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Over-Speed Detection Using RFID

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Abstract -Speeding is a major cause of road accidents and fatalities worldwide. To address this issue, various technologies have been developed to alert drivers when they exceed the speed limit. In this paper, we present two different systems for monitoring speeding: an audio alert system for the driver and a GSM-based SMS overspeeding alert system for the vehicle owner. The audio alert system alerts the driver with a sound when they exceed the speed limit, helping them maintain a safe speed while driving. The GSM-based SMS overspeeding system sends an SMS alert to the vehicle owner when the driver exceeds the speed limit, providing real-time notifications and enabling them to take appropriate action to ensure the safety of the driver and the vehicle.Additionally, we discuss a vehicle keyless entry system using RFID technology to enhance vehicle security and convenience. The system uses RFID tags to authenticate the user and provide keyless entry to the vehicle. This reduces the risk of vehicle theft and eliminates the need for physical keys, making it more convenient for the user. Overall, these systems offer effective solutions for addressing the issue of speeding and improving vehicle security and convenience.
Keywords*:* Overspeeding alert , audio alert , RFID authentication , GSM

1. Introduction

Vehicle overspeeding is a leading cause of accidents and fatalities on roads worldwide. To address this issue, manufacturers have developed various technological solutions, such as the overspeeding audio alert system, keyless vehicle entry, and smart message systems that use RFID to store data about overspeeding vehicles. These solutions aim to improve driver behavior, promote safe driving practices, and reduce the likelihood of accidents. The purpose

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of this research paper is to examine the effectiveness of overspeeding audio alert systems, keyless vehicle entry, and smart message systems in reducing the incidence of vehicle overspeeding. The study will evaluate the advantages and disadvantages of these technologies and assess their impact on driver behavior and road safety. Furthermore, the research paper will explore the potential benefits of these technologies in improving vehicle security and reducing the likelihood of theft.The findings of this study can provide insights into the potential benefits of these technologies and their role in promoting safe driving practices. This research can help manufacturers and policymakers make informed decisions regarding the adoption of these technologies to improve road safety.

2. Methodology

aims to design and implement an overspeed audio alert system that triggers an SMS alert to the vehicle owner via a GSM module and uses RFID for keyless entry. The methodology for this research paper will involve a literature review to identify existing systems and technologies, followed by system design, implementation, and testing.

The system will be designed using an Arduino microcontroller and an audio module to trigger an audio alert when the vehicle speed exceeds the preset limit of 100 kmph. The GSM module will be used to trigger an SMS alert to the vehicle owner's mobile phone number when the overspeed alert is triggered. Additionally, an RFID reader will be installed in the vehicle to enable keyless entry. The system will be implemented in a test vehicle, and the necessary hardware components will be installed The Arduino programming code will be developed to interface the different hardware components and enable the overspeed audio alert system, GSM module, and RFID-based keyless entry. The system's performance will be evaluated through laboratory and field tests, and the results will be analyzed to determine the system's accuracy, reliability, and cost-effectiveness. Overall, the proposed methodology will provide a comprehensive overspeed audio alert system with integrated GSM module and RFID-based keyless entry, ensuring increased safety and security for vehicle owners.

3. Literature Review

[1]The need for effective traffic monitoring and management systems is becoming increasingly important in urban areas. This paper presents a novel approach to speed detection or estimation of vehicles from a video stream, which can provide an alternative to the commonly used radar equipment. By using image processing techniques, which are mainly based on software implementation, we can reduce hardware dependencies and offer a more flexible and cost-effective solution. Several techniques for measuring vehicle speed using video streams have been proposed in existing literature, with the most critical component being object detection and tracking. The proposed approach builds on these techniques and seeks to improve accuracy and reliability. By analyzing the motion of objects in the video stream, the system can estimate the speed of vehicles passing through the monitored area. Object detection and tracking can be achieved using several computer vision algorithms, such as background subtraction, optical flow, and feature-based tracking. Once the objects are detected and tracked, their speed can be

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estimated by analyzing their displacement over time. Additionally, the system can incorporate machine learning techniques to improve object recognition and tracking accuracy. The proposed system has the potential to provide a low-cost, efficient solution for speed detection and monitoring. It can be easily integrated into existing traffic management systems and can help reduce the need for expensive hardware-based solutions. By accurately monitoring vehicle speeds, traffic management authorities can implement more effective traffic control measures and ensure safer roads for all.

[2] Accidents caused by high-speed vehicles or driving under the influence of alcohol remain one of the leading causes of road-related fatalities worldwide. Controlling the speed of vehicles can be an effective way to reduce the incidence of such accidents. In this paper, we propose a position-based high speed vehicle detection algorithm (PHVA) for detecting high-speed vehicles in a vehicular ad hoc network (VANET).

Our proposed algorithm utilizes a vehicular cloud server that provides computing as a service. The algorithm calculates the speed of a vehicle using data directly received from road-side units (RSUs). When a vehicle enters the coverage of an RSU, the RSU receives information such as time and position of the vehicle, and sends it to the cloud server for analysis. Based on the information received from nearby RSUs, the cloud server calculates the average speed for a vehicle in a particular lane. The calculated speed is then compared with the permitted speed limit for that lane. If the calculated speed is greater than the limit, the cloud server increments a speed violation counter for that vehicle. Depending on the frequency of violations, appropriate action will be taken on the high-speed vehicle with the help of Certification Authority (CA). We simulated our work in the Vehicles in Network Simulation (Veins) hybrid simulation framework to check the efficiency of our PHVA algorithm. Veins uses the Simulation of Urban Mobility (SUMO) as the road traffic simulator and OMNeT++ as the network simulator. The simulators are connected via a TCP socket standardized in the Traffic Control Interface (TraCI). Our results show that our algorithm has better detection efficiency compared to existing algorithms. In conclusion, our PHVA algorithm provides an effective method for reducing high-speed vehicle accidents in VANETs by detecting and regulating vehicles that exceed speed limits

[3]The number of fatal road accidents caused by excessive speeding has been increasing. While road traffic departments have implemented speed traps and cameras at certain segments to detect speed offenders, many drivers are aware of their locations and tend to slow down only in their proximity. To address this issue, this research proposes an unavoidable speed offence detection system for smart cities and highways.

The proposed system involves installing Vehicular Ad-Hoc Network (VANET) devices on both the roadside and within vehicles to achieve real-time, side-to-side communication. These devices would be responsible for delivering instant information about a vehicle's status, including its speed, to detect speed offenders. The system aims to produce a prototype that would warn speeding drivers of their offence and ensure that a fine is issued for every offender. Moreover, the proposed system is expected to assist traffic police in identifying and proving that a driver has broken road driving rules. The use of VANET technology would provide a

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more efficient and reliable method of detecting speed offenders, which would ultimately reduce the number of fatal accidents caused by excessive speeding.

[4]This paper proposes a novel approach to automatically control the speed of vehicles by detecting speed sign labels from speed sign boards on the road. This approach aims to enhance road safety by notifying drivers of speed limits and taking necessary steps to reduce the speed of vehicles when the driver fails to heed caution signs. The proposed system consists of two main components: real-time image processing software and hardware modules. The software is built using MATLAB, which is capable of identifying speed sign labels accurately. The hardware modules comprise an ARDUINO UNO, which is responsible for sending data to the cloud, and a GPRS module that sends the location of the vehicle to the cloud. Once the speed sign label is identified, the ARDUINO UNO sends the data to the cloud, where PHP scripts analyse the information and take appropriate actions. The system sends a caution notification to the driver when they exceed the speed limit indicated on the speed sign label. If the driver ignores the caution notification, the system sends details of the vehicle to traffic officials, and the speed of the car is reduced to the threshold speed limit as indicated on the speed sign label. By using this innovative approach, road safety can be improved by reducing the number of accidents caused by speeding. This system can provide real-time feedback to drivers and help them to adhere to speed limits, thereby minimizing the risks associated with excessive speed. The proposed system is expected to be highly effective in reducing accidents and improving road safety.

[5]The current transportation system has made traveling faster and more convenient, but it has also resulted in an increase in road accidents and fatalities. To address this issue, a new road safety measure is proposed in this paper. The proposed system uses advanced technology to automatically control the speed of vehicles on the road. The system is designed to detect speed sign labels from speed sign boards placed on the roadside. When a speed sign is detected, the system sends a caution notification to the driver to reduce their speed. If the driver fails to slow down, details of the vehicle are sent to traffic officials, and the speed of the car is automatically reduced to the threshold speed limit as indicated on the speed sign. The proposed system uses real-time image processing to identify the speed sign label. An "ARDUINO UNO" microcontroller is used to send the data to the cloud, and a GPRS module is used to send the location of the vehicle. The data is then analyzed by PHP in the cloud, and necessary actions are taken according to the results of the analysis.

By implementing this system, it is expected that road accidents and fatalities caused by speeding will be significantly reduced. This innovative approach to road safety is a step towards creating a safer transportation system for everyone.

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4. Block Diagram

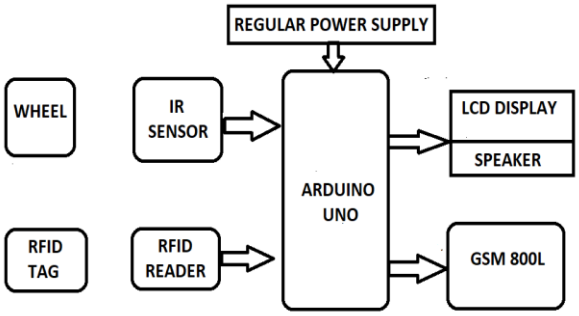

Figure 1. Explanation of Block Diagram

The Over-Speed Audio Alert and GSM SMS Alert project will be based on the Arduino platform and will include several components to achieve its goal. The system will use an LCD 16x2 display to show the speedometer reading, a speaker to sound the audio alert, an IR sensor to measure the RPM of the wheel and convert it into KMPH, a GSM 800L module to send SMS alerts to the driver and vehicle owner, and an RFID module for smart authentication of the vehicle as a keyless entry system. The first component of the system is the Arduino board, which will serve as the main control unit for the system. The board will receive inputs from the IR sensor and the RFID module and will use this information to calculate the speed of the vehicle and to authenticate the driver. The LCD 16x2 display will show the speedometer reading, which will be calculated using the RPM measurement from the IR sensor. The display will be used to provide the driver with a visual representation of their speed and to help them stay within the speed limit. The speaker will be used to sound an audio alert when the vehicle exceeds a predetermined speed limit. This will help to alert the driver to the fact that they are driving too fast and encourage them to slow down. close to the wheel and will detect the number of revolutions that the wheel makes in a given period of time. This information will then be used to calculate the speed of the vehicle. The GSM 800L module will be used to send SMS alerts to the driver and vehicle owner when the vehicle exceeds a predetermined speed limit. This will help to ensure that the driver is aware of their speed and that the vehicle owner can take appropriate action if necessary. Finally, the RFID module will be used to provide smart authentication for the vehicle as a keyless entry system. The module will be programmed with the details of the authorized driver and will only allow access to the vehicle if the driver is authenticated. This will help to prevent unauthorized access to the vehicle and improve its security. The IR sensor will be used to measure the RPM of the wheel and convert it into KMPH. The sensor will be placed

5. Components and Specification

A. ARDUINO UNO

The Arduino Uno board is built around the Microchip ATmega328P microprocessor and is a popular choice for hobbyists and professionals alike. The board is designed to be expandable, with a variety of extension boards or shields available that can be attached to the digital and analog input/output (I/O) pins. The Arduino Uno board comes equipped with 14 digital I/O

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pins, 6 analog input/output (I/O) pins, and supports pulse-width modulation (PWM) output on six of the digital pins. The board is programmed using the Arduino Integrated Development Environment (IDE) and connects to a computer via a USB Type-B cable. The Arduino Uno board can be powered by a USB cable or an external 9-volt battery, and accepts input voltages between 7 and 20 volts. The board is compatible with other versions of the Arduino, such as the Leonardo and Nano, and reference designs for the hardware are available under a Creative Commons Attribution Share-Alike 2.5 license on the Arduino website. Construction and production files for other hardware versions are also available. Overall, the Arduino Uno board is a versatile and easy-to-use microcontroller platform that can be used for a wide range of projects, from simple electronics experiments to complex robotics projects. Its expandability and open-source nature make it a popular choice for developers, makers.

B. IR SENSOR

RPM (Revolutions Per Minute) measurement is an important aspect of many mechanical systems, especially in the automotive and manufacturing industries. One way to measure RPM is by using an IR sensor, which detects the number of revolutions made by a rotating object in a given time period.

The IR sensor works by emitting a beam of infrared light towards the rotating object, and then detecting the reflected light. As the object rotates, the reflection of the light changes, and the sensor can detect the changes in intensity. By measuring the time between each reflection, the RPM can be calculated.

IR sensors are often used in conjunction with a microcontroller or other signal processing device to calculate and display the RPM. This information can then be used to monitor the performance of the mechanical system and make necessary adjustments to ensure optimal operation.

Overall, RPM measuring using IR sensors is a reliable and accurate way to monitor the speed of rotating objects, and has many practical applications in various industries.

C. LCD 16x2

Interfacing a 16x2 LCD with an Arduino is a common way to display information in electronic projects. In the case of measuring RPM with an IR sensor, the LCD can be used to display the calculated RPM value.

To interface the LCD with the Arduino, the LCD is connected to the digital pins of the Arduino, with additional connections to power and ground. The Arduino is programmed to send commands to the LCD to initialize it and display the measured RPM value.

The Arduino code for displaying the RPM value on the LCD involves reading the sensor data using the analog input pin, calculating the RPM value using the formula, and then sending the RPM value to the LCD display.

With this setup, as the rotating object is detected by the IR sensor and the RPM value is calculated, the RPM value will be displayed on the LCD in real-time.

Overall, interfacing a 16x2 LCD with an Arduino for displaying measured RPM by an IR

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sensor is a straightforward and effective way to present data in electronic projects.

D. SPEAKER

An IR sensor can be interfaced with an Arduino board to create an audio alert system that detects and notifies the user when the measured speed exceeds a certain threshold, such as 100 kmph. The IR sensor can be used to detect the movement of an object, such as a car, and the Arduino board can process this information to trigger an alert.

To implement this system, the IR sensor should be connected to one of the Arduino's input pins, and the board should be programmed to read the input signal from the sensor. The program should then compare the measured speed to the threshold value and activate a speaker or other alert mechanism if the speed is above the threshold.

The system can be enhanced by adding other sensors or features, such as a display to show the measured speed Overall, an IR sensor interfaced with an Arduino board

can create a simple and effective alert system for detecting and notifying users of high-speed measurements.

E. RFID

RFID technology can be used for keyless entry for vehicles, and can be easily interfaced with an Arduino board. The RFID system works by using an RFID tag or card that contains a unique identifier that is read by an RFID reader. The Arduino board can be used to process the information from the RFID reader and activate a mechanism to unlock the vehicle.

To implement this system, an RFID reader should be connected to one of the Arduino's input pins, and the board should be programmed to read the input signal from the reader. The program should then compare the unique identifier from the RFID tag to a stored list of authorized users and activate a mechanism to unlock the vehicle if the tag is recognized.

The system can be enhanced by adding other features, such as a display to show the status of the system or a GPS module to track the location of the vehicle. Overall, an RFID system interfaced with an Arduino board can create a simple and effective keyless entry system for vehicles, providing an added layer of security and convenience for vehicle owners.

F. GSM 800L

The GSM 800L module can be used with an Arduino to send SMS alerts to the vehicle owner if the driver over speeds above 100 kmph. The module can be interfaced with the Arduino using serial communication. The Arduino can be programmed to read the speed data from the vehicle's speedometer and compare it with the predefined limit of 100 kmph. If the driver exceeds this limit, the Arduino can trigger the GSM module to send an SMS alert to the owner's mobile phone number.

To achieve this, the Arduino will need to have the necessary libraries and software installed. The GSM module will also need to be connected to the Arduino's serial pins and power supply. The code can be written in Arduino's IDE, and the necessary commands can be sent to the GSM module via the serial interface.

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Overall, using a GSM module with an Arduino is a cost-effective and reliable way to implement SMS alerts for speed violations in vehicles, and it can greatly help in ensuring the safety of both the driver and the passengers.

6. Simulation and Hardware

A. Circuit Simulation Result of the system

Figure 2 shows simulation result of the system

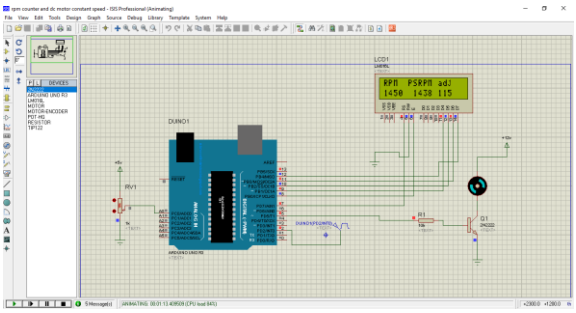

Figure 2 Simulation result

B. HARDWARE RESULT OF THE SYSTEM:

Figure 3 shows hardware result of the system

Figure 3 Hardware result

7. Conclusion

In conclusion, the proposed overspeed detection system using IR sensor and audio alert system with GSM based SMS alert and RFID for keyless entry is an effective solution for improving road safety. The system accurately detects overspeeding vehicles and alerts the driver with an audio warning, while also notifying the vehicle owner through a text message. Additionally, the RFID keyless entry system provides convenience and added security. Overall, this system has the potential to reduce accidents caused by overspeeding and enhance the driving experience..

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