increase in the dynamic polling frequency.

Detailed Description

The present invention is described below with reference to specific examples. Those skilled in the art can understand that these examples are only used to illustrate the present invention and do not limit the scope of the invention in any way.

Referring to Figure 1 which shows a system to improve live tracking of driver location (4) on the application on the subscriber device. The system (4) consists of DLS (Driver Location Services) unit (5), Kafka Topic unit (6), DLOR (Driver Location on Road) unit (7), live tracking subsystem (8) and database (9). The system (4) is connected to multiple driver devices (1) and multiple subscriber devices (2) via a network (3). The driver device (1) and the subscriber device (2) are mobile devices including cellular phones or smartphones, personal digital assistant (PDA), laptop

computers, tablet computers and other communication devices capable of providing connectivity to the system (4) via one or more internet networks (3).

Based on booking status and the current location of the driver to the pick-up location, system (4) will increase the frequency of polling only in the following scenario due to the cost of maintaining the high frequency of polling is higher and more battery consuming on the driver app:

- Booking status: On the way for pick-up

- a few seconds (*initial x seconds*) after the driver accepts the booking
- The driver location is close to the pick-up location.

This time duration and short distance will be based on the driver application configuration.

Sending location ping at normal frequency is also performed during other scenarios:

- Before accepting booking

- Booking status: On the way to drop-off location.

Referring to Figure 2, it is shown in detail the flowchart of when to send location ping is performed based on the above scenario. In the online transportation system, subscribers can place an booking through an application installed on the user device (2). The booking of interest is transportation booking, food booking, goods delivery, shopping delivery, etc. When a subscriber through the subscriber device (2) places a booking, the driver will receive the booking (100) on the driver device (1). Then, the system (4) will determine whether the booking status is On the Way for Pick-up (200) or On the Way to Drop-off Location (300). If the booking status is On the Way to Drop-off Location (300), the system (4) sends location ping with normal frequency (700) to the subscriber device (2). If the booking status is On The Way For Pick-up (200), the system (4) checks whether it is a

few seconds (initial X seconds) after the driver has received the booking (400), if yes, the system (4) sends location ping with high frequency to the subscriber device (2), if no, the system (4) determines whether the driver location is close to the pick-up location (500), if yes, the system (4) sends location ping with high frequency (600) to the subscriber device (2), if no, the system (4) sends location ping with normal frequency (700) to the subscriber device (2).

Referring now to Figure 3 which is a flowchart of the driver location updates from the application on the driver device (1) to the application on the subscriber device (2). The driver device (1) will continue to transmit usual regular location ping (at 10 second intervals) and will also send multiple aggressive location ping (at intervals of <10 seconds). Based on polling and drop-off location configuration to the driver location, sending location ping at normal or higher frequencies. Higher frequencies ping will be given tags, which with its backend will differentiate it with normal frequency ping. System that using this driver location ping (Driver Location Services, DLS) (5), will not consider this aggressive ping to be published to topic kafka in the flow. Instead, DLS (5) will publish this aggressive ping to separate kafka topic (6) (kafka is message broker). Backend service of driver location (Driver Location on Road, DLOR) (7), will receive this ping from new kafka topic (6) through firehose. This high frequency ping will power the live tracking subsystem (NAVIC) (8) to provide a more accurate driver location on the subscriber device (2).

To measure the impact of this dynamic polling, inventors have been experimenting by increasing the polling frequency of a group of motorcyclists/car driver. Measurement of the difference between subsequent `driver_last_location` is performed. `driver_last_location` is the most recent driver location retrieved

by the subscriber application from the system (*backend*) (4) anytime. From the experimental results, an increase in the fluency metric is found as measured by the following 2 parameters:

1. 0 distance updates are becoming less frequent,

2. When there is a new location update, the distance gets shorter.

1. 0 distance updates are becoming less frequent:

- For car transportation services (*gocar*) : 60% to 55%

- For motorbike transportation services (*goride*) : 70% to 60%.

Figure 4 is a chart showing the impact of the increase in the dynamic polling frequency i.e. 0 distance updates are becoming less frequent. This drop means that some of the 0 distance updates are the result of the absence of a recent update of driver location.

2. When there is a new location update, the distance gets shorter.

Distance from the subsequent driver last location (*driver_last_location*) become closer:

- For car transportation services (*gocar*) : 66m to 57m

- For motorbike transportation services (*goride*) : 66m to 50m.

Figure 5 is a chart showing the impact of the increase in the dynamic polling frequency i.e. subsequent drivers last locations become closer.

The invention has been described in detail above, however, the invention should not be construed as being limited by the detailed description but can be modified as may be understood by those skilled in the art as long as it does not deviate from the scope of the invention.

Claims

1. A method to improve live tracking accuracy of driver location on a subscriber application using a system to improve live tracking accuracy of driver location, the method comprising:

accepting a booking from subscriber on a driver device;

determining, by the system, whether a booking status of the booking is On the Way for Pick-up or On the Way to Drop-off Location;

if the booking status is On the Way to Drop-off Location, sending, by the system, location pings at a first frequency to a subscriber device;

if the booking status is On the Way for Pick-up, checking, by the system, whether it is within an initial period after the driver has received the booking;

if yes, sending, by the system, location pings at a second frequency, which is higher than the first frequency, to the subscriber device;

if no, determining, by the system, whether the driver location is within a threshold distance from the pick-up location;

if yes, sending, by the system, location pings at the second frequency to the subscriber device; and

if no, sending, by the system, location pings at the first frequency to the subscriber device.

2. The method to improve live tracking accuracy of driver location on subscriber application according to claim 1, wherein sending location pings at the second frequency comprises:

sending aggressive location pings based on polling and drop-off location configuration to the driver location;

giving tags on aggressive location pings to differentiate them from pings sent at the first frequency;

publishing aggressive location pings to a separate Kafka topic;

receiving the aggressive location pings from the separate Kafka topic through a firehose; and

5 giving the aggressive location pings to a live tracking subsystem (NAVIC).

3. The method to improve live tracking accuracy of driver location on subscriber application according to claim 2, wherein
10 the aggressive location pings are sent at intervals of less than 10 seconds.