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THE REALTIME VEHICLE TRACKING SYSTEM

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ABSTRACT :
Vehicle tracking systems are a mature technology currently used by fleet technicians and vehicle owners worldwide. This is a safe and reliable technology. In our article, we will create a system to track and locate a vehicle using the Global Positioning System [GPS] and the Global System for Mobile Communications [GSM]. We will focus on Ev powered rickshaw tracking using Arduino Uno R3 and Node MCU. The design is an application that will continue to monitor the movement of the vehicle and report the status of the vehicle upon request. For this purpose, Arduino Uno R3 is connected to the Node MCU and GPS receiver via serial interface. A Node MCU is used to link the vehicle's location to a remote location. GPS data uses satellite- based navigation equipment to continuously provide information about longitude, latitude, speed, distance and more. shows the latitude and longitude position of the car.
KEYWORDS- GPS, Google Map, Tracking System, Wireless sensor network, safety and security enhancement.

INTRODUCTION :

Vehicle Tracking System is a security and management solution. It is a device used to determine the location of the vehicle using various methods such as GPS and other systems operating on satellites and ground stations. Modern vehicle tracking systems use GPS technology to track and locate vehicles anywhere in the world, but sometimes there are many types of automatic vehicle positioning systems. Vehicle tracking systems are installed on the vehicle to provide real- time location, and the data can also be stored and downloaded to a computer for future analysis. This system is a must-have tool for vehicle owners to keep track of when they want to maintain their vehicles, and is very popular today among people who own expensive cars for the purpose of preventing theft and recovering stolen vehicles. and software electronic maps. Equipment includes hardware& software, component. Help track and locate vehicles online and offline. The tracking system generally consists of three parts: vehicle unit, fixed station, database and software system [1]. The vehicle unit consists of hardware devices such as Arduino, GPS and Node MCU, which are kept in the vehicle for tracking. The device is generally used as a modem and receives signals from satellites with the help of a GPS antenna. The modem then converts the data and sends the vehicle's location data to a server that can be placed outside the digital map via SMS and a mobile app calledVTS, which syncs with the web page. Fixed stations include wireless networking systems that receive and transmit data to data centers. The central station has software and maps that can be used to locate the vehicle. Maps of all cities are available on stations with built-in web servers.

PROPOSED SYSTEM :

Vehicle safety is every vehicle owner's biggest concern. Vehicle owners and researchers are always looking for new and improved vehicle safety. To improve technology, it is now possible to instantly track and monitor vehicles, as well as check the vehicle's movement history. It is necessary to thank the vehicle tracking method, which goes a long way in ensuring the safety of the vehicle by constantly monitoring the traffic. The system uses the Global Positioning System [GPS] to find the tracking vehicle's location data and then sends the latitude and longitude to the tracking station via satellite. In the tracking area, different software is used to display the vehicle on Google Maps. This is how our body instantly follows cars. Thanks for the fast-tracking site, Car Tracking systems have become

popular among vehicle owners because they can constantly monitor their vehicles. The tracking device is mounted inside the vehicle and cannot be seen from outside the vehicle. Therefore, it constantly sends coordinates to the monitoring center, acting as a secret. Tracking software helps vehicle owners check the vehicle's location on an electronic map. Users can use any browser to connect to the server and monitor target traffic on Google Maps. Thus, since the vehicle can be tracked online, it saves users the trouble of calling the driver and finding out the location of the vehicle.

LITERATURE SURVEY :

The research examines GPS technology for tracking objects, going over its history, popular uses, and interaction with Node MCUand RFID. It examines pertinent research, contrasts various object tracking techniques, and talks about two important algorithms: the Kalman Filter and Localization Improvement. Problems like as receiver errors and signal multi-path are emphasized, highlighting the necessity of improved accuracy. All things considered, the report offers insightful explanations of GPS operation and suggests ways to enhance object tracking systems [2]. The article describes a real-time smart car security system that makes use of Java-based virus detection, internet connection, and face recognition. It attempts to counteract growing car theft risks. The vehicle's Person Authentication System (PAS) protects against unwanted entry while enabling authorized users to start the car. The system aims to be more cost-effective, simpler, and more secure [5].This study shows an advanced vehicle monitoring and tracking system using Embedded C programming with LPC2148. GPS and Node MCU (Esp8266) are integrated into the system to provide real-time vehicle tracking. GPS locates the car, GPRS transmits tracking information to the server, and an owner alert is generated. With the use of an alcohol sensor, the system can identify when the car veers off course, warns of driver fatigue or intoxication, and keeps an eye on the engine's temperature to avert catastrophes. It puts traveler safety first by integrating technology to provide accurate monitoring and prompt alarms [6].

METHODOLOGY :

Creating a vehicle tracking system using Arduino Uno R3 requires a set of structured steps. The hardware setup begins with an Arduino Uno R3 with the required equipment such as a GPS module (e.g. NEO-6M), a Node MCU (e.g. Esp8266), an alcohol sensor, and possibly additional features such as automatic braking or anti-theft devices. Involves connecting to components. GPS integration is then achieved by leveraging the Arduino library to establish communication with the GPS module and extract important location data such as latitude and longitude. Node MCU integration follows. This requires the implementation of a code that will allow us to use the Node MCU module to send his GPS coordinates via SMS to a central server or to a predefined phone number. The integration of an alcohol sensor is very important as it allows the alcohol content in the driver's breath to be monitored. An alert is triggered when the detected value exceeds a predefined threshold. When an automatic braking system is part of the setup, sensors are also integrated to detect obstacles or potential collisions, and codes are used to activate the braking mechanism when necessary. Anti-theft measures such as geofencing and ignition lock controls are then implemented to prevent unauthorized use or theft of the vehicle, and alarms and notifications are set for tampering or theft attempts. Data processing and storage algorithms are then developed to process the incoming GPS data, detect patterns, and either store the information locally or send it to a server for further analysis. Optionally, create a user interface that provides real-time feedback on vehicle status, location, and alerts using LEDs, LCD displays, or mobile apps. To ensure accuracy, reliability, and proper functionality of all components, the system undergoes thorough testing and optimization under a variety of conditions.

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Documenting the system design, components, and functionality is essential for future reference. Once a vehicle tracking system is sufficiently tested and refined, it can be used in vehicles. Proper installation and user training are essential for optimal use.

IMPORTANCE OF VEHICLE TRACKING SYSTEM

Vehicle tracking system with Arduino, GPS, Node MCU, alcohol detection, automatic braking and anti-theft features are important to ensure safety. It enables real-time vehicle location monitoring, emergency response and anti-theft. Alcohol detection ensures drivers stay alert, while automatic braking reduces accidents, promoting safer roads. Together these technologies optimize fleet management, reduce risk and improve transport efficiency, thereby promoting a safer and more secure driving environment.

DESIGN METHODOLOGY

Block Diagram

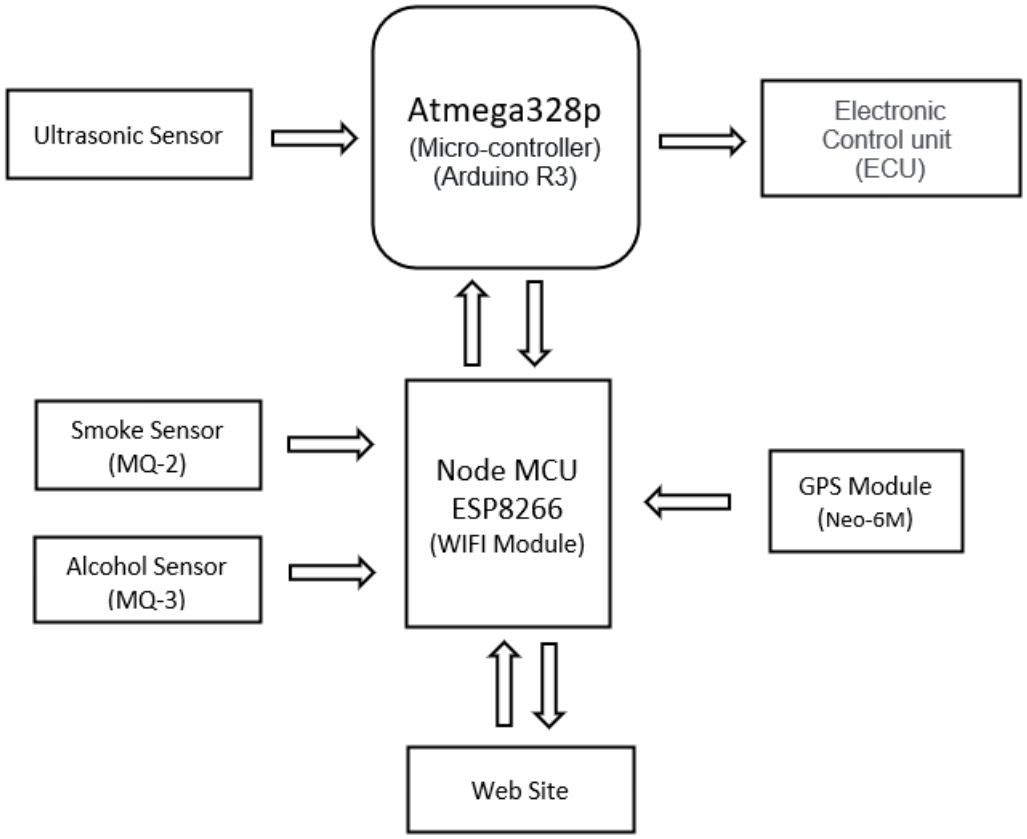

Figure 1. Block Diagram

Arduino

Arduino is instrumental in vehicle tracking systems due to its affordability, versatility, and ease of use.Vehicle tracking in real time is made possible by connecting Arduino to GPS and communication devices. GPS data is gathered by Arduino, processed, and sent to a central server or monitoring station. Scalability, customization, and cost-effectiveness are some of its benefits. Fleet management, asset monitoring, and private car tracking are among the uses for Arduino-based vehicle tracking systems. Data security and power management are among the difficulties. But thanks to constant development,

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Arduino-based tracking systems are becoming better and better, providing creative answers for a range of tracking requirements.

DESIGN FLOW :

The vehicle tracking device consists of Arduino Uno R3 and Esp8266 modules containing GPS and wifi module . The main part of the monitoring is the microcontroller Arduino Uno. The geographical location of the vehicle can be determined by the GPS receiver and this information is sent to the web server via ESP technology. This information will be stored in the database. We created a web application to track the location of the vehicle on the map. We developed this website using PHP, HTML and JavaScript using XAMPP software. User information is used to store location information. We also developed a mobile application that displays the location of the vehicle on a mobile phone using Android Studio. The Node MCU starts up and starts receiving geographical information from satellites, starts using AT commands including GPS and Node MCU, powers it up and puts it into reset mode. Then the module is ready to receive control from the satellite. Then open the GPRS operation, including initializing GPRS, setting the APN service provider, initializing the HTTP protocol, and setting the operation (Tau model). It takes approximately 1 minute to initiate device initialization and calculate accuracy. If the network is not available, the received GPS coordinates and other data (such as time and speed) will be stored temporarily until network service is restored, and then sent to storage along with their time and speed. . Node MCU needs 2A peak current. Therefore, an external power source such as a 12V- 2A battery is needed to provide power. The GPS antenna is connected to the Node MCU connection port. This module has some similarities with Arduino. We loaded the program written in the C programming language onto the Arduino microcontroller. Use the Arduino IDE software to upload the program to Arduino.

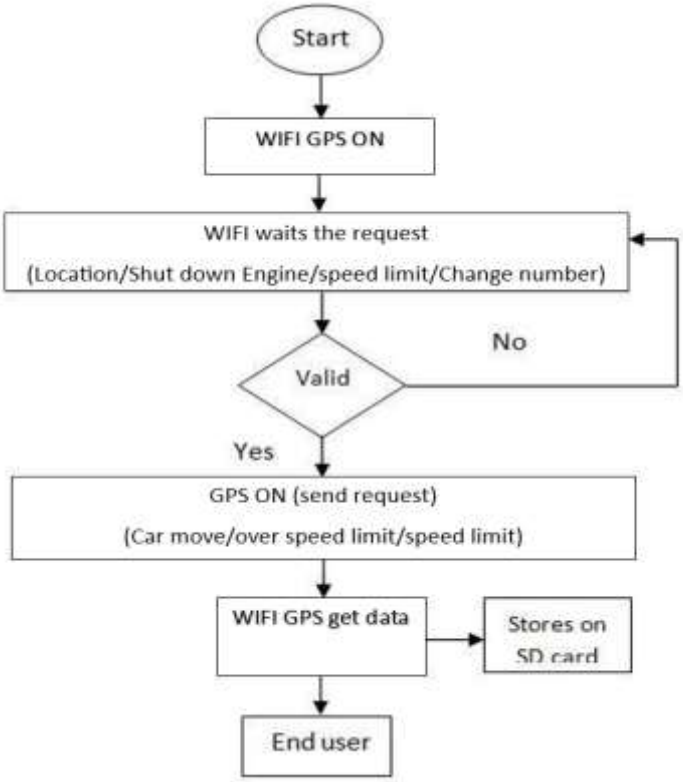

Figure 2. Design flow

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RESULTS :

The use of Arduino microcontrollers in a real-time vehicle tracking system has shown to be a successful method for fleet management and vehicle monitoring. It is appropriate for a number of applications, such as asset monitoring, logistics, and transportation, because to its strong performance, scalability, and ease of integration. Additional improvements and optimizations can be put into place to meet particular user needs and improve system performance as a whole. The data analysis is shown in figure 3.

Figure 3.Live location output

Figure 4. Last seen chart

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Data

Date	Location	Altitude	Satellites Used	Speed Over Ground(KM)	Course (in °)
15-05-2024 at 09:15	View Location	37.400	10	0.02	169.5
15-05-2024 at 09:15	View Location	37.400	10	0.02	169.5
15-05-2024 at 09:15	View Location	37.400	10	0.02	169.5
15-05-2024 at 09:15	View Location	37.400	10	0.02	169.5
15-05-2024 at 09:15	View Location	37.400	10	0.02	169.5
15-05-2024 at 09:15	View Location	37.400	10	0.02	169.5
15-05-2024 at 09:15	View Location	37.400	10	0.02	169.518.4215263

Figure 5. Data sheetchart

CONCLUSION :

In conclusion, the vehicle tracking system that is based on Arduino and incorporates safety and security elements provides a complete solution for improving road safety and safeguarding property. It quickly identifies problems like drunk driving and illegal entry by integrating components including an alcohol sensor, automatic braking, smoke detector, and anti-theft system. The system's web-based interface and real-time monitoring allow for remote access and rapid action, which increases road safety and trust in contemporary transportation solutions. Because safety and security are given first priority in vehicle innovation, this integration demonstrates how technology can have a good influence on society.

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