

# Vehicle and Object Tracking Based on GPS and GSM

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**Abstract:** Global positioning system is globally used for the navigation purpose. GPS is mainly used in military purpose, farming technologies, civil, transportation for example in vehicles and commercial users around the world. This paper describes a practical model for routing and tracking of vehicles in a large area outdoor environment, based on GSM i.e. Global System for Mobile Communication and GPS i.e. Global Positioning System. The supporting device GPS continuously move with the vehicle and records the position of the vehicle. It can be communicate with the help of GSM modern which is installed in both transmitters and receivers, when it is required by the owner.

GSM model is controlled by 32 bit ARM7 LPC2148. The device will records positions to supervised centre by the SMS or GPRS which can be located in the GOOGLE EARTH and therefore the current position of the vehicle can be known. This research paper describes the working of GPS tracking system and its usefulness in actual world environment. Localisation algorithm, Kalman filter algorithm are some algorithms we will discuss in this paper.

**Keywords:** GPS, Vehicle Tracking GSM, Google Earth, GNSS, NMEA & GPGGA

**General Term:** Kalman algorithm, Localisation, Improvement Algorithm.

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## 1. INTRODUCTION

- **GPS:** The GPS is formed by 24 Earth orbiting satellite and 3 more solar powered satellite use in case if any satellite doesn't work. The orbits are arranged so that at any moment anytime on Earth, there are four or more than that satellites are visible in sky (Refers to figure 1)

24 satellites around the Earth



Figure 1

• **GPS Tracking System:** A GPS tracking unit is device that uses the global positioning system to determine the correct location of a person, vehicle or any other asset to which it is attached .We can record the position of the vehicle or any other thing at definite intervals. The location is recorded, whether the tracking unit stores this data or it may be transmitted to a central database, or to the internet- connect computer, using a general packet radio service or satellite modem embedded in the unit. GPS tracking system uses the GNSS network.

Object tracking and navigation are becoming one of the most important requirements of the people. Many people prefer travelling through travel agency vehicles and access their services. The problem arises is the user as well as the travel agency owner don't have the exact position. That's where our application comes into picture.

Crimes involving car theft is the main concern for the conduct of this project, which is one of the biggest crimes. With the help of satellite communication technology, it is easy to track the vehicle locations.

Today GPS used in cars, ambulance, fleet and police vehicles. GPS provide location based services. The GPS technology is satellite – based navigation system. The technology is forty years old. The main idea for making this is to help military.

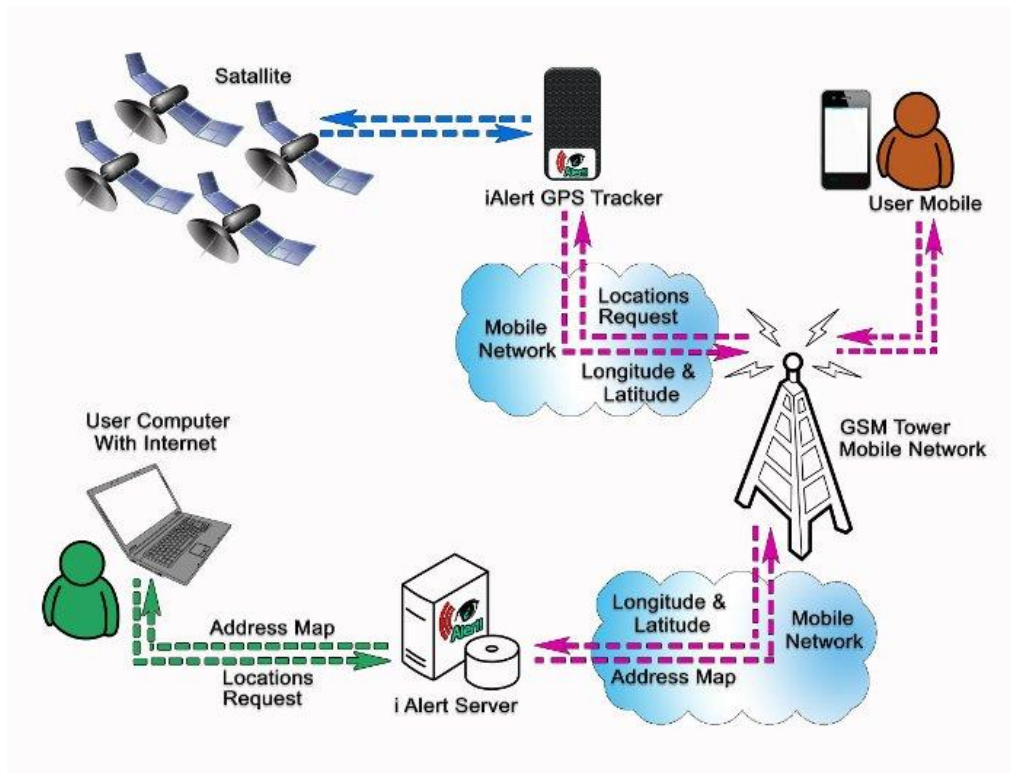


Figure 2

**Problems Identification:**

People know that GPS can provide more security for the vehicles but because of its high cost people doesn't apply it. Advanced car security system is too expensive and the cost for this device is too high. Other problem is there is no use of this device in that area where signal or network is not available. It is a big deal.

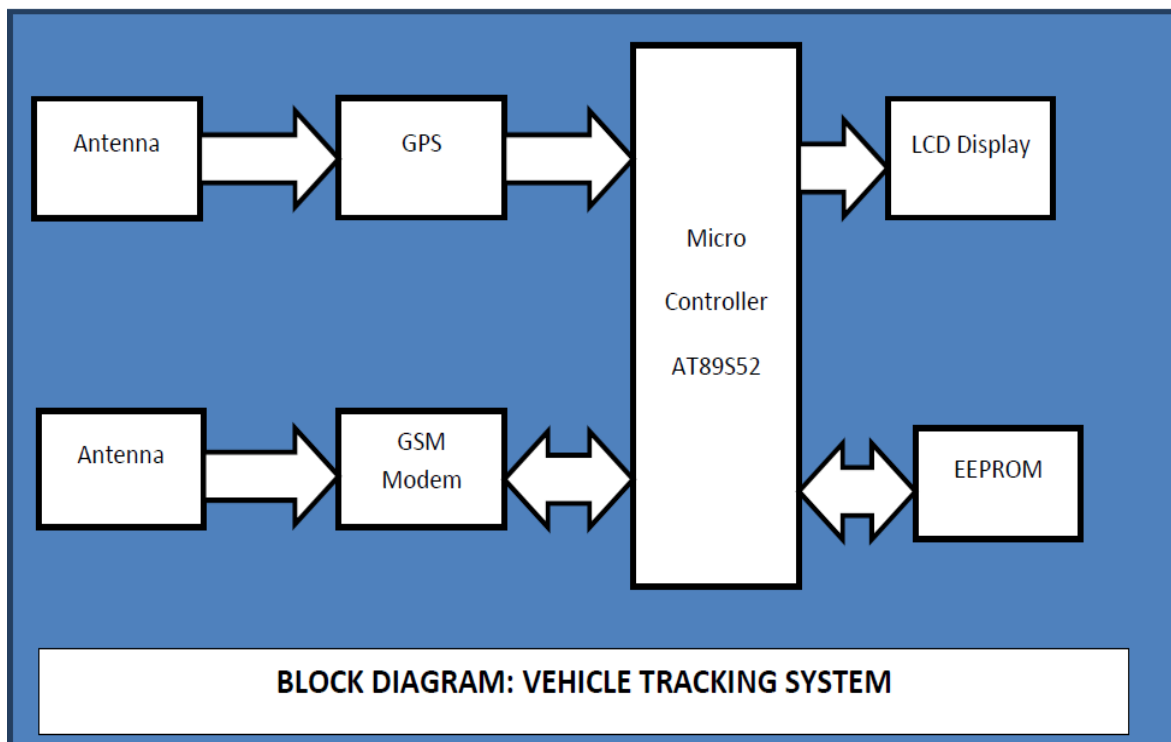
**Objective of the study:**

1. The main objective of the project is routing and tracking vehicle based on GPS and GSM .
2. To provide a solution to avoid theft in the minimum cost than advance security systems.

**Scope of the study:**

In case of vehicle theft it is not possible to keep track of it. Through this project we are able to keep track of the robbed car. This helps us to get complete surveillance of our vehicle.

**Block diagram:**



1. Microcontroller based on motherboard with regulated power supply.
2. GPS receiver for location information.
3. GSM modem/Mobile phone for remote communication
4. LED indicators
5. LCD display

**2. METHODOLOGY**

In the vehicle localization and navigation system we are able to locate the vehicle anywhere in the global with the help of simple and at the same time advanced devices having 8052 Atmel or NXP Microcontroller, GPS receiver, GSM modem, MAX 232, EEPROM. Microcontroller serial ports is connected by the transmit pin. AT8952 microcontroller communicates using serial communication with the help of RS232 Protocol, takes data from the GPS receiver and sends the data in the form of small message with help of GSM modem. GPS modem receives data at a specified baud rate, received values are then send to the microcontroller AT89S51-52, where these are forwarded to GSM modem after processing. The components like GSM, GPS and Micro control circuit using a 12 volt/3 with a 2 ampere battery .12 volt for GSM,5 volt for GSM and 5 volt for microcontroller receives the power. With the help of regulator we regulate the power between these components.

The GPS module steadily sends serial data in the form of sentences according to NMEA standard. The GPGGA sentence contains the latitude and longitude values in NMEA. In this program, these values are taken out from the GPGGA sentence and are pomp on LCD. Microcontroller accepts data from GPS from serial communication using protocol RS232.Then the data is taken out.

**Algorithms:**

The basic algorithm for the object tracking on the GPS is given below.

**1. Localisation Improvement Algorithm:-**This localisation improvement algorithm in GPS-interfacing spots by integrating various information of sensors such as gyroscope and compass in smart phones. The proposed algorithm is used in a smart phone. Following are the steps to implement this algorithm.

**Structure of algorithm:-** It consists of three steps –

- First step is to find the correct direction of movement.
- Obtaining the distance moved.
- Integrating the prior results and GPS location information.

**Recurrence processing function of compass heading:-**The measurements of the compass in smart-phone are highly dependent on the ambient magnetic field, so its accuracy is low. The heading value of the compass can be stabilized. But as the user moves the real heading changes continuously. To fix this value, here apply the difference between the previous heading and current heading and process it recursively.

**2. KALMAN Filter Algorithms:** -KALMAN filtering, also known as linear quadratic estimation (LQE). KALMAN filter is come into picture to reduce GPS errors and thus it increases the accuracy of the localisation system. It is a two-step process.

- In the first step the KALMAN filter estimates the recent state variables, together with their uncertainties.
- Ones the outcome of the next measurement is observed these estimates are update using a weighted average, with more weights being given to estimates with higher certainty.

The algorithm works recursively and therefore it can run in actual time using only the present input measurements and the previously estimated state and its uncertainty matrix, no other past information is required.

### 3. FUTURE SCOPE

1. For Optimization of the hardware system, we can choose a GPS receiver suitable for the system, compass and for more accuracy one can go for Differential global positioning system (DGPS) by using DGPS accuracy can be increased to 1.4 meters whereas in GPS it is 5.10 meters.
2. Remote door looking system to capture the thief.
3. Accident detection and generating message which will inform the family members or owner about the location of accident.
4. The owner can switch on the digital camera recorder to record the face of the thief for identification of the thief.

### 4. DISCUSSION

A practical system for tracking vehicle and objects by GPS and GSM as presented in this project. Sometimes GPS may not review in the absence of signal or network, which is the main reason for the limitation of the GPS accuracy. The accuracy may be affected due to some factors like weather, environment around the vehicle, GPS receiver, compass sensor etc.

### 5. CONCLUSION

From all this research paper we get some problem like signal multipath, receiver and orbital clock error, environmental problem like ionosphere delay, troposphere delay, delay because of the distance and time, low accuracy in result. Every life is important and due to theft and accidents in transportation system we loss them. To make better the safety, security and efficacy of the transportation systems Useful for the travelling people. They can take full advantage of advanced mobile services.

It is proven that the practical implementation of this paper will be very efficient, cheaper and reliable system for security, and to optimize the localization of object and resulting location.

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