International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 **Issue:** V **Month of publication:** May 2023

DOI: 52794

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue V May 2023- Available at www.ijraset.com

Vehicle Tracking and Fuel Monitoring System

Punam Balaji Taware[1], Sangram Ganesh Vibhute[2], Prachi Ramdas Mande[3], Anjali V. Nimkar[4]
JSPM's Imperial College Of Engineering and Research Wagholi Pune,India
Assistant Professor, Electronics and Telecommunication, JSPM's Imperial Collge Of Engineering and Research Wagholi Pune, India

Abstract*: The demand for effective methods of transporting goods, such as tracking in real time., determining the site of accidents, and cutting down on financial and logistical fuel waste caused by trucks, is fast growing. This paper outlines a solution for real-time tracking and fuel monitoring, both of which are recognized as primary challenges that the vast majority of trucking businesses are working to address. The goal of this study is to facilitate the requirement for an efficient products transportation system. The proposed system is implemented using IoT (Internet of Things) with a ESP32, which measures important information about trucks in real time using a variety of sensor modules. This information includes the current location of the truck, its fuel level, and any fuel leakage that may be occurring. All of the information that has been acquired is then uploaded into a cloud platform called adafruit IO for the sake of further analysis and monitoring. In addition to that, this technology is able to determine whether or not a truck was engaged in an accident and sends information regarding the location of the accident to the appropriate people through email. The real-time information of the vehicle is accessible in the cloud at any time and from any location for approved users as well as authorized truck owners. This comprehensive system utilizes Internet of Things (IoT) technology to provide accurate real-time tracking, remote monitoring of fuel level and truck condition, and timely delivery of goods, in addition to protecting the truck from theft.

Keywords: Fuel Monitoring, GPS, NodeMCU(ESP32), Ultrasonic Sensor, Android Application,

I. INTRODUCTION

The vehicle tracking and fuel monitoring system project using GPS, ESP32, ultrasonic sensor, speed sensor, and an emergency button follows a specific workflow to achieve its objectives. The workflow can be introduced as Initialization The system initializes by powering on the components, including the ESP32 microcontroller, GPS module, ultrasonic sensor, speed sensor, and emergency button. All the components undergo a startup process and establish connections. Data Acquisition: The system starts acquiring data from the various sensors. The GPS module continuously retrieves location data, the ultrasonic sensor measures the fuel level, the speed sensor captures the vehicle's speed, and the emergency button detects any pressing events. Data Processing

The acquired data is processed by the ESP32 microcontroller. The GPS coordinates are parsed and processed to determine the vehicle's real-time location. The ultrasonic sensor readings are calibrated to accurately measure the fuel level in the tank. The speed sensor data is analyzed to ensure compliance with speed limits. Alert Generation: If an emergency button press is detected, the system generates an immediate alert or notification to the fleet management team. This alert could be in the form of a message or an alarm, indicating a critical situation that requires attention. Data Visualization: The processed data, including the vehicle's location, fuel level, and speed, is presented in a user-friendly manner. A graphical user interface (GUI) or dashboard displays the information, allowing fleet managers to monitor and track the vehicles in real-time. System Monitoring: The system continuously monitors the performance of the components and sensors

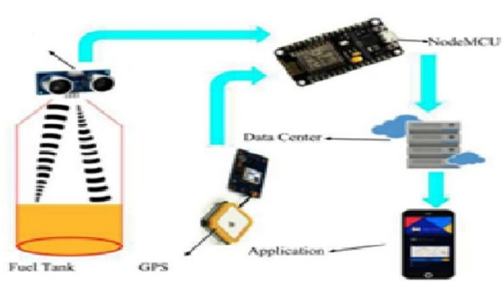


Fig 1.1: Flow Diagram Vehicle tracking and fuel monitoring system

It checks for any anomalies or errors in data acquisition or processing. any issues, appropriate actions are taken to rectify
Reporting and Analysis: The system generates periodic reports based on the collected data. These reports provide insights into fuel consumption, vehicle utilization, and adherence to speed limits. Fleet managers can analyze this information to optimize routes, fuel efficiency, and overall fleet management strategies. Maintenance and Upgrades: Regular maintenance activities are performed to ensure the system's proper functioning. Software updates, component replacements, and system upgrades are carried out as needed to enhance performance, security, and reliability.
Fuel Level Measurement: The ultrasonic sensor is installed in the vehicle's fuel tank. It uses sound waves to determine the distance between the sensor and the fuel level. By calculating the empty space in the tank, the sensor can estimate the fuel level. Fuel Consumption Calculation: As the vehicle operates, the fuel level gradually decreases. The system continuously monitors the fuel level readings from the ultrasonic sensor and calculates the fuel consumption over a certain period. Mileage Calculation: To determine the mileage, the system needs to know the vehicle's fuel efficiency or fuel consumption rate. This information is typically provided by the vehicle manufacturer or can be estimated based on historical data. By dividing the fuel consumed by the fuel efficiency, the system calculates the distance traveled or the mileage. Data Integration: The fuel level readings and mileage calculations are integrated into the overall tracking system. The system collects the data from the ultrasonic sensor and combines it with the GPS data to provide accurate real-time information on the vehicle's location, fuel level, and mileage. Monitoring and Reporting

II. LITERATURE REVIEW

1) In their paper, Padmaja etal.(2019) presented an IoT- grounded perpetration of a vehicle monitoring and shadowing system using the NodeMCU. They employed colorful detectors including Ultrasonic, Gas, IR, Temperature, and GPS, with data transfer and visualization eased through the Blynk platform. While the reviewed paper used Blynk for monitoring, the proposed system employed a mobile operation for covering purposes.
2) Gullipalli, Karri, and Kota(2018) proposed a system for GPS live shadowing of motorcars and energy monitoring using the NodeMCU. The system incorporated GPS, GSM, energy detector, and speed detector, enabling commerce between the system bias on the machine, web operation, and desktop operation. While the reviewed paper used GSM for data transmission, the proposed system employed the NodeMCU(ESP8266) and employed a mobile operation for covering rather of a web operation.
3) Dukare, Patil, and Rane(2015) aimed to develop a vehicle shadowing, monitoring, and waking system. Their proposed system involved the use of GSM or GPRS for transferring information and GPS for furnishing the stoner with the vehicle's exact position. In addition to vehicle shadowing, monitoring, and waking, the proposed system also included features similar as energy monitoring, vehicle position dogging, chancing the nearest energy pump, and transferring alert announcements. The reviewed paper concentrated solely on developing a vehicle shadowing, monitoring, and waking system.
4) Vanmore etal. (2017) introduced a smart vehicle shadowing system exercising GPS and GSM. The system continuously covered and reported the status of the vehicle, counting on the reporting frequence of the GPS shadowing. Control and monitoring were eased through an Android operation. It's worth noting that while the reviewed paper employed the PIC18F4520 microcontroller, the proposed system employed the NodeMCU.
5) Alshamisi and Këpuska (2017) proposed a real- time GPS vehicle shadowing system that employed GPS and GSM technology. The system incorporated a GPS device and a GSM modem attached to the vehicle. The reviewed paper employed GSM for data transmission, whereas the proposed system employed the NodeMCU (ESP8266), which had a erected- in Wi- Fi chip, to shoot data to the database.

III. METHODOLOGY

Following steps are Included for Implementation:
1) *Requirement Analysis:* Identify the project's objectives, including real-time vehicle tracking, fuel monitoring, and safety features such as speed monitoring and an emergency button. Component Selection: Choose suitable components such as GPS module, ESP32 microcontroller, ultrasonic sensor, speed sensor, and emergency button based on their capabilities, compatibility, and availability.
2) *Hardware Integration:* Connect and configure the selected components to the ESP32 microcontroller, ensuring proper communication between them. The paper verifies the proper functioning of all system components.. GPS Tracking Implementation: Utilize the GPS module and ESP32 to extract the real-time location data of the vehicle. Develop the necessary code to parse and process the GPS coordinates for tracking purposes. Fuel

3) *Monitoring System:* Incorporate the ultrasonic sensor into the system to measure the distance between the sensor and the fuel level. Calibrate the sensor readings to accurately determine the fuel level in the tank. Speed Monitoring: Integrate the speed sensor to measure the vehicle's speed. Develop code to capture and process the speed data, ensuring it remains within predefined limits. Emergency Button Integration: Connect the emergency

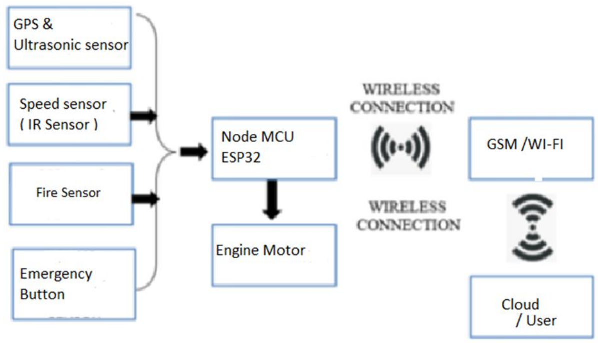


Fig III: Block Diagram of Vehicle tracking and fuel monitoring system

Develop code to detect the button press and trigger an immediate alert or notification to the fleet management team. Data Visualization and User Interface: Create a user interface to display real-time vehicle location, fuel level, speed, and emergency alerts. Use appropriate visualization techniques to present the data in a user-friendly manner. Testing and Validation: Conduct rigorous testing to ensure the accuracy and reliability of the system. Validate the system's performance by simulating different scenarios and verifying the correctness of the results. Deployment and Monitoring: Install the system in the vehicles, ensuring proper installation and connectivity. Continuously monitor the system's performance and address any issues or improvements that arise during real-world usage.

IV. COMPONENT USED

Sr	Component Name	Quantity
1	ESP32	1
2	Ultrasonic Sensor	1
3	Emergency Button	1
4	GPS Sensor	1
5	Mileage Sensor	1

1) *ESP32:* The ESP32 is a microcontroller board that can be used as the main control unit for the system. It provides Wi-Fi and Bluetooth connectivity, making it suitable for communicating with other components and transmitting data to a remote server.
2) *Ultrasonic Sensor:* The ultrasonic sensor can be used to measure the distance between the sensor and the vehicle's fuel tank. By placing the sensor near the fuel tank, you can estimate the fuel level based on the distance measurement. The sensor sends out ultrasonic waves and measures the time it takes for the waves to bounce back after hitting an object (in this case, the fuel).
3) *Emergency Button:* An emergency button can be included in the system for immediate alerts or actions. In case of an emergency or any critical situation, the driver can press the button to trigger an alarm or send a distress signal.
4) *GPS Sensor:* The GPS sensor provides accurate positioning data of the vehicle. It receives signals from GPS satellites to determine the latitude, longitude, and sometimes altitude of the vehicle's location. This information is crucial for real-time tracking and monitoring.
5) *Fuel Level Measurement:* Using the data obtained from the ultrasonic sensor, you can calculate the fuel level in the tank. By calibrating the sensor readings with the tank's capacity, you can determine the remaining fuel in the vehicle.
6) *Mileage Calculation:* To calculate the mileage, you need to track the distance traveled by the vehicle. This can be done by continuously monitoring the GPS coordinates and calculating the distance between consecutive points. By dividing the distance by the fuel consumed during that distance, you can determine the vehicle's mileage.

V. RESULT ANALYSIS

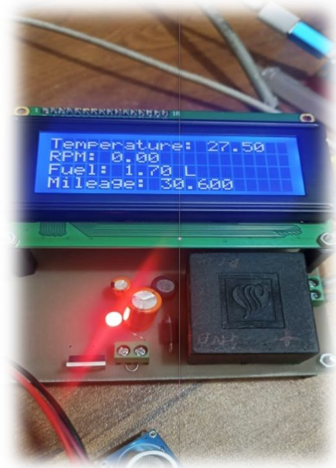


Fig V. Result Analysis

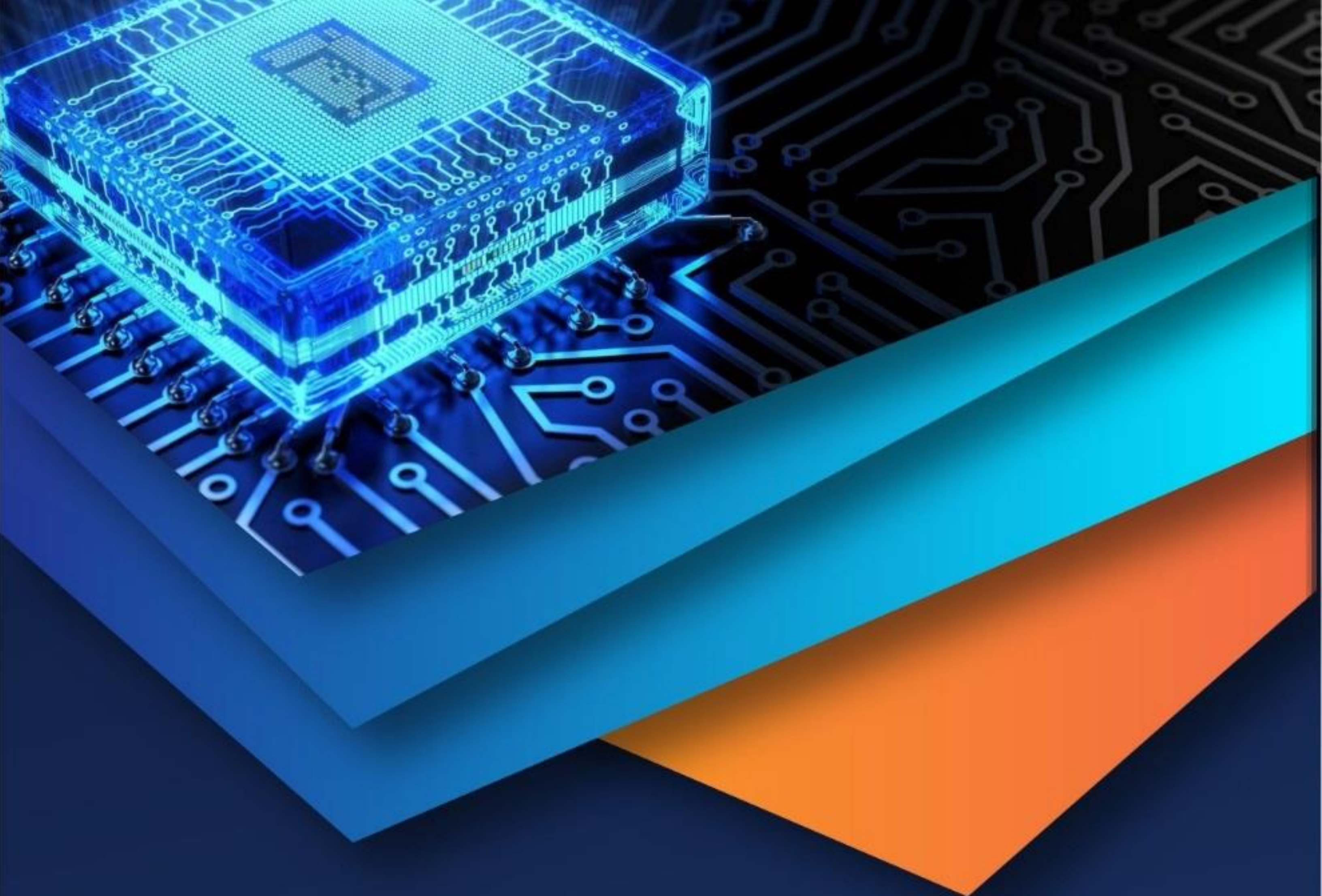
With the help of Vehicle tracking and fuel monitoring system this project we detecting temperature, RPM, Fuel, and Mileage.

VI. CONCLUSION

The vehicle tracking and fuel monitoring system project incorporated GPS, ESP32, an ultrasonic sensor, a speed sensor, and an emergency button for a comprehensive solution. The project successfully utilized GPS for real-time vehicle tracking and enhanced security. The ESP32 acted as the central processing unit, facilitating data communication within the system. The ultrasonic sensor accurately monitored fuel levels, optimizing consumption and reducing costs. The speed sensor ensured compliance with speed limits and promoted safe driving practices. The emergency button provided a quick alert mechanism for emergencies or threats. The system's integration enhances operational efficiency and overall fleet management. Real-time location tracking enables better monitoring and security of vehicles. Fuel monitoring contributes to cost reduction and timely refueling. Speed monitoring promotes safer driving practices and compliance with regulations. The emergency button improves response time and assists in critical situations**.**

REFERENCES

[1] Chiwhane et al. (2017) published a paper on IoT-based fuel monitoring for future vehicles in the International Journal of Advanced Research in Computer and Communication Engineering.
[2] Padmaja et al. (2019) presented a study on the implementation of an IoT-based vehicle monitoring and tracking system using Node MCU in the International Journal of Innovative Technology and Exploring Engineering.
[3] Vanmore et al. (2017) introduced a smart vehicle tracking system utilizing GPS in the International Research Journal of Engineering and Technology.
[4] Alshamisi and Këpuska (2017) proposed a real-time GPS vehicle tracking system in the International Journal of Advanced Research in Electronics and Communication Engineering.
[5] Rohitaksha et al. (2014) developed an Android application for vehicle theft prevention and tracking system in the International Journal of Computer Science and Information Technologies.
[6] Khin and Oo (2018) presented a real-time vehicle tracking system using Arduino, GPS, GSM, and web-based technologies in the International Journal of Science and Engineering Applications.
[7] Saini et al. (2017) designed an Android app-based vehicle tracking system using GPS and GSM in the International Journal of Scientific & Technology Research
[8] Xinjian Xiang Ming Li conducted research on the design of an alarm and control system for electric fire prevention based on MSP430F149.
[9] Amir Makki, Sanjay Bose, and John Walsh explored the use of Hall-effect sensors to add digital recording capability to electromechanical relays.
[10] Yin-Jun Chen, Ching-Chung Chen, Shou-Nian Wang, Han-En Lin, and Roy C. Hsu developed GPSenseCar, a collision avoidance support system using real-time GPS data in a mobile vehicular network.
[11] Giovanni Bucci, Edoardo Fiorucci, Fabrizio Ciancetta, and Francesco Vegliò presented a microcontroller-based system for the monitoring of a fuel cell stack.



10.22214/IJRASET

INDEX COPERNICUS

45.98

IMPACT FACTOR: 7.129

TOGETHER WE REACH THE GOAL

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY