



# IoT Based Secure and Authenticated Vehicle Navigation System

Prinyanka Sangole, Prof. M. Z. Khan

Department of Electronics and Telecommunication, Anjuman College of Engineering and Technology, Nagpur, Maharashtra, India

## ABSTRACT

A secure and authenticated vehicle navigation system has been developed which provides security and authenticity for vehicle navigation system. This novel architecture is designed with the help of existing cryptography algorithms and fault tolerance technique. A fault tolerance based mathematical model is used for system analysis. The inputs for the system are geographical location like latitude, longitude and digested engine number. It has been observed that the designed system is able to provide the correct information despite of corrupted signal sensed at destination end(at server side). It reduces server overhead using message digest concept and improves fault tolerance by applying fault tolerance techniques on digested information. A vehicle tracking system combines the installation of an electronic device which is mounted in a vehicle, or inside of vehicles, with purpose designed computer software to allow the owner or a user to track the vehicle's location, collecting data in the process. Today vehicle tracking systems commonly use Global Positioning System (GPS) technology for locating the vehicle, but other types of automatic vehicle location technology can also be used. Vehicle information can be viewed and located on the electronic google maps via the Internet or specialized software.

**Keyword :** IoT, security, GPS, GSM, Tracking

## I. INTRODUCTION

It is a field of study that focuses on tracking the movement<sup>2</sup> of a vehicle from one place to other. The term Global Navigation Satellite System (GNSS) is used for satellite navigation<sup>3</sup>. The satellite navigation is divided in three parts: US NAVSTAR Global Positioning System (GPS)• Russian Global Navigation Satellite System (GLONASS)• Galileo• Nowadays GPS and GLONASS are the two operational satellite navigation systems. GPS is the most used navigation system which is based on satellite. It is developed by US Department of Defense (DoD) and US department of transportation whereas GLONASS is developed by Russian federation. proposes a vehicle tracking

system for tracking vehicle theft using GPS and GSM technology. The GPS receiver and GSM modem utilizes Arduino MEGA2560. The system is affixed to the vehicle. A GSM mobile phone can be used to send and receive the information. Therefore, the Gps system will send the longitudinal and latitudinal values corresponding to the position of vehicle to the GSM Modem. If for example, an individual forgets where their vehicle is parked, an SMS can be sent to the vehicle GPS, The SMS sent would be transmitted through the GSM service provider, thereby reaching the vehicle. The vehicle will have a GSM device installed, which includes a SIM card. Through the GMS modem, the SMS will be received and sent to the Arduino MEGA2560 in the vehicle. Upon receipt

of the message, the Arduino MEGA2560 checks the password and the request. If everything matches then it will perform the request required by the owner by sending a link that has longitude & latitude through Google Maps, showing the location of the vehicle

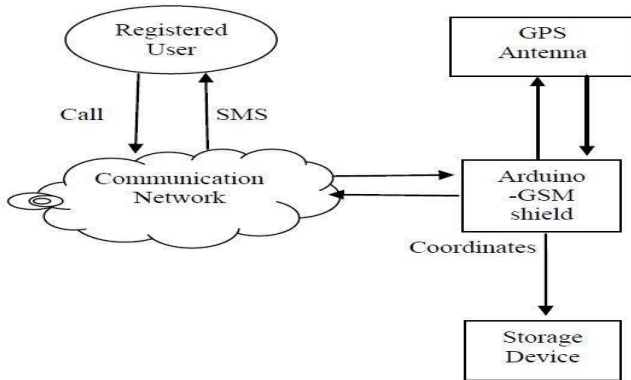


Figure 1. Architecture of Real-time GPS tracking system

## II. LITERATURE SURVEY

Nilesh Dubey et al. designed a system named VLRD to overcome the drawbacks of GPS and SMS based vehicle tracking systems, which is cost effective and highly reliable, works without using GPS technology. Iman M. Almomani et al. proposed a system which is accessible at anytime, anywhere and allows system users to track down their vehicle position, speed, Stop, and movement. It also allows monitoring of the vehicle when other person is driving it. It prevents the vehicle theft by using vehicle alarm and displays the location of theft vehicle on Google map. The major concern of Wen-hai Cai et al. was to promote the usages of cloud computing in the field of transportation. This research also presented the procedure for making the cloud transportation system and an intelligent new generation transportation system which is based on cloud computing. A hybrid GPS-GSM system was proposed by Mohammad A. Al-Khedher and Montaser N. Ramadan et al. for tracking the vehicle using Google earth, it also

increases the accuracy of measured location by using Kalman filter and displays the current location and status of the vehicle on Google earth. Intelligent anti-theft tracking system is very efficient and safe in emergency situation and engine failure. Zhengzhong Li et al. designed a Vehicle Tracking Data Recorder (VTDR) for recording vehicle speed, real time, mileage and other status information. The hardware and software architecture of this system includes Radio Frequency Identification (RFID) authentication for driver, data collection, data storage, data printing, serial and USB communication and LCD display. The main goal of Daniel K. Schrader et al. research was to design a more accurate and reliable system<sup>117</sup> using inexpensive GPS receivers only for vehicle tracking applications. A GPS, GIS, GPRS and RFID based bus monitoring system<sup>118</sup> was implemented in 2012. A new theoretical and rule based framework was designed for this system. This system was able to reduce man power which is required on monitoring center. Muhammad Ridhwan Ahmad Fuad et al. also gave GPS, GSM and Google<sup>119</sup> earth based vehicle location tracking system. This system was used in many applications including vehicle security and fleet management. An integrated cost effective public vehicle tracking<sup>120</sup> system, which is combination of both technologies GPS and RFID is designed by Apurav Vasal et al. It provides public vehicle arrival information at predefined Stops and improves public vehicle occupancy.

Vehicle navigation is one of the most important applications in the field of navigation which is mostly used by drivers. The maps given to the driver in the system plays most important role in this field. When large object or vehicles were spread out over ground, the owner corporations often found it difficult to keep track of what was happening<sup>[8]</sup>. They required some type of system to determine where each object was at any given time and for how long it travelled.

Also the need of tracking in consumer's vehicle use to prevent any kind of theft because police can use tracking reports to locate stolen vehicle. GSM and GPS based tracking system will provide effective, real time vehicle location, and reporting. [7] A GPS- GSM based tracking system will inform where your vehicle is and where it has been, how long it has been. The system fetches the geographic location and time information from the Global Positioning Satellites. During vehicle motion, its real-time parameters such as location are reported by SMS message [9]. The system takes advantage of wireless technology in providing powerful management transportation engine.

### III. DESIGN OF TRACKING SYSTEM

The In this paper, it is proposed to design an embedded system that is used for tracking and positioning of any vehicle by using Global Positioning System (GPS) and Global system for mobile communication (GSM). In this Device ARDIUNO microcontroller is used for interfacing with various hardware peripherals. The current design is an embedded application, which will continuously monitor a moving Vehicle and report the status of the Vehicle on demand. For doing so an ARDIUNO microcontroller is interfaced serially to a GSM Modem and GPS Receiver. A GSM modem is used to send the position (Latitude and Longitude) of the vehicle from a remote place. The GPS modem will continuously give the data i.e. the latitude and longitude indicating the position of the vehicle. The GPS modem gives many parameters as the output, but only the NMEA data coming out and sent to the mobile at the other end from where the position of the vehicle is demanded. When the request by the user is sent to the number at the modem, the system automatically sends a return reply to that mobile

indicating the position of the vehicle in terms of latitude and longitude.

The block diagram of a tracking system using GPS and GSM technology is presented in figure 3. The project is vehicle positioning and navigation system we can locate the vehicle around the globe with a microcontroller, GPS receiver, GSM modem. The microcontroller used is ARDIUNO. The code is written in the internal memory of Microcontroller i.e. ROM. With the help of the instruction set, it processes the instructions and it acts as an interface between GSM and GPS with the help of serial communication of ARDIUNO. GPS always transmits the data and GSM transmits and receives the data.

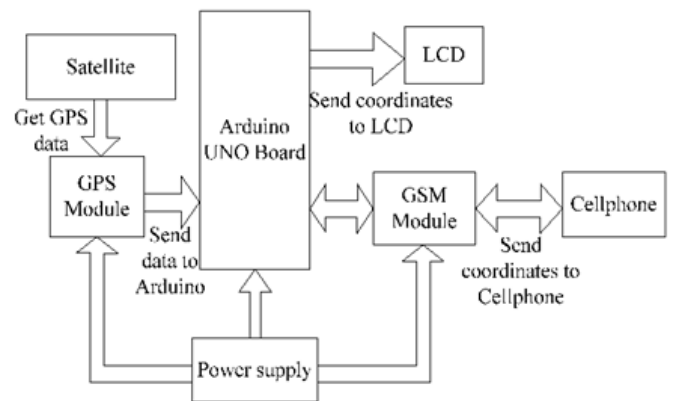


Figure 2. Block Diagram Proposed System

GSM and GPS, TX pins of the court are connected to each other, TX RX series Microcontroller. See the microcontroller which communicates with the help of your contribution. First, it gives and receives information, information about the GPS receiver with the help of using the SMS phone. The use of the GPS receiver (9) 600 transmission speed works to receive data from the space segment (satellites a) values is different from the GPS microcontroller satellites ARDIUNO they are, where they are processed and transmitted to the phone. GPS processing time only accepts GPRMC \$ values. From these values, it only

takes the time to eliminate the values and the width and the length of the microcontroller, and the height, the name of the satellite, the authentication, etc., for example, the cause of the LAT : 1728, 2470

LOG: 7843.3089 GSM modem with a baud rate 57600. GSM is a Global system for mobile communication in this device it acts as a SMS Receiver and SMS sender. The power is supplied to components like GSM, GPS and Micro control circuitry using a 12V/3.2A battery .GSM requires 12v,GPS and microcontroller requires 5v .with the help of regulators we regulate the power between three components.

#### IV. CONCLUSION

In this article, we have proposed an anti-theft system that can be used to track a vehicle equipped with the proposed device. It can also be used for tracking wildlife, tracking assets and recovering stolen vehicles. In the future, we may be able to integrate other related devices into a vehicle such as sensors. We can create a server to see the vehicle route and other information on our computer and we can record the trajectory of it. The sensors installed in our vehicle can report vehicle information to our server and it can form an intelligent tracking system. There are various reasons why car owners and public vehicle operators prefer to use GPS. You can determine your location, whether you are traveling locally or abroad, having a GPS is really an advantage. If you think you are lost, you can use your GPS receiver to find out your exact location. Vehicle tracking systems are commonly used by fleet operators for fleet management functions such as routing, dispatch, on-board information and safety. Other applications include monitoring driving behavior, such as an employee's employer or a parent with a teenage driver.

#### V. REFERENCES

- [1]. Chih-Yung Chen, Jen-Pin Yang, Guang-Jeng Tseng, Yi-Huan Wu, ReyChue Hwang. An indoor positioning technique based on fuzzy logic. Proceedings of The International Multi Conference of Engineers and Computer Scientists. Hong Kong. 2010; II:
- [2]. Nilesh Dubey, Vandana Dubey, Shivangi Bande. Cell-ID based vehicle locator and real-time deactivator using GSM network. Springer-Verlag Berlin Heidelberg. 2011; 82–86.
- [3]. Iman M. Almomani, Nour Y. Alkhalil, Enas M. Ahmad, Rania M. Jodeh. Ubiquitous GPS vehicle tracking and management system. Jordan Conference On Applied Electrical Engineering and Computing Technologies (AEECT). IEEE. 2011; 1-6.
- [4]. Wen-hai Cai, Ting-ting Sun. CTS new generation intelligent transportation system. Second International Conference On Innovations In Bio-Inspired Computing And Applications. IEEE. 2011; 137-140.
- [5]. Mohammad A. Al-Khedher. Hybrid GPS-GSM localization of automobile tracking system. International Journal of Computer Science & Information Technology (IJCSIT). 2011; 3 (6):
- [6]. Montaser N. Ramadan, Mohammad A. Al-Khedher. Sharaf A. Al-Kheder. Intelligent anti-theft and tracking system for automobiles. International Journal of Machine Learning and Computing. 2012; 2 (1): 7Zhengzhong Li, Guangping Zhou, Zhaofeng Liang. The design of vehicle travelling data recorder based on GPS/GPRS. Future Wireless Networks And Information Systems. Springer-Verlag Berlin Heidelberg. 2012; 144: 17–22.
- [7]. Daniel K. Schrader, Byung-Cheol Min, Eric T. Matso, J. Eric Dietz. Combining multiple, inexpensive GPS receivers to improve accuracy

- and reliability. Sensors Applications Symposium (SAS). IEEE. 2012; 1-6.
- [8]. M. A. Hannan, A. M. Mustapha, A. Hussain, H. Basri. Intelligent bus monitoring and management system. Proceedings of The World Congress On Engineering And Computer Science. San Francisco. USA. 2012; II:
- [9]. Muhammad Ridhwan Ahmad Fuad, Micheal Driberg. Remote Vehicle Tracking System using GSM Modem and Google Map. Conference On Sustainable Utilization And Development In Engineering And Technology (CSUDET). IEEE. 2013; 15-19.