

Vehicle Tracking System

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Abstract:-- An efficient vehicle tracking system is designed and implemented for tracking the movement of any equipped vehicle from any location at any time. The proposed system made good use of a popular technology, a Smartphone application. This will be easy to make and inexpensive compared to others. The designed in-vehicle device works using Global Positioning System (GPS) and Location Based Services (LBS) technology that is one of the most common ways for vehicle tracking. The device is embedded inside a vehicle whose position is to be determined and tracked in real-time. The vehicle tracking system uses the GPS module to get geographic coordinates at regular time intervals. The GSM/GPRS module is used to transmit and update the vehicle location to a database. A Smartphone application is also developed for continuously monitoring the vehicle location. The Google Maps API is used to display the vehicle on the map in the Smartphone application. Thus, users will be able to continuously monitor a moving vehicle on demand using the Smartphone application and determine the estimated distance and time for the vehicle to arrive at a given destination. In order to show the feasibility and effectiveness of the system, this paper presents experimental results of the vehicle tracking system and some experiences on practical implementations. **Keyword-5G, super speed, WSCM.**

Keywords:- Android operating system, , Autonomous GPS, Google Map.

I. INTRODUCTION

The vehicle tracking system is an electronic device that tracks the vehicle's location. Most of the tracking systems use GPS module to locate the vehicle's position [1]. Many systems also combine communication components such as satellite transmitters to communicate the vehicle's location to a remote user [2]. Google maps are used to view the vehicle's location. With rapid development of mobile internet technology and wide usage of Smart Phones, more attentions have been given to network access techniques and interactive applications through mobile phones. Android which is an open source has become most popular smart phone used by people. In recent years, more and more people have started using the smart phone, laptop, PDA and other mobile devices. Tracking or detecting the position of people is very important for various reasons such as identifying the culprit, to notify friends about serious issues, to convey an important message etc. For this purpose, Global Positioning System (GPS) is being used widely. This paper proposes the Position Detection and Tracking system using Android which can be used to track friends and family members who are travelling in vehicle. On the basis of vehicle number, Fig 1, one can observe that the world is experiencing accelerated growth in Smartphone ownership. As a result, Smartphone users are now more prevalent within the overall population than owners of basic mobile phones [1]. As Smartphones become more familiar to people and finding use in the day to day lives, their influence on society continues to grow. The main driving force for this accelerated growth in Smartphone usage is the availability of a large variety of applications to meet the needs of a wide

range of users. In our project we developed a Smartphone application along with the in-vehicle tracking device. The two parts work together to offer the most convenience to the users as they become handy to track vehicle locations in real-time.

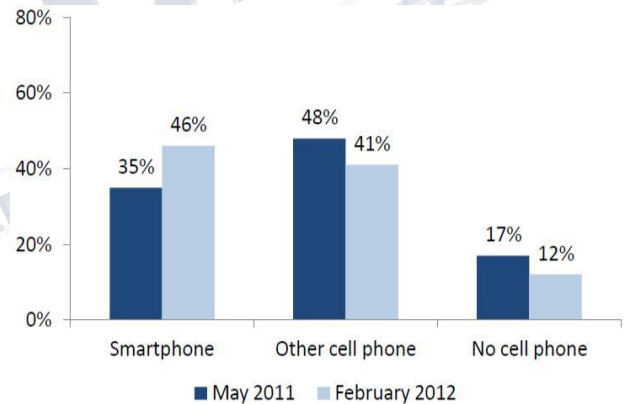


Fig. 1. Changes in phone ownership, 2011-2012. The number of Smartphone owners increased 11% from 2011 to 2012. [1]

A vehicle tracking is a prerequisite of the most basic function in all fleet management systems. A fleet management is the management of a company's transportation fleet. The fleet management system aims at improving the quality and efficiency of the industry by identifying major obstructions on the road and tracking real-time locations of their fleet on a map [2],[3]. Most of the vehicle tracking systems are designed by using GPS/GSM technology [4]. In vehicle tracking systems, a vehicle location is one of the most important components. The location and time information anywhere on earth is provided

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by using GPS technology [5]. For wireless data transmission, GSM and SMS technology are commonly used. The SMS technology through GSM network and GSM modem provide a user with vehicle location information [6],[7]. Utilization of SMS technology has become popular because it does not require much cost. It is convenient and accessible way of transferring and receiving data with high reliability [8]. Instead of using SMS, the proposed vehicle tracking system uses the Smartphone application to track and monitor a vehicle location obtained from the in-vehicle tracking device. The vehicle location is automatically placed on Google maps, which make it easier for tracking a vehicle and provides users with more accurate vehicle location information. The basic purpose of a vehicle tracking system is to track a specific target vehicle or other objects. The tracking device is able to relay information concerning the current location of the vehicle and its speed, etc. Most of such tracking systems consist of an electronic device as usually installed in-vehicle and can be used for tracking motor cycles, buses, and trains.

II. LITERATURE SURVEY

LBS (Location Based Services) is not what they are inside of but rather what they are not an active part of and the answer is very little. They are a part of virtually all control and policy systems which work in computers today. They have evolved from simple synchronization based service models to authenticated and complex tools for implementing virtually any location based service model or facility.

Foundation of Location Based Services

Stefan Steiniger, Moritz Neun & Alistair Edwardes [1], Location Based Services (LBS) are developing rapidly in the mobile and information technologies (IT) fields. Increase demand to modern technologies and interest in utilizing geospatial information servers to provide useful information and services to mobile users through wireless networks plays a very important factor to LBS advancement. Location based service (LBS) is emerging as a killer application in mobile data services thanks to the rapid development in wireless communication and location positioning technologies. Users with location-aware wireless devices can query about their surroundings (e.g., finding the nearest restaurant or all shopping malls within 5 miles) at any place, anytime. While this ubiquitous computing paradigm brings great convenience for information access, the constraints of mobile environments, the spatial property of location-dependent data, and the mobility of mobile users pose a great challenge for the provision of location-based services to mobile users.

Perceived Effectiveness of Push vs. Pull Mobile Location Based Advertising

Ramaprasad Unni, Robert Harmon [2], Push services imply that the user receives information as a result of his or her where about without having to actively request it. The information may be sent to the user with prior consent (e.g., a subscription based terror attack alert system) or without prior consent (e.g., an advertising welcome message sent to the user upon entering a new town). Pull services, in contrast, mean that a user actively uses an application and, in this context, "pulls" information from the network. This information may be location-enhanced (e.g., where to find the nearest cinema). **Location Based Services.** Thamer Abulleif & Abdulwahab Al-Dossary [3], GPS is the worldwide satellite-based radio navigation system, consisting of 24 satellites, equally spaced in six orbital planes 20,200 kilometres above the Earth, that transmit two specially coded carrier signals, one for civilian use and one for military and government use. The system's satellites transmit navigation messages, which a GPS receiver uses to determine its position. GPS receivers process the signals to compute position in 3D – latitude, longitude, and altitude – with an accuracy of 10 meters or less. The main advantage of this technique is that the GPS system is already in use for many years. GPS uses these satellites to calculate positions accurately to a matter of meters. The positions are measured using the receivers themselves or processed on the network then the actual position is sent to the user.

Implementing Location Based Service in Android using GPS & Web Services

Manav Singhal, Anupam Shukla [4], Location based Services offer many advantages to the mobile users to retrieve the information about their current location and process that data to get more useful information near to their location. With the help of GPS in phones using GPRS, Location based Services can be implemented on Android based smart phones to provide these value-added services: advising clients of current traffic conditions, providing routing information, helping them find nearby hotels.

III. SYSTEM ANALYSIS

The basic purpose of a vehicle tracking system is to track a specific target vehicle or other objects. The tracking device is able to relay information concerning the current location of the vehicle and its speed, etc. Most of such tracking systems consist of an electronic device as usually installed in-vehicle and can be used for tracking motor

cycles, buses, and trains. The vehicle tracking system proposed in the paper has the following features:

- ♣ Transmission of a vehicle's location information to a web server after a specified time interval using the GSM/GPRS module
- ♣ Database is designed to store and manage received vehicle's location information
- ♣ Whenever a user requests the vehicle location, it can be accessed from the database and monitored on Google maps in real-time using a Smartphone application

3.1 Proposed System:

The App is a GPS service based application which would help us in locating the exact geo-position of vehicle depending upon their current location/whereabouts. Geo-position would be displayed on the map-view on our android set and display functioning can analogue to the current usage of Google Maps / Nokia Maps / iOS Map Service. Some Key points about the App:

All vehicle's locations would be retrieved from an online database. Periodic refreshing has to be present so that each time the geo-location changes or after a fixed interval of time the values in database should be updated. All vehicles would be having a unique number and this would be used for searching for the vehicle.

3.2 System Architecture

Our real-time tracking management system is composed of three components, a GPS Tracking Device, a server and a database. The GPS tracking is done by GPS enabled android mobile that transmits location information to the server through GPRS & networks. The server 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.

Sattelite Web Server

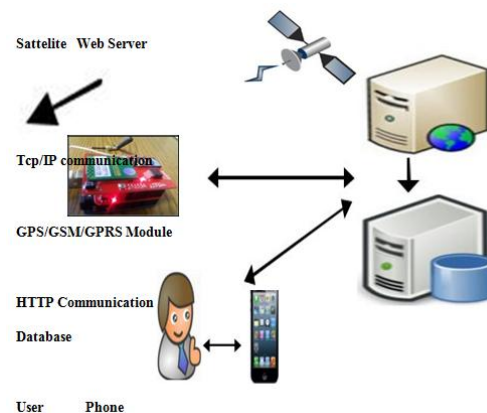


Fig. 2 shows our vehicle tracking system layout. It can help understand how the project is implemented

A. 3.2.1 Testing In-vehicle device

As shown in the diagram, starting from the satellite at the top of the diagram, the GPS module receives geographic coordinates from the satellites. The GPS module will continuously give the data, i.e. the latitude and longitude indicating the position of the vehicle. The GPS module gives many parameters as the output, but only the NMEA data coming out is read and displayed onto the LCD. The same data is sent to the mobile at the other end from where the position of the vehicle is demanded. The vehicle's location information is read in from the GPS module by the microcontroller. The vehicle's location information is then transmitted to the web server through GSM/GPRS network. The GSM/GPRS module is used for TCP/IP communication. The received vehicle's location information is sent from a form with the GET method for transmission to the server. GSM modem is used for transmitting and receiving the data. The GSM module requires a Mobile IP and Internet connectivity to transfer the data to TCP Server. Mobile IP & Internet Mobile IP (or MIP) is an Internet Engineering Task Force (IETF) standard communications protocol that is designed to allow mobile device users to move from one network to another while maintaining a permanent IP address. The Internet is a global system of inter-connected computer networks that use the standard Internet protocol suite (TCP/IP) to link several billion devices worldwide. It is a network of networks that consists of millions of private, public, academic, business, and government networks of local to global scope, linked by a broad array of electronic, wireless, and optical networking technologies.

3.2.2 Testing Web Server and Database

The web server is connected to a database, and the database is designed to store and manage received vehicle's

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location information. Some real experimental data for a vehicle's location information, collected and uploaded to a database. This time interval is actually configurable according to the movement of the vehicle. Whenever a user requests the vehicle location, it can be accessed from the database and monitored on Google maps in real-time using the Smartphone applications.

3.2.3 Testing Smartphone application

In order to demonstrate operation of the vehicle tracking system successfully, an smartphone was configured with the developed Smartphone application where user enters the vehicle number. Two locations, one for the vehicle and the other remotely located user appear on the Google map. The location of the vehicle is updated from the in-vehicle tracking device. Whenever a vehicle location changes, the vehicle's address will be updated regularly Smartphone application with the most recent vehicle's location information from a database.

IV. IMPLEMENTATION

The working of Vehicle tracking system is as showed below,

4.1 Algorithm

In Vehicle tracking system the working is divided into two views, one as an End user and the other is a Client side functions.

a) End User

Mode of tracking i.e. via Smartphone.
 Then Request for locations of vehicles.
 Fetch information from Database.
 Start fetching GPS Data from Microcontroller's buffer via TCP server.
 Send GPS data to Google Maps server.
 Rendered map is sent back to Web server.
 The Vehicle's location is shown in Smartphone Application as Map View.

b) Server Side Functionalities

Power on the Device.
 GPS receiver checks for signal from multiple satellites at Baud rate of 9600 bps.
 GPS Receiver receives NMEA data.
 NMEA data is parsed to get GPS Data.
 GSM searches for Cellular Base station.
 GSM makes a 3 way Handshake to the nearest Base station.

GPS Data from Microcontroller's buffer is transmitted to the TCP server via Internet.

TCP Server inserts GPS Data into the Database.

Advantage :

User can track the position of the vehicle independent of the location and time.

V. CONCLUSION

Planning to develop and test a vehicle tracking system to track the exact location of a moving or stationary vehicle in real-time. This paper has described the design and implementation of our vehicle tracking system. An in-vehicle device, a server and a Smartphone application are used for the vehicle tracking system. In this work, the in-vehicle device is composed of a microcontroller and GPS/GSM/GPRS module to acquire the vehicle's location information and transmit it to a server through GSM/GPRS network. On the other end, the web interface is implemented to directly connect to a database. A vehicle's geographic coordinates obtained from an in-vehicle device are recorded in a database table. And a Smartphone application has been created to display a vehicle location on Google maps. The system was able to experimentally demonstrate its effective performance to track a vehicle's location anytime from anywhere. Furthermore, our implementation is low-cost that is based on easily accessible off-the-shelf electronic modules.

VI. FUTURE SCOPE

- ♣ Better traffic management by analyzing traffic patterns by individuals and (or as a whole).
- ♣ Learn individual's emissions and house hold information to lead to better/smart city concept.
- ♣ With the anticipation of big data and over 90% of total data in the world coming only in 2012, collaborating LBS with big data leads to better Customer Relationship Models (CRM) and understanding the consumer preference levels in details, which otherwise is not possible.
- ♣ Culprit tracking by exchange of information.

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