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IOT Based Smart Vehicle Speed Control System Using GSM Module

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Abstract: *This report introduces an IOT based smart vehicle speed control system using GSM module designed to enhance vehicle safety and provide critical psychological reassurance to drivers following an accident. The system leverages a combination of vibration and gyroscope sensors to detect collision events and abnormal vehicle orientation in Realtime. Once anacidities confirmed, it employs a dual communication strategy: Zigbee is used for rapid, short-range alerts to nearby control stations or vehicles, while GSM transmits SMS notifications to pre-configured family members. Anique aspect of the system sits ability to receive SMS commands from family members—which trigger pre-recorded audio messages like "Accident Detected" and "Sending Emergency Services"—thereby offering immediate reassurance to the driver. Comprehensive testing validates the system 'accuracy, prompt alert trans mission, and it effectiveness sin reducing driver anxiety. This integrated approach aims to minimize emergency response times and enhance overall road safety, marking a significant step forward in intelligent vehicle safety systems.*

Keywords: *Arduino, GPS Module, Accelerometer Module, Alcohol Detection Module, GSM Module.*

1. INTRODUCTION

Vehicle safety systems have evolved significantly, integrating both passive features like airbags and seatbelts and active technologies such as ADAS. However, response time and the driver's psychological state after an accident remain crucial for emergency effectiveness. The Intelligent Accident Detection and Emergency Alert System addresses this gap by combining real-time accident detection, communication, and driver reassurance. It utilizes vibration and gyroscope sensors to detect accidents and sends alerts through Zigbee (for nearby station notifications) and GSM (to inform family members). A key feature is immediate auditory reassurance from family responses, helping reduce post-accident anxiety and ensuring the driver remains calm while awaiting assistance. This system enhances safety by providing timely alerts and psychological support, improving emergency response efficiency and overall accident outcomes. In emergencies, rapid communication is crucial for reducing response times and saving lives. The Intelligent Accident Detection and Emergency Alert System ensures timely alerts via Zigbee (for local stations) and GSM (for family members). A key feature is real-time auditory reassurance, providing messages like "Accident Detected" and "Sending Emergency Services" to help the driver stay calm. Post-accident, drivers often experience fear and confusion, making immediate support vital. This system acts as both a communication tool and psychological aid, ensuring help arrives quickly. For solo drivers, the risk of feeling abandoned increases psychological stress. The system's ability to provide instant alerts and reassurance enhances emergency response, improving accident outcomes and reducing injury severity. By bridging the gap between detection and response, it significantly enhances vehicle safety.

2. LITERATURESURVEY

1. 2024 - Pavithra, S. Dhanalakshmi Title: IoT based Vehicle Speed Monitoring and Controlling System Contribution: Embedded systems play a critical role in the transportation industry by providing a means of control, communication, and monitoring of various components in vehicles and transportation systems. They also provide communication between different components of a vehicle, such as the engine, transmission, and brakes.[1] 2. 2023 - Mr. Amarendra Alluri, B. Raju Title: Smart Vehicle Speed and Location Tracking System Using IoT Contribution: In terms of innovation, the internet of Things (IoT) [1] is seen as the internet's successor. All items may exchange data and communicate via data-detecting devices thanks to the Internet of Things (IoT), a sophisticated system that links them all to the Internet. It makes it possible to precisely recognize, discover, follow, observe, and supervise. It is a system that enhances communication between people, between people and things,

and between things.[2] 2023- R. Lavanya, Dr. G. Srinivasa Rao Title: Alcohol Detection Alert System in Vehicle using IoT Contribution: The old-fashioned method used by officers to detect alcohol in the driver is by using Breathalyzer. Even though it has proved its function, however this method is not efficient. Nevertheless, it is impossible to do road block all the time and check driver of each car using Breathalyzer. Breathalyzer is a device to check alcohol presence in the driver's breath by making them blow into it.[3] 4.2021 - G. Boopathi Raja, Keerthika A, Keerthika S G, Nandhini A, Pranitha K J Title: GSM based Vehicle Accident Alert System Contribution: The primary goal of the accident warning system is to save people in crashes. This device helps the owner to observe and find out vehicle activity and its past vehicle movements, the latest such as GPS are highly useful now-a-days. Over the past decade, the use of auto mobiles has improved linearly, which increased the risk of human life. This is because the emergency services are inadequate. We use an alert system in this paper that helps to strengthen the emergency system of the crash system [4] 5. 2021 - Rani and Pandey Title: IoT in traffic management for speed control Contribution: Investigated the use of IoT for managing traffic by controlling vehicle speed using real-time data. The study emphasizes improving traffic flow in urban areas through synchronized speed control across multiple vehicles.[5].

3. EXISTINGSYSTEM

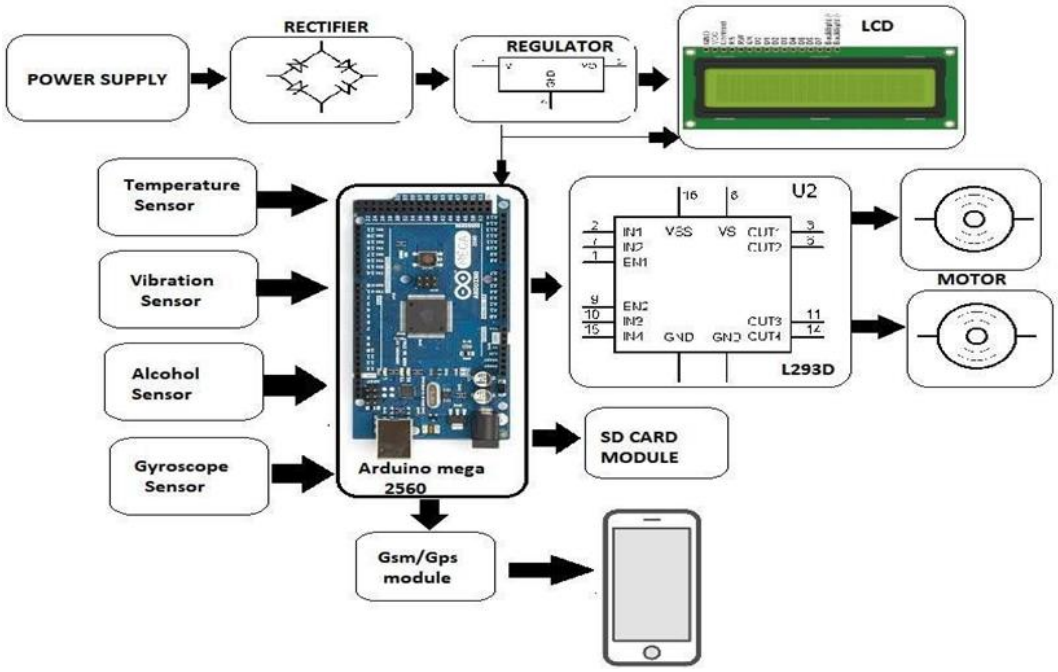

FIGURE 1. Block Diagram of System

TheexistingsystemsforIoT-basedvehiclespeedcontrolusingGSMmodulesprimarilyaim to monitor and regulate vehicle speed in predefined zones to enhance road safety. Here's a concise overview of such systems:

Existing System:

- Speed Monitoring: Sensors like IR or GPS modules monitor the vehicle's current speed and location. These systems compare the speed with area-specific limits, such as in school zones or hospitals.
- GSM Communication: GSM modules enable real-time communication by sending alerts about over speeding or violations to vehicle owners or authorities through SMS.
- Automatic Speed Regulation: Some systems are equipped with mechanisms to automatically reduce the vehicle's speed when it exceeds the limit in sensitive zones.

Efficiency Evaluation:

While effective at improving road safety, existing systems can be further optimized. Enhancements might include:

- Advanced sensors for higher accuracy in detecting speed and location.

- UseofmoderncommunicationtechnologieslikeIoT-enabledSIMcardsformore reliable data transmission.
- Better integration within Telligent Tran sportsy stems (ITS)for smoot her operation.
- Detects accidents using accelerometer and gyroscope sensors, Vehicle Tilting or Rollover Detection.
- Tracks speed, braking, and alcohol levels for safety alerts.
- Logs speed, GPS location, and other critical data in non- volatile memory.
- Operates via the vehicle's battery with stable power management.
- Provides system stat us and alerts through an LED or display.
- Limited data accessibility using SD cards and Black Box.
- It just detects alcohol and send alerts. It sends the message alert soothe specific contacts using
- GSM module.
- We Cannot able to send data due to poor signal reception. It doesn't contain Pre-recorded emergency instructions and alert messages.

4. PROPOSEDSYSTEM

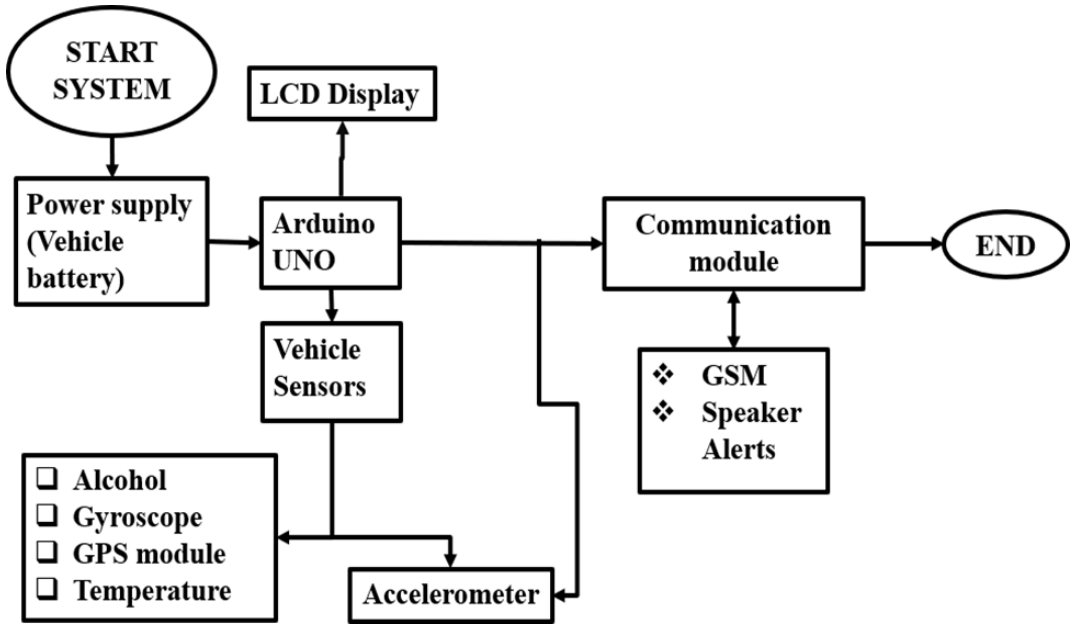

FIGURE 2. Block Diagram of Proposed System

TheproposedsystemforanIoT-basedvehiclespeedcontrolsystemusingaGSMmoduleaims to provide an innovative, automated approach to ensuring road safety and compliance with speed limits. Here's a detailed overview: The block diagram in Figure 4.1 presents our proposed vehicle system, which leverages the Arduino UNO as its core processing unit. Drawing power from the vehicle's battery, the system begins its operation upon initiation and diligently collects data from an array of integrated sensors. These sensors potentially include modules for detecting alcohol levels, measuring the vehicle's orientation and motion via a gyroscope, tracking its location using GPS, and monitoring temperature. Additionally, an accelerometer provides data on the vehicle's acceleration forces. The Arduino UNO serves as the central intelligence, processing the information received from these diverse sensors. This processed data is then utilized to provide immediate feedback to the user through an LCD display. Furthermore, a communication module, equipped with GSM connectivity and speaker alerts, indicates the system's capability for remote data transmission and the provision of audible warnings. In essence, our proposed system functions as a comprehensive vehicle monitoring platform, capable of analysing various parameters and likely triggering specific actions or alerts based on the interpreted sensor data before concluding its operation

5. PERI MENTAL RESULTS

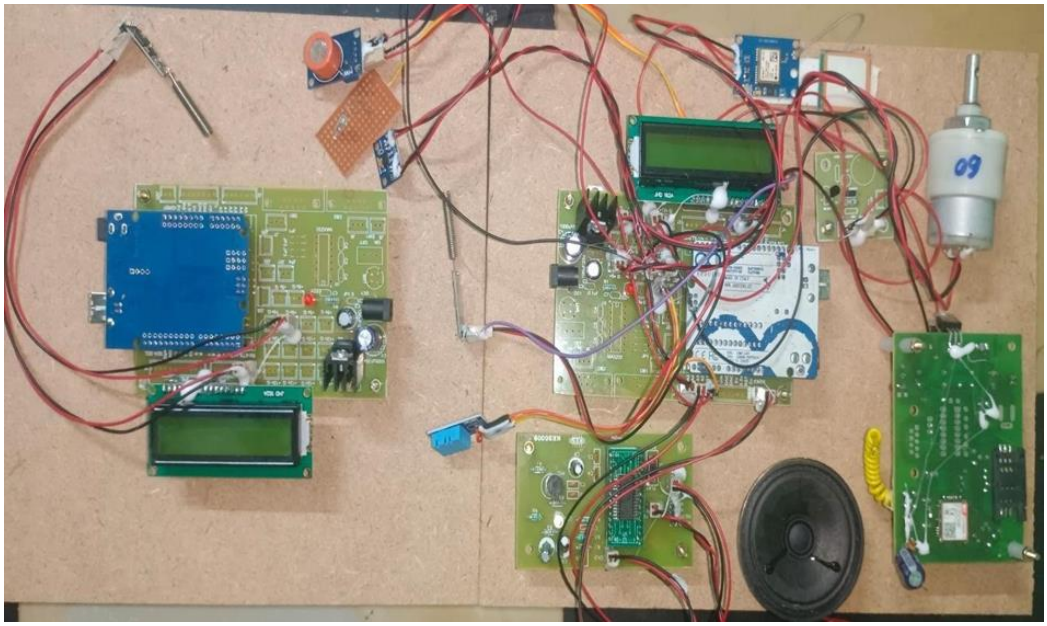

FIGURE 3. Working Model

FIGURE 4. Accident Alert

FIGURE 5. Message Alerts

FIGURE 6. Fall Message Alert

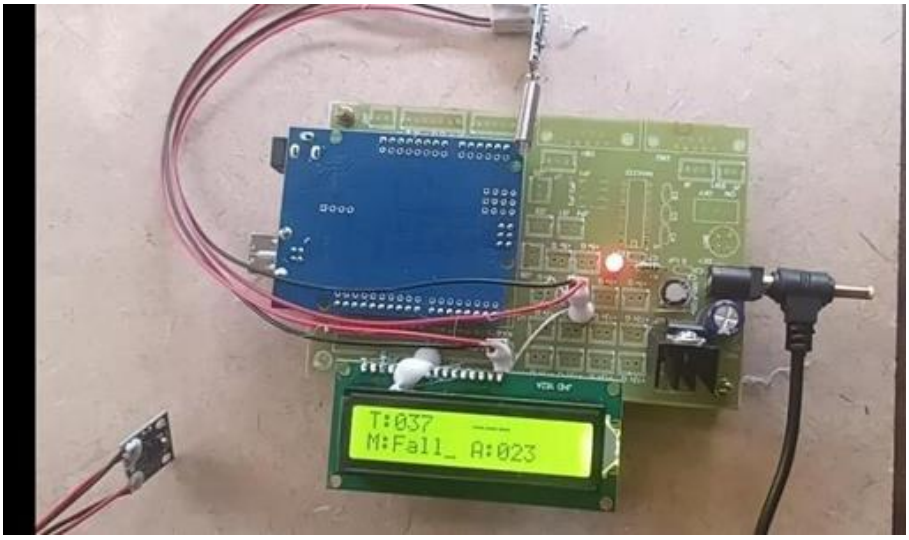

FIGURE 7.

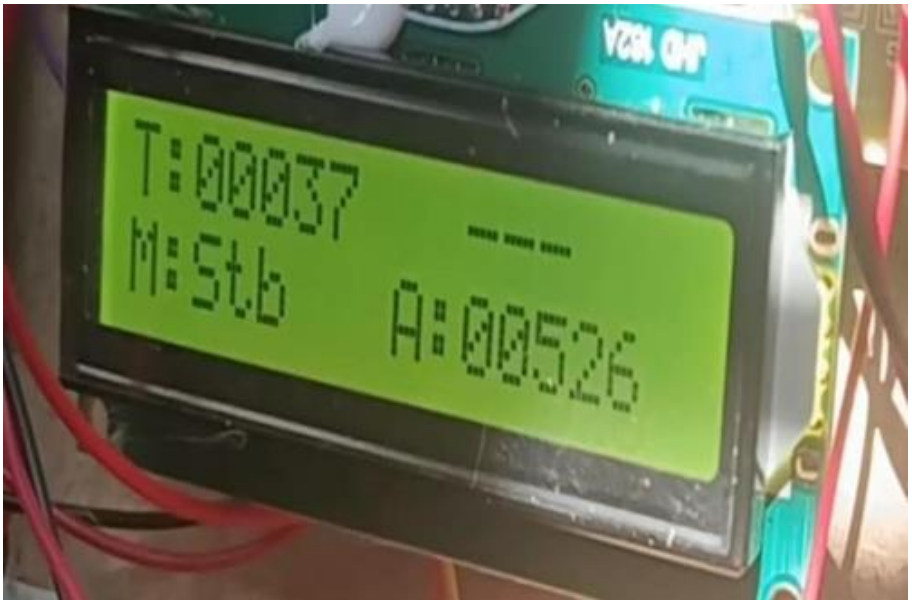

FIGURE 8. Alcohol Detection

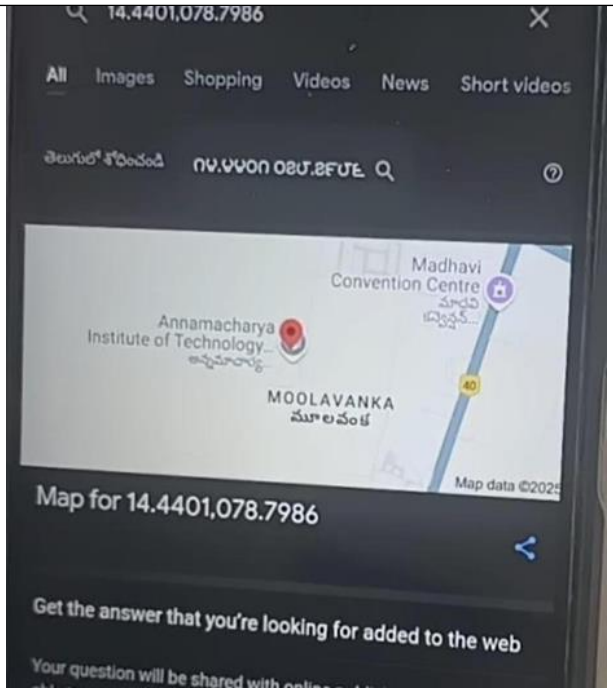

FIGURE 9. Location from GPS

6. EXPLANATION

The proposed system is a compact, smart vehicle safety solution built around an Arduino UNO microcontroller. It integrates multiple sensors—including an alcohol sensor, gyroscope/accelerometer, GPS, temperature sensor—and modules like GSM, LCD display, and a speaker, all neatly assembled on a PCB and powered by a regulated supply. The Arduino collects and processes data from each component to detect safety threats and respond in real time. If alcohol is detected above a threshold, the system disables the motor (simulating ignition lock), triggers an alert, and sends the vehicle's GPS location to emergency contacts via the GSM module. In case of sudden impact or abnormal movement, the accelerometer triggers a crash alert with precise location details. The GPS continuously tracks the vehicle, while the temperature sensor monitors cabin heat, prompting warnings if levels are too high. Real-time data and alerts are displayed on the LCD, and the speaker ensures audio notifications are heard promptly. This integrated setup offers a cost-effective way to improve vehicle safety, particularly for drunk driving prevention, accident detection, and emergency response.

7. CONCLUSION

The Intelligent Accident Detection and Emergency Alert System enhances vehicle safety by combining advanced sensors with dual communication channels. It swiftly detects accidents, sends alerts via GSM and Zigbee, and provides reassuring audio feedback to the driver. While already a major improvement over traditional systems, future upgrades—such as GPS integration, a mobile app, better sensor fusion, advanced communication protocols, and improved power management—could further reduce emergency response times. These enhancements would not only make accident management more efficient but also offer crucial emotional support to drivers during critical moments, ultimately improving road safety and survival outcomes.

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unwavering support and motivation, which kept me focused and determined to achieve this milestone. This work is a reflection of collective effort and shared knowledge, and I am truly grateful for all the contributions that have made it possible.

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