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Complete Tracking of Vehicles Using GPS Technology

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Abstract:
Now a day's without transportation we won't live in this world. May be the transport for personal use or for public use. In transportation most of time we need information about vehicles for example: government transport vehicles for public service, college bus transportation, personal vehicles etc. Why is it necessary to track transport vehicles? Here is the answer, so many times we are travelling, and we don't know where the vehicle and we are waiting for long time, it is difficult to give better service by transport department but we have solution if we know that exact position of that accidental place then we can help them easily. To do like this we want some advanced technology i.e. GPS technology. GPS means **Global Positioning System** is a series of satellites owned by the US government that broadcasts signals that GPS receivers on the surface of the planet can use to determine position through triangulation. We can also use this technology to reduce our time whenever we are waiting for buses by knowing their location on our mobile phones. If vehicle has been stolen then also we can track our vehicles.
Every GPS tracking system is a common approach to get vehicle location information in real-time. We proposed a GPS tracking system called "trackME" that is composed of commodity hardware i.e. GPS enabled Android Mobile as GPS Device, open source software (GCM Architecture) and an easy-to-manage user interface via a web server with Google Map software. The system includes a GPS/GPRS module for location acquisition and message transmission, GCM to transfer of location information, and third party App Server to temporary store location. It will show the correct position of the vehicle to the user on the basis of the location information sent by the GPS Device through GCM.

I. Introduction:

So many times we are travelling by private agencies and as we know that some of them only providing good service to their passenger. But all time we won't get better service by private or public transport. So due to this reason here I am going to introduce a better solution to reduce this problem. Among all of us some of them are above 50-60 age. At that time they can't wait for long time. For them also we are providing exact location of vehicle on their mobile phones using GPS technology as I explained above. In this real-time tracking system I am using this GPS technology for college buses to track them and it is better service to college students so that they can save their valuable time and money, and also it will use for antitheft application by determining the exact position of college buses.

Here student or college faculty should be registered on this application i.e. on "trackME" application. Their information we will save on a third party database server (like cloud database using Amazon SimpleDB) so that no need to provide the security from client side. After registration we will provide UserName and Password to each of them so

they can login in application. After login , we provide the list of buses which belongs to their college, and after making oneClick they can find the exact position of bus, in this way we will save their valuable time.

II. Literature Survey:

As I said our application is based on GPS (Global Positioning System) and GCM (Google Cloud Messaging) to track the college vehicles. This application is combination of Android Technology and Web Services. By using the GPS and GCM technology we will show the position of vehicle on Google Map to the user who requested for.

III. System:

As I explained above the system needed to develop this application needs four components as Web Server to store the information, GPS device to track the vehicle, GCM and Client side application.

In this web server is Cloud based Amazon service i.e. Amazon SimpleDB, it is fully secured online database to store information. It is just like our

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localhost database but difference is that it has storage capacity much greater than localhost database with full of security. Second is GPS device to track the vehicle. This is the heart of our application without this we can't build this application. For GPS device we have two options : first ,we can use our Android mobile as GPS device as we know now day's every Android mobile is with GPS service , second is we can separately buy the GPS device that we can track using our application by fitting it into our vehicle. Second option will go costly. Third component is GCM to send and receive the messages through internet. Whenever we track any GPS device then their co-ordinates will send by GCM technology. Last is a user friendly android application interface for clients.

System Building Blocks:

1) GPS Technology:

The **Global Positioning System** (**GPS**) is a space-based satellite navigation system that provides location and time information in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. The system provides critical capabilities to military, civil and commercial users around the world. It is maintained by the United States government and is freely accessible to anyone

3) Google Map:

Google Map is very popular free software that provides maps by satellite images around the world. Google Map is a version of Google Earth that shows the maps on-line using with a web server and a web browser. The program provides plug-ins for community to show objects in the program. Such objects are, for example, 3D objects of skyscrapers using Sketch Up software, pin objects to indicate a point of interest (POI), and line objects to show a track. To show such objects, Google Earth utilizes its own programming language called KML (Keyhole Markup Language) which is an extensible markup language (XML) that is written to describe how the objects are rendered. The KML-based objects can

with a GPS receiver. The GPS system concept is based on *time*. The satellites carry atomic clocks which are synchronized and very stable; any drift from true time maintained on the ground is corrected daily. Likewise, the satellite locations are monitored precisely. User receivers have clocks as well. However, they are not synchronized with true time, and are less stable. GPS satellites transmit data continuously which contains their current time and position. A GPS receiver listens to multiple satellites and solves equations to determine the exact position of the receiver and its deviation from true time. At a minimum, four satellites must be in view of the receiver in order to compute four unknown quantities (three position coordinates and clock deviation from satellite time).

2) GCM:

Google Cloud Messaging (GCM) is a service that enables developers to send data from servers to both Android applications or Chrome apps and extensions. The service provides a simple, lightweight mechanism that servers can use to tell mobile applications to contact the server directly, to fetch updated application or user data. The service handles all aspects of queuing of messages and delivery to the target application running on the target device.

also be used with Google Map to show line and pin objects. In our proposed system, we employ Google Earth software and Google Map as our choices of track displays to show locations of vehicles.

4) Algorithm:

GPS Device receives the GPS co-ordinates and sends it to the server after every fixed time. The server receives the information from the GPS Device and stores it. The user requests for a particular vehicle. The server processes the request and shows the latest position to the client. *System Diagram:*

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IV. Implementation:

A. GPS Tracking Module:

The GPS Tracking Module is based on the GPS enabled android device. The android device must be based on version 2.2 or more. This type of mobile device can have the access to GCM service.

B. GPS-Tracking Firmware:

The firmware of the GPS Tracking module is written and compiled using an open source compiler. The firmware performs three phases, the initialization, the GPS position reading, and the GPS data formatted and transmitted to GCM server via GPRS networks. The initialization phase prepares the module for reading and transmitting location information. It is composed of three functions. The first function is to initialize the GPS Device for GPS reading. The second function is to initialize GPRS/GPS module to set up parameters to warm up GPS engine, to make a connection to a GPRS network and to connect to the GCM server via TCP/IP socket. The third function is to initialize MMC module into SPI mode for data read/write.

C. GCM Server:

Once the GPS Tracking Module is connected to GPRS networks, it transmits position information to GCM Server. The server has three functions to receive the information from the GPS device, to send the information to the application server, and to send the information to the client device when requested. The receiving function opens a non-blocking socket to receive data from multiple GPS Tracking Modules simultaneously.

Android Mobile in the vehicle gets its position using GPS. From that position we get the latitude, longitude & time. And we have to send that position to App Server through GCM. This process repeat after every 2 or 5 minutes i.e. set by Admin of the system.

D. Application Server:

The application server receives the information from the GCM server. The storing function formats the receiving data into our database that is designed to provide real-time query response for real-time tracks and to provide search query response for the post- analysis of vehicle tracks. On request from the client for location for a particular vehicle the server sends the information to GCM server and GCM server then sends the location information to the client.

V. Conclusion & Future Scope:

In this paper we have proposed a GPS tracking system which will track the current position of the vehicle and show it to the user who wants to travel by the vehicle. The system will reduce the waiting time for travelling. The GPS Device will send vehicles' current position to the server. The server on request from the client will show the client the current location of the vehicle on the Google Map.

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