

# Vehicle Tracking System Using Arduino,GPS ,GSM (Simulation)

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**Abstract-** Vehicle tracking system is a well-established technology in this era which is used by fleet systems and owners of vehicles all over the world. 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]. The design is an embedded application, which will continuously monitor a moving vehicle and report the status of the vehicle on demand. For doing so the Arduino Uno R3 is interfaced serially to a GSM modem and GPS receiver. 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 the 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 the Internet. In this pandemic situation of COVID-19 simulation is the best way to understand the functioning of this device. The simulation working is the same as that of the real device but proxy values of gprs data and mobile number are used.

## I. INTRODUCTION

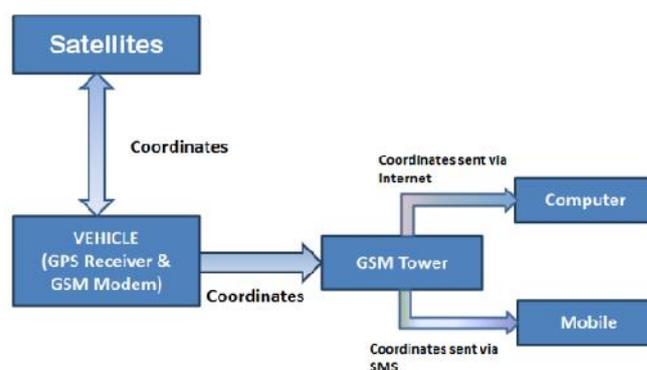
It is the technology used to determine the location of a vehicle using different methods like GPS and other navigation systems operating via satellite and ground based stations. Modern vehicle tracking systems use GPS technology to monitor and locate our vehicle anywhere on earth, but sometimes different 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 cars 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 the internet and software.

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 maps. The device consists of a module that communicates independently and has the ability to work simultaneously with the local GSM network. It provides effective real time location.

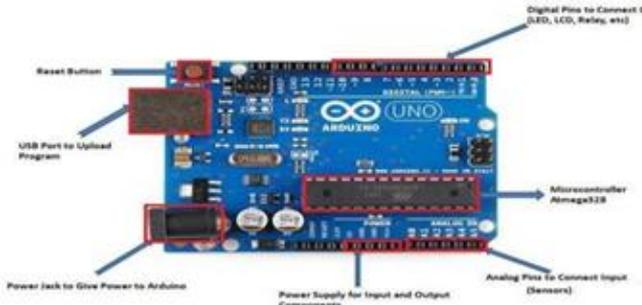
## II. BLOCK DIAGRAM

The block diagram of the vehicle tracking system shows how our system actually works. The vehicle tracking unit is installed inside the vehicle that is to be tracked. The GPS receiver receives the coordinate from the satellite which is then sent to the GSM tower by the GSM modem. The coordinate is then sent to a computer via the internet where it is stored in the database for displaying the location on Google Map.



## III. COMPONENTS

### 1. Arduino UNO R3



The Arduino Uno is a microcontroller board based on the ATmega328. The ATmega328 has 32 KB (with 0.5 KB occupied by the boot loader). It also has 2 KB of SRAM and 1 KB of EEPROM (which can be read and written with the EEPROM library). It has 20 digital input/output pins (of which 6 can be used as PWM outputs and 6 can be used as analog inputs), a USB connection (used to upload the programme), a power jack, an in-circuit system programming (ICSP) header, and a reset button.

**VCC:** Power Supply 3.3 – 6 V

**GND:** Ground

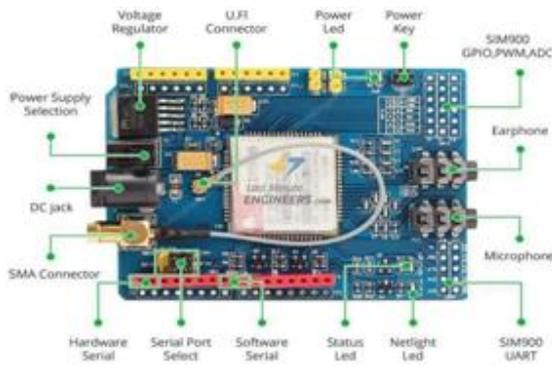
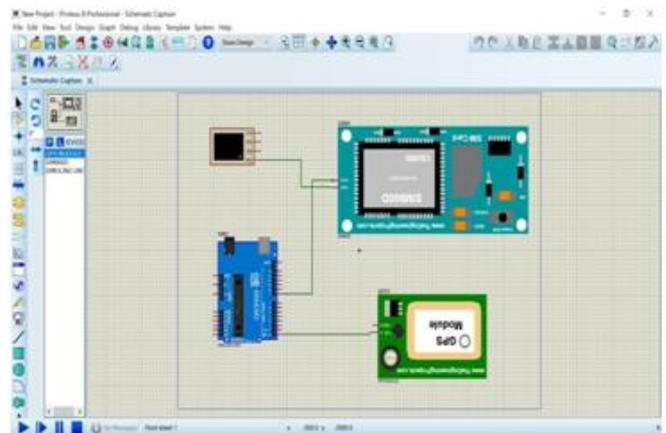
**TX:** Transmit data serially which gives information about location, time

**RX:** Receive Data serially. It is required when we want to configure a GPS module.

**2. SIM 900 Module**

- Make and receive voice calls using an external earphone & electret microphone
- Send and receive SMS messages
- Send and receive GPRS data (TCP/IP, HTTP, etc.)
- Scan and receive FM radio broadcasts
- Serial-based AT Command Set
- U.FL and SMA connectors for cell antenna
- Accepts Full-size SIM Card

**IV. SIMULATION**



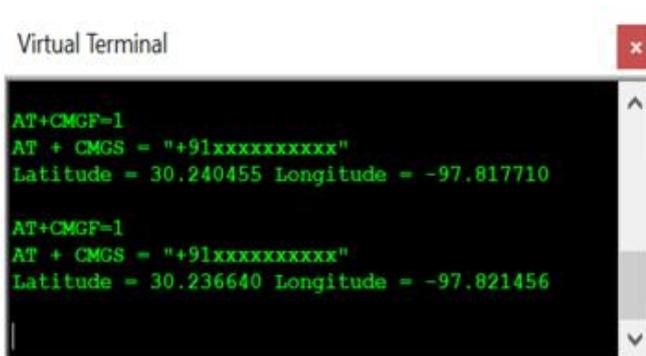
**3. GPS Module**

The satellites transmit information about their position and the current time in the form of radio signals towards the Earth. These signals identify the satellites and tell the receiver where they are located.

The vehicle tracking device is one of the best uses of the Arduino system. In the pandemic situation which we are facing today that COVID-19 best way to understand the vehicle tracking device is its simulation. For simulation we have used two software which are Arduino IDE and Proteus. Arduino IDE is well known to everyone. Well the Proteus Design Suite is a proprietary software tool suite used primarily for electronic design automation.

As you can see in the figure is the mechanism of the vehicle tracking system in proteus software. GPS module, Arduino UNO, SIM900D and virtual terminal(act as mobile screen in simulation) are the components used. Every component has a .HEX program file. The .hex file of the GPS module has the GPRS data i.e. location in terms of longitude and latitude as same as we get from GPS modules of real devices . The .hex file of Arduino consists of a compiled tinyGPS program. All the data flows from GPS Arduino – SIM900 Virtual terminal. The result when we run the simulation. The result can be seen on the virtual terminal.

The message we get in the virtual terminal; this same message we get on the mobile number of the respective sim card.



```

Virtual Terminal
AT+CMGF=1
AT + CMGS = "+91xxxxxxxxxxx"
Latitude = 30.240455 Longitude = -97.817710

AT+CMGF=1
AT + CMGS = "+91xxxxxxxxxxx"
Latitude = 30.236640 Longitude = -97.821456

```

- The design of the device makes it easy to upgrade which provides large and open scope for the modification of the device

## V. BENEFITS

- 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.
- 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.
- Monitoring discourages dangerous and inefficient driving practices of drivers which lead to increased vehicle security and driver safety.
- Revolutionary in industries and organizations who have to manage and keep track of a lot of vehicle traffic.

## VI. LIMITATIONS

- Often GPS takes time to connect with the network due to poor weather conditions.
- Unlikely to work indoors or may even have problems outside where it has no clear path of transmitting to and receiving signal from satellites.
- Due to obstacles like tall buildings or such infrastructure which block view of the sky, it often causes multipath error to the receiving signal of the GPS receiver.
- So location seems to appear to jump from one place to another leading to inaccurate results with incorrect values of Latitude and Longitude.

## VIII. CONCLUSION

- With a real vehicle tracking device and its simulation we concluded that a vehicle tracking system is flexible, customizable and accurate.
- This device can provide good control on carjacking as well as keeping track of vehicles.