Advance Vehicle Tracking System Using GPS and GSM

Mr. A. P. Narkhede[1], Rushikesh P Patil[2], Gaytri O Wankhade[3], Mansi S Mantri[4], Pratha J Gorle[5],

[1]*Professor, ENTC Department, MGI-COET, Shegaon, Maharashtra, India.*

[2,3,4,5]*Student, ENTC Department, MGI-COET, Shegaon, Maharashtra, India.*

***Abstract** - This study analyzes different GPS and GSM-based vehicle tracking methods. One of the most crucial aspects of navigation, which is mostly utilized by many drivers, is vehicle navigation. A car tracking system consists of installing an electronic device inside a vehicle or mounted in one, together with specially made computer software that tracks the location of the vehicle and gathers data. While other forms of automatic vehicle location technology can also be employed, Global Positioning System (GPS) technology is now the most widely utilized technology for car tracking systems. You can use the Internet to browse and locate vehicle information on the electronic Google Maps.*

***Keywords-** GSM (Global Services for Mobile Communication), GPS (Global positioning system) Vechicle Tracking, Navigation.*

I. INTRODUCTION

Global Positioning System (GPS) and Global System for Mobile Communication (GSM)-based car tracking and location system provided effective, real-time vehicle locating, mapping, and and reporting of this data, adding value and improving the quality of services offered. With the use of an SMS, the GPS-based car monitoring system may determine the precise location of any vehicle and notify the proper authorities of its location. The system comes with a GPS modem that can determine a vehicle's location by determining its latitude and longitude. Geographic position and time data from the GPS are used by the system. The system consists of a central station that tracks data from the different vehicles and an internal module that the vehicle carries to be tracked. A GSM modem and a GPS receiver make up the onboard module. This hardware was installed on the car in a way that made it invisible to observers. That system functions as a hidden unit since it continuously transmits location data to the monitoring unit. When a vehicle is stolen, the tracking system's position data is used to locate the vehicle and provide police with the information. This offers it an advantage over other technologies for the same use case. When a user submits a request to the number at the modem, the system immediately responds to that specific mobile device with the vehicle's position in terms of longitude and latitude.

An application has been created that may be used to follow a moving vehicle on a Google map and determine its exact position. Anytime, anyplace, and in any weather, the system enables monitoring of the target. This system can be used for a variety of applications and is easy to use, install, and access.

II. LITERATURE REVIEW

Padmaja, B.V. et al. developed in [1] a car tracking system that transports and shows data using Blynk. Ultrasonic, gas, infrared, temperature, and GPS sensors are all included in the system. The suggested method uses a mobile application for monitoring.

Dukare, S.S., Patil, D.A., and Rane, K.P. introduced in [2] A vehicle monitoring, tracking, and alerting system. While GPS gives the precise location of the car, the alerting system sends data via GSM or GPRS. By including petrol monitoring, vehicle location tracking, locating the nearest gas stations, and receiving alarm alerts, the proposed system, in contrast, goes above and beyond these features.

Gullipalli, Karri, and Kota introduced in [3] An Arduino, GPS, GSM, fuel sensor, and speed sensor are all part of this system, which allows for data transfer and communication between desktop apps, mobile applications, and the gadgets on the bus. The Node-MCU (ESP8266) was an essential component of the researchers' suggested system. Also, it employs a web application for system monitoring, while the suggested choice makes use of a mobile application.

Ribeiro and Gonzaga presented in [4] a number of methods for real-time background removal techniques that use video sequences for picture segmentation and depend on the Gradient Mixture Method (GMM).

Van more, S.V. et al. developed in [5] a GPS/GSM system for tracking and locating vehicles. This device can track the status of the vehicle through GPS tracking reports. For safety, Android apps offer car tracking.

Rohitaksha, K., Madhu, C.G., Nalini, B.G., and Nirupama, C.V. created in [6] To be able to find the latitude and longitude coordinates of a satellite during the crucial information, it uses Global Positioning Devices (GPS). We are all aware of how essential tracking structures are in the modern world. This gadget can be used for a number of purposes, including troop monitoring and vehicle theft monitoring.
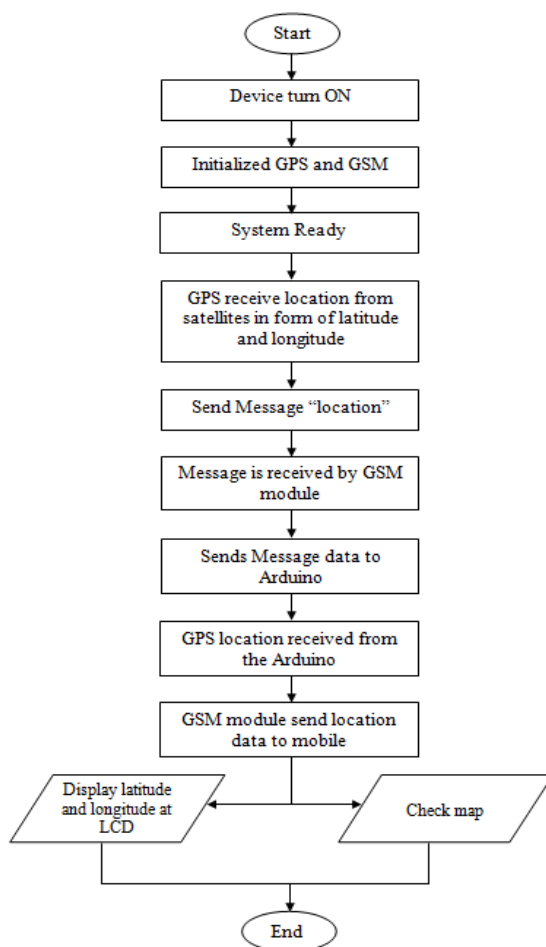
III. FLOWCHART

Fig.1: Flowchart

The GPS+GSM tracking system's flowchart system is displayed in Figure 1. As the communication channel, the GSM module is where this transmission starts its journey. After carefully receiving the message data, the GSM module quickly forwards it to the Arduino Uno, an essential component that coordinates the device's operations. The received GPS location coordinates are transmitted to the Arduino Uno, where they are available and prepared for the following stage.

Once again, with perfect precision, the GSM module takes over and sends the most recent location data to a designated mobile device. The result of this operation is seamlessly displayed on the mobile device's display, which shows the current position in the concise form of "latitude and longitude." This picture illustrates the process from satellite-acquired

coordinates to the thorough display of geographical placement on the user's mobile interface, showing how complicated and interconnected of each component.

This carefully developed series of steps shows the effortless combination of GPS and GSM technology and represents a cooperative effort between both software and hardware. The end result of this procedure is not just a display of geographic coordinates; rather, it is an instance of the complex dance between data transfer and interpretation, highlighting the wonders of contemporary technology in providing correct and easily accessible location data.
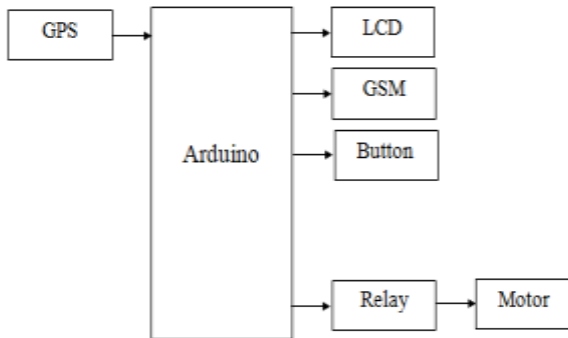
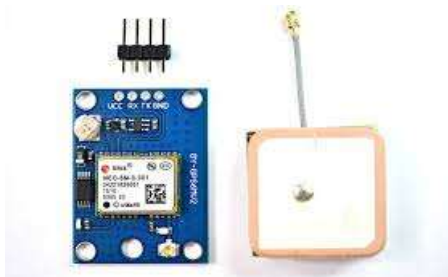## IV. BLOCK DIAGRAM

Fig.2 : Block Diagram

1. GPS Module:

Fig.3: GPS Module

The GPS module receives real-time location data from satellites and provides latitude and longitude to the Arduino. It is essential for tracking and navigation purposes.

2. Arduino:

Fig 4. Arduino

Arduino acts as the central controller, taking input from the GPS and button, processing it, and controlling the LCD, GSM module, relay, and motor. It runs the main logic of the system.
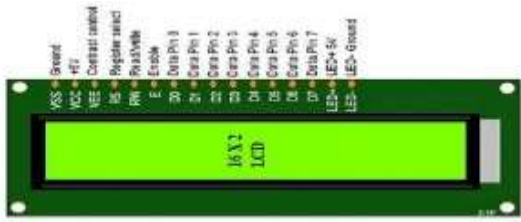
3. LCD Display:

Fig 5. LCD Display

The LCD displays useful information like location data or system status. It helps users easily monitor the system without needing additional devices. shows it on a 16x2 LCD screen in real time

4. GSM Module:

Fig 6. GSM ModuleThe GSM module enables the Arduino to send SMS alerts or make calls to a user's mobile phone. It provides remote communication, especially for emergencies A "GSM number" is 7028809067 refers to the digital mobile phone number associated with a Global System for Mobile Communication (GSM) network..

5. Relay:

Fig 7. Relay

The relay acts as an electrically operated switch, allowing the Arduino to safely control high-power devices like the motor by isolating the control and power circuits.

6. DC Motor

Fig 8. Motor

The motor represents a mechanical device like a vehicle engine, which can be turned ON or OFF based on commands from the Arduino through the relay. DC motor is an electrical machine that converts electrical energy into mechanical energy using direct current (DC).
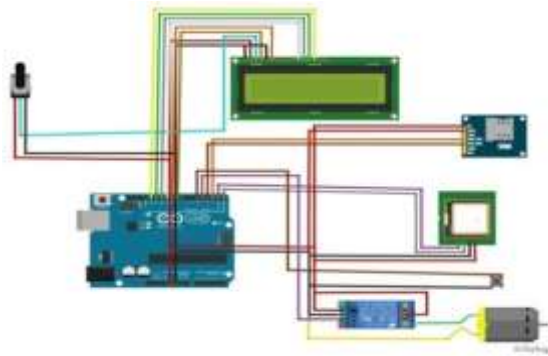
V. WORKING

Fig 9. Circuit Diagram

The goal of this project is to use an Arduino Uno to develop a car tracking and control system that is based on GPS and GSM. GPS satellites send location data, including latitude and longitude information, to the GPS module continually. The Arduino processes this data and shows it on a 16x2 LCD screen in real time, enabling the monitoring of the present location. Additionally, a GSM module (such the SIM800L) is linked to the Arduino, allowing SMS connection with a mobile phone. The Arduino texts a pre-specified mobile number with the location of the vehicle either on a regular basis or when needed. The device has the ability to remotely operate the vehicle in addition to tracking it.

The car is essentially stopped when the Arduino triggers a relay module that turns off the motor's power supply in response to an SMS instruction such as "STOP" from the user to the GSM module. The relay is deactivated in response to a "START" command, which enables the motor to restart. To improve visibility, the LCD display's contrast is adjusted via a potentiometer. Using GPS tracking and GSM connectivity, this system offers an easy but effective way of remotely monitoring and managing a vehicle's travel.

V. WORKING MODEL

VI. ADVANTAGES

1. Vehicle location tracking in real time is made possible by the system.

2. By enabling in the quick return of stolen automobiles and sending out alerts for unauthorized movement, it enhances vehicle security.

3. Using efficiency improvements and vehicle utilization tracking, it enables companies to effectively manage their fleet.

4. The system helps in providing the precise position for prompt assistance in the event of an emergency, such as an accident or failure.

5. By optimizing travel routes, the technology helps save time and petrol.

VII. CONCLUSION

This report has presented the development of a vehicle tracking system's hardware. The system can get the GPS coordinate of a vehicle and relay it to the user's phone using GSM modem. The following developed vehicle tracking system shown clearly that the near real-time or even live monitoring of vehicles is indeed feasible, which can be applied for protection (convenience operation) of personal cars, public transportation systems and many other industries such as fleet management. The system consists of many parts, such as the GPS module, GSM modem, and microcontroller and input devices. This system provides advantages including real-time location tracking, and route optimization. Through the combined GPS and GSM technologies, users can retrieve real-time location information as well as monitor their cars in ways that make security measures more efficient and convenient.

VIII. REFERENCES

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