Real Time Tracking of Complete Transport System Using GPS in Android System

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Abstract:

Due to the high cost of time several methods are proposed to reduce the wastage of time on the bus station or waiting for the bus for more time is not preferred. So, we require one racking system to track the Complete Transport System. Every GPS tracking system is a common approach to get vehicle location information in real-time. We proposed a GPS tracking system called tRackIt 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. Our proposed system is not tested yet. But 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.

Keywords: *GPS, GCM, Android, Tracking, Transport tracking, Vehicle Tracking*

1. Introduction:

Now a day's lot of people travels through travel agency vehicles and access their services. The problem that arises is the user as well as the travel agency owner don't have the exact information of the state of vehicle i.e. its exact position.

That's where our application comes into picture. Real Time tracking of all vehicles of travel agency using Global Positioning in this project is on tracking travel agency vehicles. It will help both the passengers and the agency to track the vehicles, to get real time position of the System as the name suggests, it uses GPS to track any vehicles. Our area of concentration vehicles, changed routes (If any), it can also act as an anti theft application by detecting the exact position of the vehicles.

The application will ask the user (Passenger) to enter the bus number in which he/she wishes to travel. Then the user will enter the source and the destination of their journey.

After entering all the necessary information, the user will click on the locate button. Upon clicking the locate button, the user will get all the detailed information about the location of the bus, the fare user has to pay for his/her journey.

2. Literature Survey:

As said above, our proposed system will show user the real time location of the vehicle on the Google Map by using GPS (Global Positioning System) & GCM (Google Cloud Messaging). The existing system of vehicle tracking includes the tracking of the vehicle by using GPS and web server for showing the location on the Google Map whereas, our proposed system will show the position of the vehicle to the user who requests the location.

3. System:

Our real-time tracking management system is composed of four components, a GPS Tracking Device, a server and a database, GCM & Client application as shown in Figure 1. The GPS tracking is done by GPS enabled android mobile that transmits location information to the server through GPRS & GCM networks. The server is a personal computer that receives the information and put it in the database. The database formats the information in a special form that can search and display using Google Earth software or Google Map.

3.1. System Building Blocks:

I. GPS Technology:

Global Positioning System (GPS) is a system composed of a network of 24 satellites of the United States, which are originally used in military services, and later allowed for commercial use. The satellites periodically emit radio signal of short pulses to GPS receivers. A GPS receiver receives the signal from at least three satellites to calculate distance and uses a triangulation technique [1] to compute its two-dimension (latitude and longitude) position or at least four satellites to compute its three-dimension (latitude, longitude, and altitude) position. Once a location is computed, it can calculate an average speed and direction of traveling. Therefore, GPS is a key technology for giving device its position.

II. GCM:

Google Cloud Messaging for Android (GCM) is a service that allows you to send data from your server to your users' Android-powered device, and also to receive messages from devices on the same connection. The GCM service handles all aspects of queuing of messages and delivery to the target Android application running on the target device. GCM is completely free no matter how big your messaging needs are, and there are no quotas.

III. Google Map:

Google Map is very popular free software that provides maps by satellite images around the world [5]. 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) [6] which is an extensible markup language (XML) that is written to describe how the objects are rendered. The KML-based objects can 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.

3.2 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.
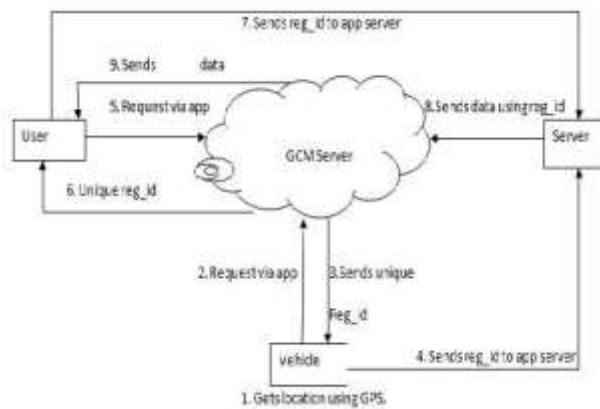
3.3. System Diagram:

Figure 1:System Architecture

4. 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. 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.

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.

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.

4.1. Hardware:

Server:

Processor: 1.0GHz or more

RAM: 2 GB

GPS Device: Android Mobile Processor: 1GHz or more RAM: 1 GB or more

Client Device: Android Mobile: Processor: 1GHz or more RAM: 1 GB or more

4.2. Software:

Server:

OS: Windows Server 2003

Firewall: Windows Firewall or any other firewall.

Database: SQL Server 2005

GPS Device:

OS: Android 4.0(ICS) or later

Client Device:

OS: Android 4.0(ICS) or later

4.3. Tools &Technologies:

GPS (Global Positioning

System) GCM (Google Cloud Messaging)

5. 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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