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VEHICLE SPEED CONTROL USING NFC DEVICES

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ABSTRACT

The Intelligent Vehicle Safety System (IVSS) is a new way to make driving safer, especially in places like schools, construction sites, and areas where accidents often happen. It uses special technology to help drivers know when they are in these zones and to make sure they drive safely. The system uses three main technologies—RFID, GPS, and ultrasonic sensors. RFID sets up virtual boundaries around special zones. GPS tells the system exactly where the vehicle is on a map. Ultrasonic sensors detect nearby objects and people. With this information, the IVSS can warn drivers when they are entering a special zone and help them adjust their driving. For example, it can tell them to slow down if they are going too fast. This can help prevent accidents and keep everyone safe. The IVSS is still being developed, so it's not available in all vehicles yet. But it has the potential to make driving much safer, especially in places where accidents are more likely to happen.

Keywords: Intelligent Vehicle Safety System, IVSS, Speed Control Systems

1 INTRODUCTION:

The paper introduces an Intelligent Vehicle Safety System (IVSS) merging RFID, GPS, and ultrasonic sensors to detect special zones, alert drivers, and regulate speed automatically. RFID identifies zones like schools or construction sites, GPS ensures precise location tracking, and ultrasonic sensors detect obstacles. Arjun K et al. (2017). This integration enhances safety and efficiency by providing timely alerts and appropriate responses to potential hazards on the road. Rangan P. R. (2017). The recent progress in technology enabled the design of Intelligent Vehicle Safety Systems (IVSS), which would be designed to maximize security and efficiency in the operation of vehicles. Aishwarya et al. S. R. (2015). This paper presents an IVSS integrating RFID, GPS, and ultrasonic sensors for detecting special zones, alerting drivers, and automatic regulation of speed to ensure a safer and more efficient driving experience. The IVSS applies Radio Frequency Identification (RFID) technology to detect special zones such as school zones, construction areas, or accident-prone areas. RFID tags installed in these zones communicate with the vehicle's onboard system, triggering alerts and necessary actions. GPS technology is used to improve accurate location tracking and mapping. By integrating GPS data with the RFID detection, the system identifies the vehicle position regarding the special zones promptly and performs the necessary reaction. Furthermore, ultrasonic sensors are used to detect obstacles that prevent the vehicle from moving forward. Such sensors always monitor the surroundings and warn the driver if they feel that a collision or obstruction is impending.

2. WORKING PROCESS

The IoT-based integrated RFID and GPS vehicle safety system works by combining RFID technology for vehicle identification and GPS for location tracking. Here's a simplified working principle:

1. **RFID Tagging**: Each vehicle is equipped with an RFID tag containing unique identification information. When a vehicle enters a designated area, such as a parking lot or a restricted zone, RFID readers installed at entry points detect the presence of the vehicle by reading the RFID tag.

2. **Data Transmission**: The RFID reader captures the unique ID of the vehicle from the RFID tag and sends this information to a central server or cloud platform via the internet.

3. **GPS Tracking**: Simultaneously, the vehicle's GPS module continuously tracks its location in real-time. This information is also sent to the central server or cloud platform.

4. **Data Integration and Analysis**: The central server or cloud platform receives and integrates the RFID data (vehicle ID) with the GPS data (vehicle location). It analyzes this combined data to determine the vehicle's status, such as its presence in unauthorized areas or its movement patterns. Malik et al. (2014).

5. **Alert Generation**: If the system detects any unauthorized activity, such as a vehicle entering a restricted area or deviating from its designated route, it generates alerts. These alerts can be sent to designated personnel via SMS, email, or through a mobile application.

6. **Response Mechanism:** Upon receiving an alert, authorized personnel can take appropriate actions, such as remotely disabling the vehicle's engine, notifying security personnel, or triggering alarms.

7. **User Interface**: Users, such as fleet managers or security personnel, can access a user-friendly interface provided by the central server or cloud platform to monitor vehicle locations, track movements, and review historical data.

By integrating RFID technology with GPS tracking, this system provides enhanced vehicle safety and security measures, enabling efficient monitoring, control, and management of vehicles in various scenarios, such as fleet management, asset tracking, and theft prevention.

Implementing the Intelligent Vehicle Safety System (IVSS) involves a comprehensive methodology that encompasses system design, development, testing, and deployment phases. Each phase is crucial for ensuring the system's effectiveness, reliability, and user acceptance. Below is a detailed methodology for the development of IVSS:

1. Requirements Analysis

Needs Assessment: Identify and document the specific safety needs by consulting with stakeholders, including vehicle manufacturers, transportation authorities, and drivers.

Technology Review: Assess the current state of RFID, GPS, and ultrasonic sensor technologies to determine their suitability, limitations, and integration capabilities.

Regulatory Compliance: Review relevant regulations and standards to ensure the system complies with safety, privacy, and communication protocols.

2. System Design

Architecture Design: Develop a system architecture that outlines how RFID, GPS, and ultrasonic sensors will integrate with the vehicle's onboard computer system. This includes data flow diagrams, hardware interfaces, and software modules.

Zone Identification: Define the parameters for special zones, including school zones, construction areas, and accident-prone zones, and determine how these will be encoded in RFID tags.

Alert and Control Logic: Design the logic for how the system will alert drivers to special zones and obstacles, and under what conditions it will automatically adjust the vehicle's speed or suggest corrective actions.

3. Development

Hardware Integration: Select and integrate suitable RFID readers, GPS modules, and ultrasonic sensors with the vehicle's onboard system. This includes hardware prototyping and interfacing.

Software Development: Develop software for processing data from the sensors, implementing the alert and control logic, and managing user interface interactions. This stage involves coding, application development, and creating databases for zone information.

- School Zone

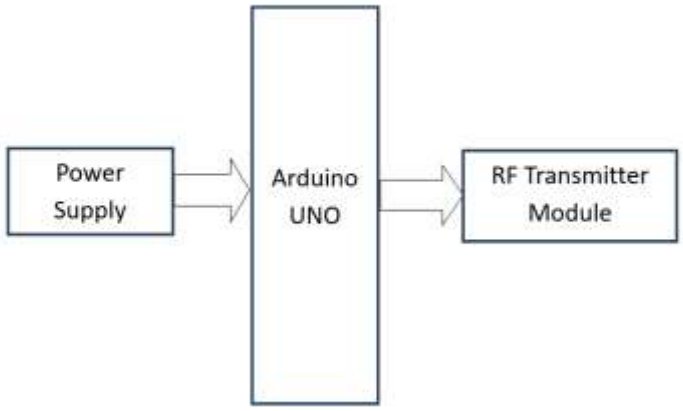

Fig .2.1 Transmitter Block

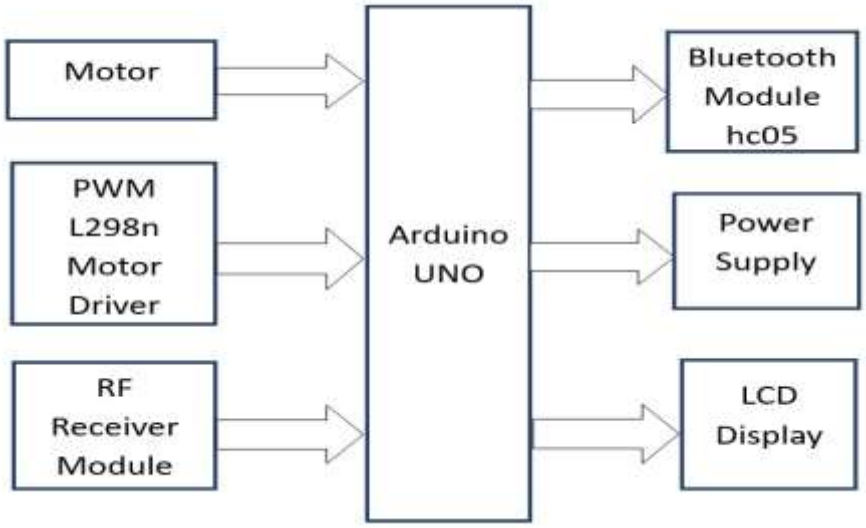

Fig .2.2 Receiver Block

3 Proposed Methodology

The proposed Intelligent Vehicle Safety System (IVSS) is a comprehensive solution designed to enhance road safety in special zones by integrating RFID, GPS, and ultrasonic sensor technologies. The system employs a combination of hardware components, software algorithms, and a user interface to detect special zones, alert drivers, regulate vehicle speed, and detect obstacles effectively.

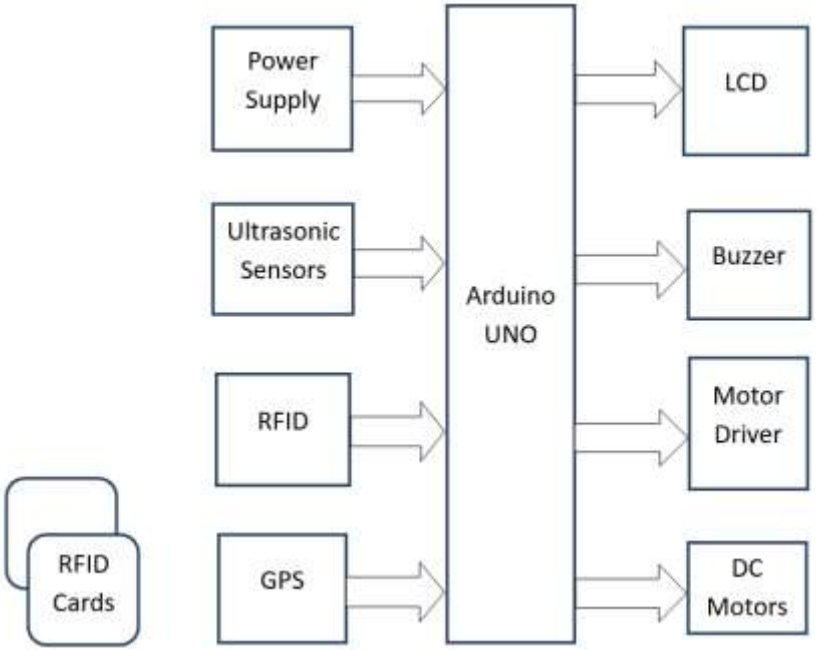

Fig 3.1 Proposed Block Diagram

4 Results and Conclusion

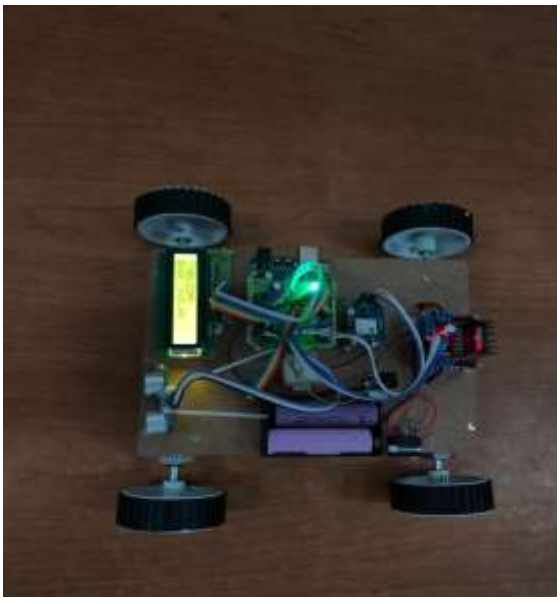

Fig 4.1 Output

In summary, the integrated RFID and GPS vehicle speed control system paper formulates an all-round solution toward enhancing road safety, enhancing traffic management, and boosting operational excellence in general fleet activities. Here are some other primary benefits drawn throughout the paper:

Safety Issues: The technology ensures that accidents are deterred and provokes safer practices in the process of enforcing driving limits with precise speed regulation measures. Qualitative Traffic Management: This technology on the use of real-time factors and optimization of traffic flow has allowed for optimized traffic management and congestion control. Flexible Solutions: The amount of customization available in the system allows users to set limits for specific areas of use according to specifications for road conditions, timing, and vehicle type. Comprehensive Monitoring and Reporting: With this paper, continuous monitoring of the speed and location of vehicles, coupled with the reporting aspect that gives details on the number of vehicles, flow of traffic, and data on accidents, enables authorities to properly run operations, implement speed legislation, and quickly react in case of incidents.

Integration with Future Technologies: This integration provides a foundation for future developments and possible integration with some of the emerging technologies such as autonomous vehicles, smart city services, and others. Overall, the RFID and GPS vehicle speed control system integrated paper is surely a big step towards the improvement of road safety, the enhancement of traffic management, and the paving way to a smarter, better-connected, and optimized transportation system.

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