VEHICLE TRACKING SYSTEM USING GPS

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Abstract-

Global Positioning System is used for tracking vehicle. This paper describes vehicle tracking system with the help of GPS and Wi-Fi. Tracking unit is kept inside the vehicle. User can monitor moving vehicle using this system. Wi-Fi and GPS technology is powerful technology. GPS satellite transmits signals in the form of latitude and longitude. GPS receiver or tracking unit receives signals from GPS satellite. Database stores the latitude and longitude positions. To know the path of the vehicle there is need of internet at client side and server side for transmission and receiving of information. Tracking unit Wi-Fi gets connected it takes the last received latitude and longitude positions from database and sends positions to the server. After the location information is sent to the server, user views the location of vehicle having tracking unit on Google map.

Keywords:

Global Positioning System, land-vehicle navigation, latitude, longitude, Wi-Fi, Google map

Introduction

Global Positioning System is a satellite positioning system. This paper describes vehicle tracking system with the help of GPS and Wi-Fi. GPS data helps in finding the location of moving vehicle which is having tracking unit installed in it. GPS data then calculates the projection point about GPS point on the road. It provides a method to display the vehicle on the

Google map. The paper is an application to facilitate the vehicle owner with helping guidance. This will be used in the near future by various companies. The project is mainly a navigation system for vehicle owner along with a map of the city with guidance features i.e. it will guide the driver about the easiest route etc. It will also be useful and helping in case of any accident.

The application will suggest the overall physical condition of the vehicle and can even capable of guiding the owner about the vehicle. This project is planned to design system which is used for tracking and positioning of any vehicle by using Global Positioning System and GPRS. A GPRS is used to send the Latitude and Longitude of the vehicle from a remote place. The data coming out is read and displayed on to the server. A database is used to store the data received by GPS receiver. A Program has been developed which is used to locate the exact location of the vehicle and also to navigated track of the moving vehicle on Google Map.

Vehicle Tracking System is a solution which is developed using technology with Authentication & Authorization methodologies. Vehicle Tracking System allows tracking vehicles in real time using GPRS technology. It sends the location address to a central server. It also sends alerts to the computer whenever an exceptional event has occurred.GPS unit constantly, sends out information about the vehicle's position and distance travelled. This information can then be accessed from a central location through a mobile phone. GPS satellites transmit signals to equipment on the ground. GPS receivers need a clear view of the sky. Each GPS satellite transmits data that indicate its location and the current time. All GPS satellites synchronize operations so these repeating signals are transmitted at the same instant. Ground stations precisely track each satellite's orbit. GPS satellites transmit signals on two main carrier frequencies. The signals, moving at the speed of light, arrive at a GPS receiver at slightly different times because some satellites are farther away than others.

Objective

The main objective of the system is to provide a solution to the following problems

➢ Lack of a system to keep track of vehicles in real-time

➢ Loss of productivity due to lack of timely means of transport for employees for company work

➢ Loss of productivity due to unauthorized use of vehicles.

The system presented attempts to solve the above problems with:

> ➤ an easy to use web interface,

> ➤ a widespread, already available, communications infrastructure,

> ➤ an easy-to-understand graphical user interface

> ➤ Open source tools to reduce the system cost

Steps Involved In the Vehicle Tracking

A. Location Data capture: Location data is captured through a tracking unit called android mobile. Location information of the vehicle is received by the device from the GPS Satellites. It uses the Global Positioning System to determine the location of the vehicle. This unit is placed in the vehicle.

B. Location Data storage: Captured data is stored in the SQL server database. It processes location information data.

C. Location Data transfer: Stored data are transferred to the computer server via internet.

D. Location Data analysis: Data analysis is done through software application. Google map is used to display the current location of the vehicle.
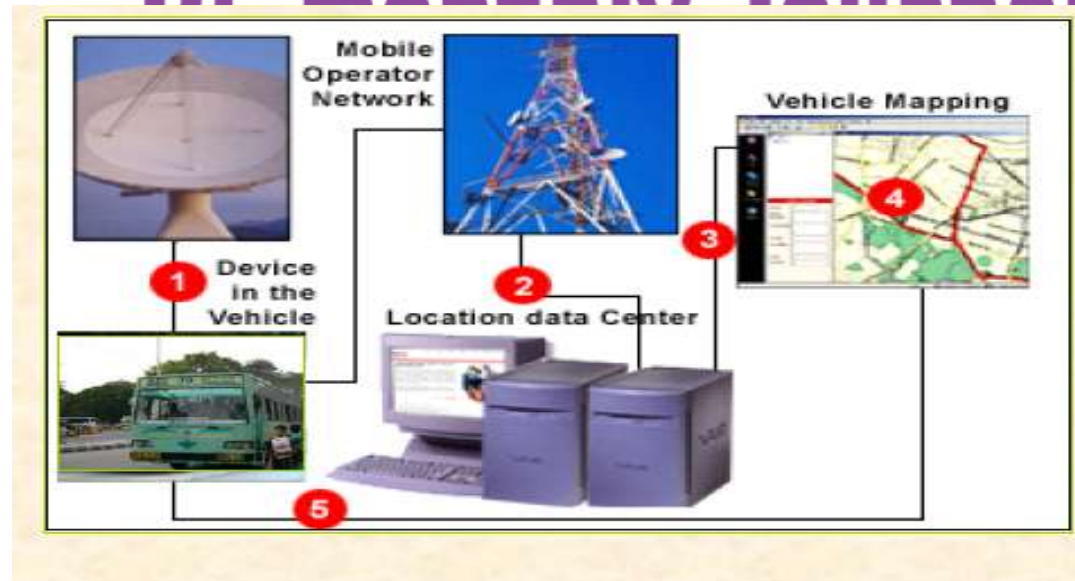
Fig 1. Steps involved in the vehicle tracking

Features and Benefits

Location and Tracking: Getting latitude and longitude *Real-time polling*: report the location Latitude and Longitude data at anytime.

Auto Track: set up the tracking time to get the Latitude and Longitude data at every setting interval

Compatible with the original anti-theft car

*Tracking solutions***:** tracking via cell phone with a Google map link to view current location on screen.(If the cell phone can connect internet by Wi-Fi),

*Availability***:** System access via the Internet 24 hours a day from anywhere in the world

Reports Generation: Analysis report is generated which contains history data of vehicle.

Security: Prevention of frauds in vehicle usage

*Authentication***:** Username and password controlled system access

Usability: Easy to use with simple graphical interface

Technology Used

GPS:

Global positioning system is satellite navigation system. It is maintained by United States but freely accessible to anyone with the help of GPS receiver. GPS satellites transmit signals to GPS receiver. GPS receivers need a clear view of the sky. GPS receiver calculates position by timing signals send by GPS satellite. Each GPS satellite transmits data that indicate its location information in all weather condition. Ground stations track each satellite's orbit. The signals, moving at the speed of light, arrive at a GPS receiver at slightly different times because some satellites are farther away than others.

Wi-Fi:

Wi-Fi is a technology that allows a device to exchange data wirelessly using radio waves over network, including Internet connection. The Wi-Fi is wireless local area network that is based on IEEE standards. Most modern are based on WLANs. A device that can use Wi-Fi can

connect to a network resource such as the Internet via a wireless access point. Such an access point has a range of about 20 meters indoors and a greater range outdoors. Hotspot coverage can comprise an area as small as a single room with walls that block radio waves or as large as many square miles. This is achieved by using multiple overlapping access points.

Android OS Mobile:

Android is a Linux based mobile operating system. It is designed for touch screen mobile devices. A group of companies devoted to advancing open standard for mobile devices. Android is open source and Google releases the code under the Apache license. This open source code and permissive licensing allows the software to be freely modified and distributed by device manufacturers, wireless carriers and enthusiast developers. Android has a large community of developers writing applications (mobile "apps") that extend the functionality of devices, written primarily in a customized version of the JAVA programming language.

Architecture

A. GPS Tracking Device:
The Device in the vehicle captures the GPS location information at regular intervals.

B. GPS tracking Server:
The tracking server has dual responsibility. They are for receiving data from the GPS tracking unit and securely storing it; other for serving this information on demand to the user.

C. User interface:
User interface will be able to access information and view vehicle data on map.

Fig.2. Basic Architecture

D. High Level Architecture

GPS satellites broadcast free to air signals, which carry information about their exact positions in the orbit. GPS receivers receive GPS signals determine vehicle's current position. GPS receivers never fail to detect the location of a vehicle. The server runs the Vehicle Tracking Software. Clients are able to track vehicles in real-time on maps. Wi-Fi networks are used as communication to transmit location information to the owner of the vehicle.

Working Of Vehicle Tracking System

A vehicle tracking system using GPS takes the location data provided via satellite from the Global Positioning System to the GPS receiver unit in a vehicle and transmits it to a server connected to the Internet. The user of a GPS vehicle tracking system will be able to sit at your PC or laptop computer, login to the system and monitor the movement, of any vehicle that has a GPS tracking unit installed for your system. User should also be able to look back at historical data of where the vehicle has been; when it was there and how long it stayed there. User will also get analysis tools to monitor trends and calculate vehicle running costs. User will be able to do this at any time because the GPS unit in the vehicle will operate correctly in all weather conditions. Location data is computed by the unit using signals received from GPS satellite. It processes the location data because it is in form of latitude and longitude and sends it via

communication network to the server and from there it is accessed by the user on Computer or mobile phone. Vehicle tracking systems can provide up to date and historical data on routes. The data can then be viewed on Google Map.

Implementation Details

For real-time applications, in order to meet the demand of the conventional implementation methods are not sufficient. Vehicle tracking system is implemented using two modules client side and server side module. Client side module is implemented on android mobile phone which acts as GPS receiver. As GPS receiver is very expensive to purchase mobile phone will do the same function like GPS receiver. The purpose of using android Operating system phone is to run the android based application. The mobile phone prerequisite is that it should have GPRS activated in it and Java installed in it. GPRS is required for internet connection in mobile. Java is required for running the application. The application once installed in the mobile has three screens. First screen has text box for entering server IP. Second screen contains username and password after user is authenticated third screen appears which contains welcome in it. Username and password is provided by the user while filling add user form in netbeans.

Sever side module is developed in netbeans. Server side module contains login page which is authenticated by Admin user. Once user authenticated server tab is enabled then start the server. This module is used for adding user, adding vehicle type, updating the user and updating the vehicle type. The programming is done using JAVA programming language. There is database connectivity with SQL server. The Google map API is used for displaying the result. The project can also be implemented using WIFI but drawbacks of WIFI are that the range is small only few meters, coverage is major limitation of WIFI. GPRS has broader range as compared to WIFI. In this project as server is Laptop internet connection through modem is not possible as modem contains dynamic IP. This project requires static IP so connectify software is installed. This software is nothing but virtual router. It behaves like physical router. It is similar to WIFI.

Results

The output screen of vehicle tracking system contains Google map. Google map shows the current vehicle location. The vehicle location is represented in Google map using red marker. The red marker contains the number which indicates positions for example 1 means first position 2 means next position likewise. There is zoom in and zoom out option for viewing the detail map clearly so the user can identify the correct position of the vehicle. Users just have to enter mobile IMEI number to track the vehicle. The significance of IMEI number is that it is 15 digit numbers which is unique number for each mobile and even if the SIM is changed the IMEI number never changes it remains the same. User can track the location of vehicle by entering start time and end time. The start time indicates beginning time of tracking and end time indicates finish time of tracking. So the user can get sufficient information about the history of vehicle location. After refreshing the page user get updated status of vehicle. The Google map is displayed on separate web page. The address is programmed in net beans.

Conclusions

The results obtained are useful for end user to track vehicle in easy user friendly manner because of interactive graphical user interface. Socket programming is used to develop vehicle tracking system. Analysis report is generated which displays history records of vehicle location. This provides good solution for maintaining records of each vehicle. It can be well thought-out as the safest transportation media. To improve the efficiency of the transportation systems, it is necessary to examine the accidents and find out the essential methodologies for optimum management of information and resources. The information shows that a huge number of accidents occurred due to human errors. Therefore, having a systematic way for vehicle operation management and reduction of human involvement, controlling activities, performances etc. may play a significant role to reduce the number and impact of accidents. Reliable, accurate, precise, up-to-date and structured geospatial data is the key for decision making.

The use of GPS for tracking the movement of vehicles presents challenges to the technology. It has developed a continuous, all-location, real-time solution for tracking, positioning vehicles by integrating GPS with the vehicle navigation technology. The real-time location of a vehicle can be transmitted to the server in real time by the use of Wi-Fi over mobile

phone networks. Wi-Fi wireless communication technologies with enabled wireless LAN are also used for measurement and automation applications. Vehicle tracking system is a better and more convenient alternative to collection by manual observation and measurement.

Therefore, this system is very essential for the vehicle because it could bring an abrupt change to the existing vehicle monitoring system.

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