

THE REALTIME VEHICLE TRACKING SYSTEM

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ABSTRACT

Vehicle tracking system is a well-established technology in this era which is used by fleet system and owner of vehicle all over the world. It is a very safe and reliable technology. In our thesis we are going to design a system which is used for tracking and positioning of any vehicle by using Global Positioning System [GPS] and Global System for Mobile Communication [GSM]. We will be primarily focusing on tracking a Solar Assisted Rickshaw Van using Arduino Uno R3 and GSM module sim908. The design is an embedded application, which will continuously monitor a moving vehicle and report the status of vehicle on demand. For doing so the Arduino Uno R3 is interfaced serially to a GSM modem and GPS receiver. The GSM modem is used to continuously send the position of the vehicle from remote place. The GPS modem that uses satellite technology for its navigation system will continuously give data like longitude, latitude, speed , distance travelled etc. When the request by user is sent to the number at the modem in the form of SMS, the system automatically sends a return reply to the mobile indicating the position of the vehicle in terms of latitude and longitude via SMS. We will also view the position of vehicle on a digital mapping i.e. on Google map with the help of software via Internet. For this we will be using the software XAMPP and Google Map API. XAMPP is a free and open source cross-platform web server solution stack package consisting mainly of the Apache HTTP Server,

MySQL database and interpreters for scripts is written in PHP and Perl programming languages. The Google Maps API allow for the embedding of Google Maps onto web pages using a JavaScript interface which is designed to work on desktop browser application. The MySQL database is used to store all the data of the GPS and Google Map API is used display the location information through a Google Map. We will also be able to control the vehicle if it is stolen.

I. INTRODUCTION

The vehicle tracking system is a total security and fleet management solution. It is the technology used to determine the location of a vehicle using different methods like GPS and other navigation system operating via satellite and ground based stations. Modern vehicle tracking system use GPS technology to monitor and locate our vehicle anywhere on earth, but sometimes different types of automatic vehicle location technology are also used. The vehicle tracking system is fitted inside the car that provides effective real time location and the data can even be stored and downloaded to a computer which can be used for analysis in future. This system is an essential device for tracking car any time the owner wants to monitor it and today it is extremely popular among people having expensive cars, used as theft prevention and recovery of the stolen car.

The data collected can be viewed on electronic maps via internet and software. The device includes modern hardware and software components that

help to track and locate automobiles both online and offline. A tracking system comprises of mainly three parts- vehicle unit, fixed based station and database with software system [1]. The vehicle unit incorporates the hardware part that is the Arduino, GPS and GSM modem kept inside the vehicle that is to be tracked. The unit is mainly based on a modem that receives signals from the satellite with the help of GPS antenna. This modem then converts the data and sends the vehicle location information via SMS as well as a mobile application named „VTS“ which is synchronized with the web page and to a server which can be displayed on digital mapping. Fixed Based station consists of a wireless network system that receives and transfer the information to the data center. The based station contains software and geographic map useful for locating the vehicle. Maps of every city are available in the based station that has an in-built Web Server.

II. PROPOSED SYSTEM

Vehicle Security is a primary concern for all vehicle owners. Owners as well as researchers are always looking for new and upgraded vehicle security systems. For the modernization of technology it is now possible to track and closely monitor vehicle in real time as well as to check the history of vehicles“ movements. One has to be thankful to Vehicle Tracking System that has helped enormously to maintain the security of the vehicle by tracking its activities at regular time interval. The system uses Global Positioning System [GPS], to find information about the location of the vehicle that is to be monitored and then send the latitude and longitude to the monitoring center through satellite. At the monitoring center different software is used to display the vehicle on the Google map. This is how our system tracks automobiles in real time. Due to real-time tracking facility, vehicle

tracking systems have become increasingly popular among owners of vehicles as they are able to monitor their vehicle continuously. The tracking hardware is installed inside the vehicle in such a manner that it is not visible from outside the vehicle. Hence, it works as a secret unit which continuously sends the coordinates to the monitoring center. Monitoring center Software helps the vehicle owner with a view of the vehicle location on an electronic map. The user can use any browser to connect to the server and monitor the targeted vehicle on Google Map. Thus it saves the user from the hassle of calling the driver to know the vehicle“s location as it is now possible to track vehicle online.

III.LITERATURE SURVEY

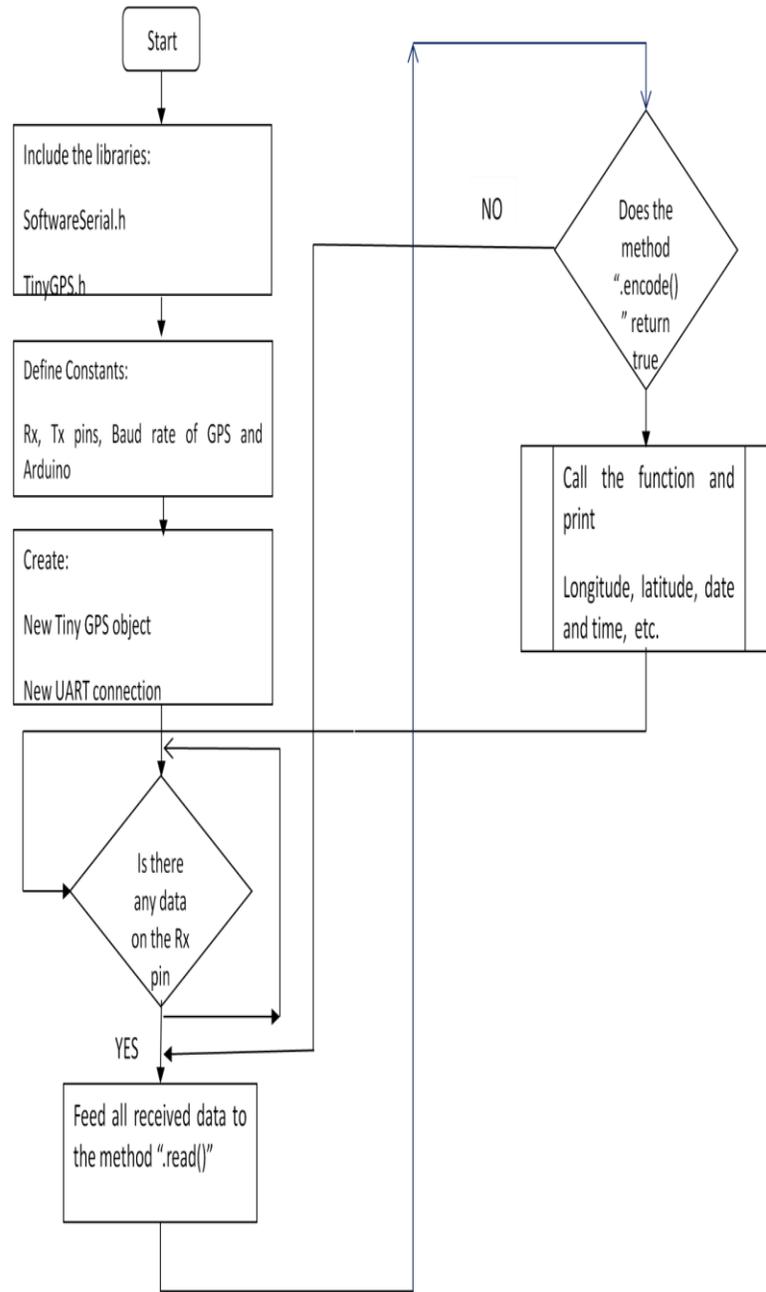
Global Positioning Systems (GPS) were designed by the United States Government and military, which the design was intended to be used as surveillance. The GPS was invented as a collaborative effort by the United States“ Department of Defense and Dr. Ivan Getting as a means to create a satellite course-plotting system, primarily used for navigation purposes [2]. At that time, the GPS project cost approximately \$12 billion for the design and launch of 18 satellites, six in each of the orbital planes spaced 120 degrees apart, and their ground stations. GPS uses these satellites as reference points to determine and give the accurate geographical positions on map. The idea for a global positioning system was initially planned to be used by military and intelligence organizational during the Cold War, with the introduction of the project stemming from the Soviet-launched spacecraft Sputnik. Since its introduction in the 1960s, GPS has developed into a larger and more advanced satellite network constellation that orbits Earth at fixed points in space to send signals to anyone with a GPS

receiver. The signals carry a time code and geographic data point that enables us to display a device's exact position anywhere on the planet [2].

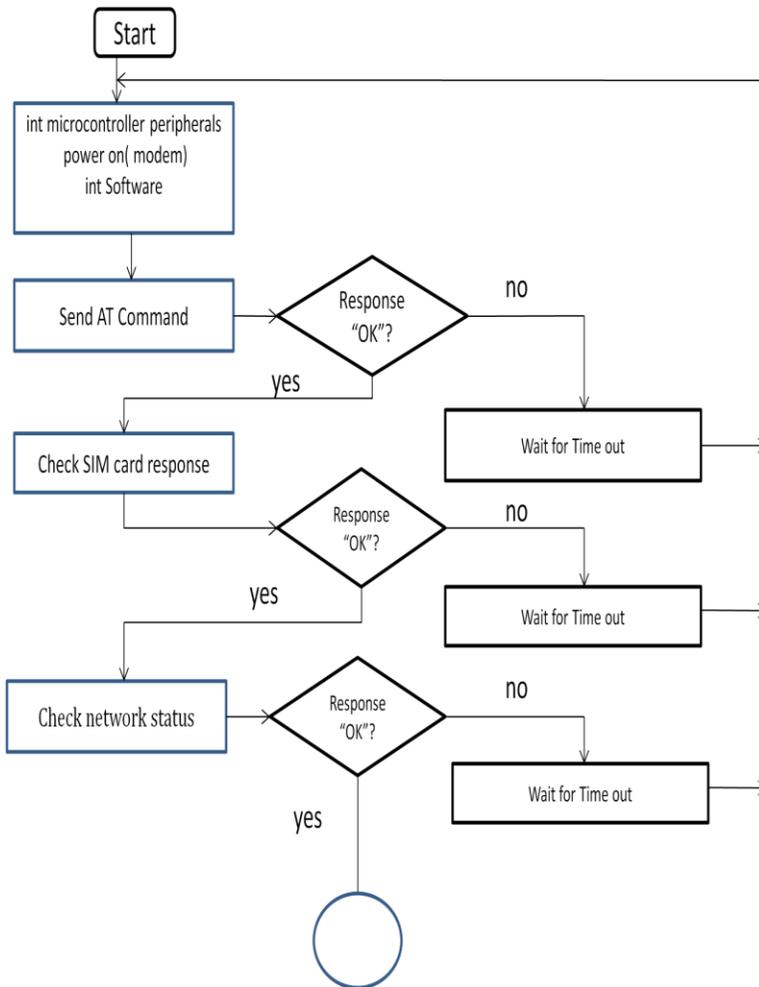
IV.SYSTEM DESIGN

Vehicle tracking device is made up with Arduino Uno R3, SIM908 module including GPS and GSM antenna. The core part of tracking system is microcontroller Arduino Uno. The geo location of a vehicle can be captured through GPS receiver and that data will be transmitted to the web server by using GSM technology. That data will be stored in a database. For monitoring the location of the vehicle on the map, we had developed a web application. We made up this web application with PHP, HTML and JavaScript using XAMPP software. For storing the location data, a text file had been used. We had also developed a mobile application to view the location of vehicle in a mobile device by using Android Studio. The SIM908 module is initialized to start gathering geo location data from the satellite; device initialization is done using AT commands and includes GPS and GSM module; to turn on the GPS, first it is powered on and put in reset mode. Then the module become ready for receiving coordinates from satellite. The GPRS is next turned on; the process includes GPRS power on, setting APN of service provider, initiating HTTP protocol, and setting protocol method (Get method). Device initialization process may take up to 1 minute to worm up and calculate the accurate position. In case of network un-availability, the acquisitioned GPS coordinates and other data such as time and speed are stored temporarily until the network returns back to service then the stored coordinates are sent with their time stamp and speed. SIM908 requires 2A peak current. So, external power supply like 12V-2A battery is used to provide the power. GPS antenna and GSM antenna are connected to the port of SIM908

module. The module and Arduino have a common ground. We had uploaded the program into the Arduino microcontroller which program is written in C programming language. Uploading program into Arduino is done by using Arduino IDE software.



Flow chart for GSP Coding

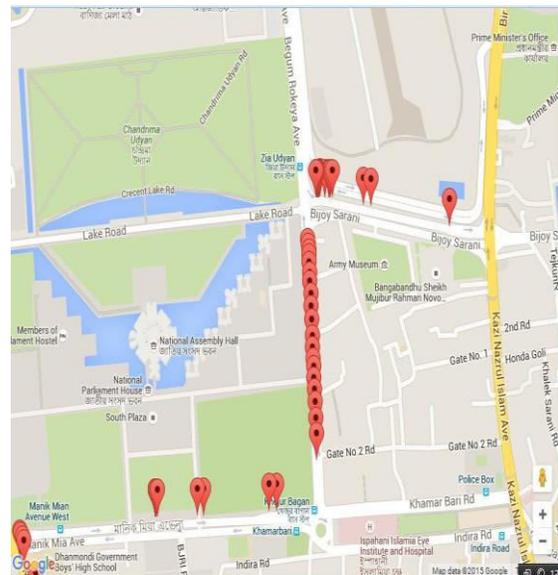
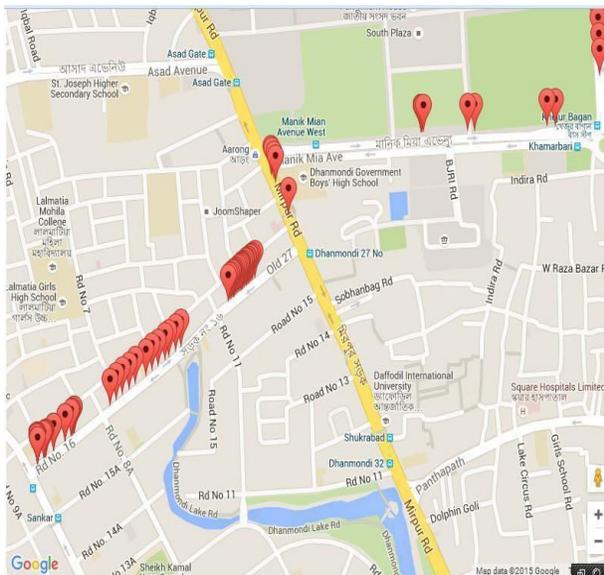


Flow chart for GPS Coding
DATA ANALYSIS

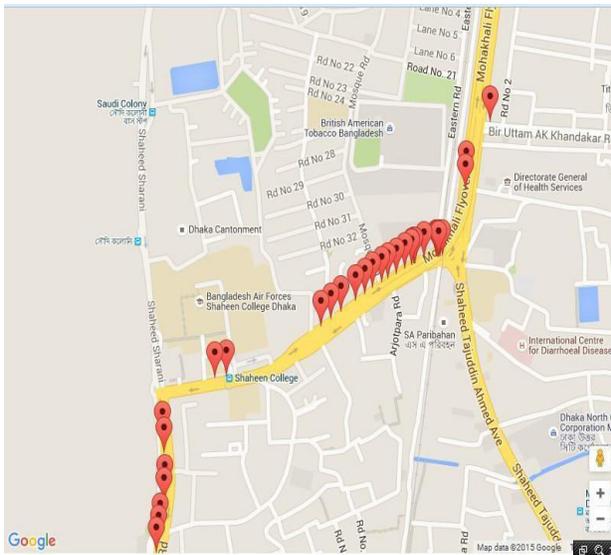
BENEFITS OF VEHICLE TRACKING SYSTEM:

The in-vehicle tracking device or unit working along with a central server and a software, which let the user or owner of a car to know the whereabouts of his own vehicle, surely comes with several benefits. The GPS and GSM installed inside the vehicle fetches its location information and send it to owner on regular intervals according to user’s preferences, in order to remain up- to- date all the time. As all the relevant information is displayed on the screen, it is very convenient for the user to monitor and take any actions in case of an emergency.

Also monitoring discourages dangerous and inefficient driving practices of drivers which lead to increased vehicle security and



driver safety [18]. The vehicle tracking system plays a vital role if it is used in any companies or organization for any kind of delivery purposes. Since the driver is being aware of the fact that the car is constantly being monitored so one would be careful while driving and take shortest possible route to reach destination right on time [19]. This system can also be named as an anti-theft tracking system as this advanced yet affordable system ensures the recovery of stolen vehicles too. If the car does not get to designated location or being used by unauthorized user, the location can be traced and then notified to police to reach the unauthorized location where the vehicle is residing and thus this vehicle tracking system ensures car safety as well [18].



CONCLUSION

In our thesis we have developed a vehicle tracking system that is flexible, customizable and accurate. The GSM modem was configured and we tested and implemented the tracking system to monitor the vehicle's location via SMS and online on Google map. To display the position on Google map we have used Google map API. The Arduino is the brain of the system and the GSM modem is controlled by AT commands that enable data transmission over GSM network while the GPS provide the location data. Whenever the GPS receives a new data it is updated in the database and hence we are able to see the location on the Google map. We thought of designing a real time vehicle tracking system in our thesis keeping the scenario of Bangladesh in mind where vehicle theft is rapidly increasing. Our device can provide good control on carjacking. The system provides accurate data in real time that makes it possible for the user to track the vehicle and it also enable an early retrieval if the car is stolen. Implementation of GPS tracker in vehicle can certainly bring revolutionary change in



developing country like Bangladesh where there is very high urban as well as rural vehicular transition every day. There can be various other applications

that can be built over our existing platform. Hence, we have designed our system in such a way that upgrading this system is very easy which makes it open for future requirement without the need of rebuilding everything from scratch, which makes our system even more efficient. This thesis has widely increased our knowledge of GPS and also improved our programming skills. We have also ensured the reliability of our system through various field tests that we have done during our thesis and the initial results that we obtained through our prototype are very promising. This makes our thesis complete, robust and we can even think of commercialization of this system in future.

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