

# Vehicle Tracking System Using GPRS For School Bus

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**Abstract:--** In today’s fast world, it’s necessary to get the correct information at the right time to provide fleet management and vehicle security. Any person or organization that owns a large fleet faces the problem of not knowing where each and every vehicle. Global Positioning System (GPS) is becoming widely used for tracking and monitoring vehicles. The proposed system can be use for tracking vehicle in real time using GPRS (General Packet Radio Service) technology. A vehicle tracking system can be enables the fleet operator to find out the location of the vehicle throughout the journey of the vehicle.

The proposed system can provide GPS-GPRS based vehicle tracking system. The current position of the vehicle can be acquire by GPS device which will integrating into the target vehicle and the location coordinates can sent through GPRS, it provide by the GSM network. The GPS receiver is used to give latitude and longitude of the current location. The proposed system can be built using the microcontroller. This is the heart of the system. The GPS receiver connecting to microcontroller through the serial port and used to obtain the current location. The GPS receiver acquires the current position of the location and this information of vehicle transmits to tracking server using GPRS modem. GPRS provide TCP/IP connection with tracking server. Tracking server receives vehicle location information via network and stores this information in database. This information is available to authorized users of the system over the internet on map. The proposed systems will provide the possibility of tracking the location of vehicles at an affordable cost.

**Index Terms:—**Automatic system in vehicle, GPS, GSM/GPRS, Arduino Uno

## I. INTRODUCTION

In this modern, fast moving and insecure world, it is became a basic necessity to be aware of one’s safety. The number of vehicles also increases on roads and highways. The proposed system is a GPS based real time vehicle tracking system, is used for security applications as well as any organization that maintains a large fleet and wants accurate real- time information about vehicle position. For the implementation of the proposed system use navigational technologies such as GPS, GPRS and database technologies. The system will be installing in a vehicle to allow the owner to track the vehicle’s location, this system will use GPS and GPRS module. Global Positioning System can determine the precise location of a vehicle. The GPS antenna present in the GPS receiver module receives the information from the GPS satellite in NMEA (National Marine Electronics Association) format and this information transmits to a server using GPRS module. GPRS provide TCP/IP connection with tracking server. Tracking server will receives vehicle

location information via network and stores this information in database. This information is available to authorized users of the system over the internet on map. Automatic Vehicle Location (AVL) system was discussed in details by Al-Bayari and Sadoun that works under GIS environment [1]. Automatic system in vehicle use for finding the geographic location of a vehicle and transmitting this information to a point where it can be stored and used with certain software and database applications [3]. Proposed systems will use a variety of hardware and software components. The vehicle tracking system can be use for Intelligent Transportation System (ITS) [2]. For example, it can be used in cars to measure real-time traffic data to identify the congesting area.

## II. LITERATURE REVIEW

Name of Author	Methodology/Tools Used
<b>Shihab A. Hameed (2010)</b>	In this paper use MMS and database technology. database contain information about car and owner .
<b>Iman M. Almomani (2011)</b>	This paper is providing two types of end user

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	applications, i.e a web application and a mobile application. The system's use to provide location and ground speed of a given vehicle in the current moment or on any previous date.		used to display the vehicle location on the map in the smartphone application.
<b>Ambade Shruti Dinkar and S.A Shaikh (2011)</b>	In this paper information is transmitted to Tracking server using GSM/GPRS modem on GSM network by using SMS or TCP/IP connection with Tracking server. Tracking server also has GSM/GPRS modem that receives vehicle Location information via GSM network and stores this information in database and use for displaying	<b>Sonali S. Solanke (2015)</b>	In this paper the GPS modem will continuously give the data to indicating the position of the vehicle. The same data is sent to the mobile at the other end from where the position of the vehicle is demanded. When the request sent by user to the number at the GSM modem, the system automatically sends a return reply to that mobile
<b>Saurabh S.Chakole, (2013)</b>	This paper provide system based on ARM using GSM and GPS. To display information GUI is built on Microsoft visual studio		
<b>LIAN Hai-Yan, YUAN Fei, (2013)</b>	This system is design to achieve real-time location of underwater acoustic communication devices and route tracking to avoid the loss of the device, as well as assist to retrieve the lost device with the help of sea buoy part carrying platform of launch, acquisition and GPS and other equipments, connects with the control center via the wireless network to transmit data and Receive instructions from the control center		
<b>SeokJu Lee, Girma Tewelde, (2014)</b>	This system work using GPS and GSM/GPRS technology.GSM/GPRS module is used to transmit &update the vehicle location to a database.it uses smartphone application for continuously monitoring of the vehicle location. Google mapAPI is		

**Table1: Literature Review of Work**

### III. PROBLEM STATEMENT

GSM Modem is mainly used to connect with GSM network, it has more application due to large covering range, however, its time delay is a drawback especially when the loads of the short message center are too heavy and the real-time property of the vehicle tracking system will lose insurance, because of it real-time SMS cost is not cheaper. GPRS services will be using to solve data transmission problem in CSD method for data transmission, it is used when real-time controlling with high real-time need. The real-time of data transfer gets guarantee due to the use of GPRS.

### IV. OBJECTIVE & SCOPE

#### 4.1 Objective:-

- 1) Study of exesisting tracking system to develop proposed system.
- 2) Selection of appropriate microcontroller, GPS and software to display map for tracking system.
- 3) Develop Automatic Vehicle Location tracking system using GPS for positioning information and GPRS for information transmission.
- 4) Transmission of vehicle's location and other information to server after specific interval of time.
- 5) Develop a web based software to display transmitted information periodically to end user on a map

- 6) Assembling and testing the actual developed vehicle tracking system for expected result.

**4.2 Scope of the project:-**

As the vehicle tracking is the initial and important step of vehicle monitoring system, this becomes very essential to get vehicle longitude, latitude and time with the help of GPS module which will be use to find exact location of vehicle. The proposed system will be implementing for tracking of sinhgad public school bus in real time. This system also useful in shipping industry, transport companies and car rental agencies.

**V. METHODOLOGY**

*Below is the modular approach for the proposed project-*

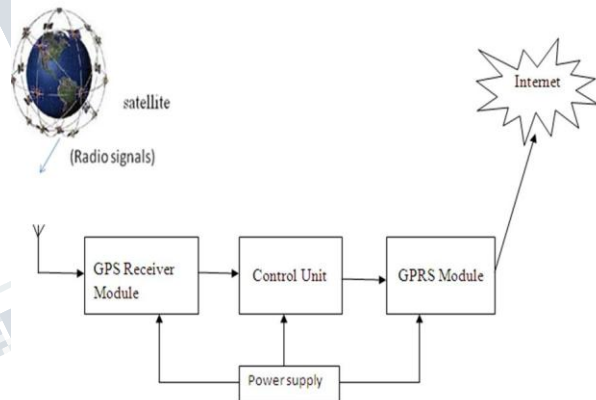
- ♣ System level block diagram: - First the complete system level block diagram will be designed and evaluated as per the system specifications.
- ♣ Each Block Design: - Once the block diagram is created, then each block will be design and verified in accordance with their specifications and functionality.
- ♣ Block Interconnections: - The design of individual blocks are connected and form the final circuit design, which will be again verified with system specifications.
- ♣ PCB layout & Artwork: - After circuit diagram verification the component decal are selected and accordingly PCB layout and artwork will be created.
- ♣ PCB Assembly and testing: - once the PCB is ready and material is procured as per requirement it will be assembled and tested with test software.
- ♣ Software / Firmware: - once the PCBs are tested then the firmware flow diagram for critical path will be design and accordingly the firmware will be written. Firmware will also be divided in smaller functions, which will be written and tested independently. Once each small functions are tested and verified then it will be integrated in main firmware as per the logic required for the operation of project.

- ♣ Finally system will track the location of bus as well as display information on map at server side.

To fulfill third objective i.e. get vehicle location data from GPS module and process on it with the help of control unit. Proposed system will give real time vehicle tracking with the help of GPS and GPRS module and also allow the user to view real time position of vehicle on map. The main core of the system will be embedded hardware to monitor real time vehicle. Web server can built into the embedded system and this embedded system communicates through GPRS with personal computer. The system block diagram is divided into two parts i.e embedded system in vehicle and tracking server.

**5.1 HARDWARE: -**

**5.1.1 Embedded system in vehicle:**



**Figure 1. Proposed system in vehicle**

This proposed system can transmits location information to the server through GPRS networks. The server is a personal computer that receives the information and put it in the database.

**5.1.1.1 Arduino uno microcontroller:**

Arduino Control unit is the responsible for tracking vehicle remotely. Microcontroller is a main part of system. Control unit is responsible for communication between GPS receiver and the GPRS modem. The Arduino Uno consists of an Atmel 8-bit AVR microcontroller with complementary components to facilitate programming and incorporation into other

circuits, it was programmed via USB implemented using USB-to-serial adapter chips such as the FTDI FT232.

**Arduino uno Board:**

- ♣ This is an open source and open hardware micro controller with an Atmel AVR processor (ATmega1280).
- ♣ It is based on Embedded C language.
- ♣ It serves as a master that sends/receives commands and data from the drive circuit and the force sensors.
- ♣ It solves the Inverse Kinematics equations and sends them to the servo motors driver.
- ♣ The transmission medium per second is 112500 Baud in order to be in synch with the Mini Mestro plolulu and the Sony playtation.
- ♣ It has four Tx/Rx pins that provide the proper interface between the microcontrollers. It has 14 PWM pins, 16 Analog input pins and 30 Digital pins. It also supports I2C (TWI) and SPI communication. [12]



**Figure2. Arduino Board**

**5.1.1.2 GPS Receiver Modem:**

GPS use to find location of vehicle. GPS technology is used to find the location of any object or vehicle to monitor continuously using satellite signals. Three satellite signals are necessary to locate the receiver in 3d space and fourth satellite is used for time accuracy. GPS give the information of parameters like longitude, latitude and attitude. These parameters use to easily locate the position of vehicle. In this GPS technology, the communication takes place between GPS transceiver

and GPS satellite. Each GPS satellite transmits radio signals that enable the GPS receivers to find location of vehicle on the Earth and convert the calculations into latitude, longitude.

This GPS Receiver Modem is based on SIMCOM' SIM908 GPS Module. This module is a high-performance quad-band GSM/GPRS/GPS module of industrial grade, which can be controlled via AT commands set. It can be used to make or receive calls, to send and to receive SMS messages. It can be used to send and receive data after connected to the network. It also realized global positioning by locating its geographical position with GPS.



**Figure 3.GPS module**

**5.1.1.3 GSM/GPRS Module:**

It uses the GSM network to transmit and receive TCP/IP based data to and from GPRS module. GPRS provides packet radio access for GSM and time-division multiple access (TDMA) users. GPRS network is established by GSN (GPRS support Node) on the GSM. GSN provide packet switching in GSM network, connect IP and manage packet routing. GPRS use two support nodes, SGSN (Serving GPRS Support Node) and GGSN (Gateway GPRS Support Node)

SGSN routes incoming and outgoing IP packets addressed to and from any GPRS subscriber and GGSN provide the interface to external IP packets networks, accessing external ISP Function such as routers and remote access dial in user service (RADIUS) server. GPRS use NAT (Network Addresses Translator) method to transmit data packet, NAT an internet standard is a router that is place between a public intranet, which Use private IP addresses. Control unit can send data to GPRS network through GPRS module. GPRS

provides AT command interface i.e all function can be accessed using AT command.

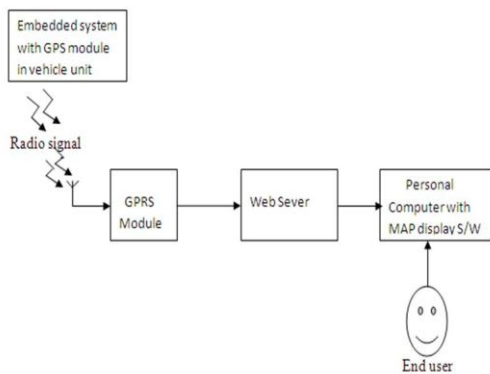


**Figure 4. GSM/GPRS module with GPS**

**5.1.1.4 Power supply:**

The Arduino Uno microcontroller initially powered by connecting it to a laptop using a Universal Serial Bus (USB) cable. but when system will be installing in the vehicle by connecting to a rechargeable battery that supplies a voltage of 5v. The proposed system will later connecting to the vehicle battery for providing battery back up.

**5.2 Tracking server/remote monitoring station:**



**Figure5. Tracking server/Remote monitoring station**

The target systems can be monitored independent from the remote location. Client PC can use software to display map of current vehicle location. Tracking server can maintain all the information received from vehicle units. This database can be accessed from internet to authorized users through a web interface. The database formats the information in a special form and display using software. Authorized users can track their vehicle and view previous information stored in database. The main block of tracking server is GPRS module which is connect to personal computer using serial port. This module can receives information from on-Vehicle units and sends information to the server through internet. Tracking server saves this information into database and display location information graphically on map.

**5.3 Software:-**

**5.3.1 Arduino ISP:**

- ♣ The Arduino can be programmed with the Arduino software
- ♣ The ATmega328 on the Arduino ADK comes preburned with a boot loader that allows you to upload new code to it without the use of an external hardware programmer. We can also bypass the boot loader and program the microcontroller through the ICSP (In-Circuit Serial Programming) header using Arduino ISP.

**VI. CONCLUSION**

The goal of this proposed system will be to create a vehicle tracking system to find longitude, latitude and time with the help of GPS in vehicle unit system. Monitor station will check the real time vehicle location remotely with the help of GPRS technology and it will show result graphically on map.

The study of proposed systems involves several areas of the knowledge, such as wireless communication, electronic, computer science. The implementation of this vehicle tracking system can be improving productivity with better fleet management. System will provide better scheduling to handle larger jobs loads within a particular time. In the near future, we expect to implement the proposed system to detect the accident by using vibration sensor, we can detect the accident and we will be sending the location to the owner, hospital and police.

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