



INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

“Silent Streets, Safe Roads”

Intelligent Vehicle Control for Speed and Honk Management

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Abstract: This research focuses on designing a smart vehicle speed and noise control system aimed at reducing road accidents and noise pollution in sensitive areas such as hospitals and schools. Using RF-based technology, the system automatically detects zone-specific speed limits and honking restrictions, informing and controlling driver behavior accordingly. This paper outlines the design methodology, implementation details, and expected impact of the proposed solution. Experimental results indicate that this system improves traffic discipline and enhances driver awareness in restricted zones.

KEYWORDS: Seat Belt sensor, alcohol detection, vibration sensor, relay, GSM module, road safety, urban environment, smart technology.

I.Introduction:

Increasing road accidents and environmental noise levels have raised concerns globally. Urban zones such as schools, hospitals, and residential areas are especially sensitive to noise and speeding. Traditional traffic signs are often ignored, leading to safety and health hazards. To address this issue, a smart system using RF-based speed and honking control is proposed. This paper discusses related research, presents the design approach, and evaluates system effectiveness. Prevention of Accidents: By controlling the vehicle speed and reducing noise pollution in honking zones, the system effectively reduces the risk of accidents caused by high-speed driving.

II.RESEARCH BACKGROUND

System consists of an Admin panel, municipal corporation and hardware module which include a buzzer, GPS, arduino board, an accelerometer sensor, IR sensor, vibration sensor, mq2 sensor, relay and gsm module.

1. Admin:

Admin can add the municipal corporation and view the honking zones included by the municipal corporation on GPS. He also views and deletes the municipal corporation and views all the details and data of others included by the municipal corporation.

2. Municipal Corporation:

In our system, the municipal corporation can add honking zones such as hospitals, schools, colleges, old age homes, and government offices in cities as honking zones with their longitude, latitude, Name, Type, and other descriptions, and decide the speed level of the vehicle, which travels from near the honking zone.

3. Vehicle Registration Login:

In our system the vehicle registration login can add vehicle owner information such as Name, Address, self-contact number, vehicle number, alternative contact number, and email.

4. System:

In this web application, when any car or vehicle travels from any honking zone, the accelerometer can track the current speed limit of the vehicle. This accelerometer can built-in the vehicle which is note the speed of vehicle during honking zone which is declare and saved on GPS by municipal corporation, if the detected speed of vehicle is greater than the speed which is allowed in honking area then the piezo buzzer will buzz and get alert to driver to drive slowly in honking zone area. It also checks the horn of the vehicle if it is on, then the in-built switch press action will automatically decrease the noise level of the horn and maintain a safe and noise-pollution-free drive.

III.LITERATURE SURVEY

Currently, Indian cities are ranked three times among the top 10 cities in the world. The cities that rank among these are Kolkata, Delhi, and Mumbai. The effects of noise pollution, which is generated from high-speed vehicles, are mainly affected by the honking zone area, which is declared by the municipality, and is being taught from the 4th grade of schools, but we still do not have any strong system to control it. The Rules and Regulations are not exercised as per papers, legal document PDFs and Government websites. Speed barriers and smart Honking Zones are created, but are hardly followed. The decibel levels of sound are constrained in regulations, but there is no tool to measure and control them in real time. People are more susceptible to early seeing loss than the expected average age, institutional disturbances, and patients in the hospital. Coming to present and existing solutions, there are speed barriers and smart honking zones that are hardly paid any attention to, and people continue honking irrespective of which zone they are in.

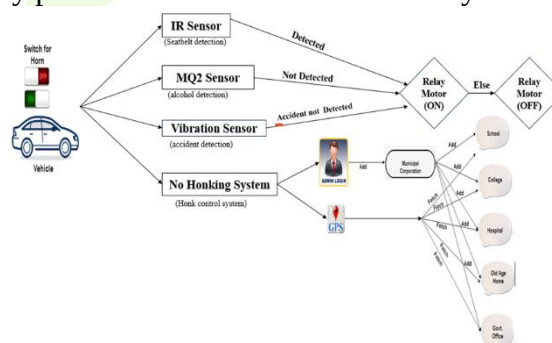
Author- R. K. Mishra Paper- Evaluation and analysis of traffic volume noise along has rapid transit system corridor. In this research paper The R. K. Mishra analysis on traffic volume noise. He tried to reduce the noise pollution created by the extra volume from vehicles.

Author- T. Vaidya agar paper noise pollution levels in Visakhapatnam City (India). In this study, the ambient air quality noise levels (AAQNL) at traffic junctions were 5 DBA or more than those prescribed by AAQNS for the commercial zone, and most of the values were found in the range of 80 ± 10 DBA, among which 75 authors, Prof. S.M. Patil Papers: Law on Environment Some Reflections. In this paper, we describe the law of the environment. He searches for the reaction of low in the environment.

Author - Ising H., Kruppa B. Paper- Health effects caused by noise. In this study, the author shows the effects of noise on human health. How can this that negative effect be reduced?

IV.PROPOSE SYSTEM DESIGN

The system architecture comprises various components and their interactions to ensure efficient operation and monitoring of vehicle safety parameters. An overview of the system functions is as follows:



Dig 1.1: System Diagram

Input:

1. IR Sensor (Seat Belt Detection): Determines whether the seat belt is inserted, providing input to the system regarding the driver's compliance with safety measures.
2. MQ2 Sensor (Alcohol Detection): This sensor detects alcohol consumption by the driver, influencing the decision-making process of the system.
3. GPS Module (Location Detection): Determines the vehicle's location, crucial for identifying entry into no honking zones.
4. Accelerometer (Speed Monitoring): This monitors the vehicle's speed, enabling the system to detect speeding violations.

Processing:

• **Decision Logic (Control Unit):** Receive inputs from the sensors and process them to make decisions based on predefined criteria. This component governs the operation of the system, including the relay control, horn volume adjustment, and alert generation.

Output:

1. **GSM Module (Alert Transmission):** Sends alert messages to the driver in case of speeding violations or alcohol consumption. These alerts serve as warnings to drivers and promote safer driving behaviors.
2. **Horn Control:** The horn volume is automatically adjusted when the vehicle enters a no-honking zone, minimizing noise pollution in sensitive areas.

Operation:

1. Upon vehicle ignition, the IR sensor checks for seatbelt insertion. If the seatbelt is not inserted, the system prevents the relay motor from starting, ensuring compliance with safety regulations.
2. After confirming seat belt usage, the MQ2 sensor detects alcohol consumption. If alcohol is detected, the relay motor remains inactive to prevent driving under this influence.
3. Simultaneously, the GPS module continuously tracked the vehicle location. When the vehicle enters a no-honking zone, the system automatically adjusts the horn volume to comply with regulations.
4. The accelerometer monitored the speed of the vehicle in real time. If speeding is detected within a no-honking zone, the GSM module sends an alert message to the driver, notifying them of a violation.
5. In addition, the system logs data related to driving behavior and violations in a MySQL database, allowing experts to analyze and provide feedback to the driver. This promotes conscious driving and helps to reduce repeated violations over time.

Components:

- **Arduino Board:** Acts as the central processing unit, interfacing with sensors, and controlling system operations.
- **Power Supply:** Provides the necessary power to all system components, ensuring continuous operation.
- **MySQL Database:** Stores data related to driving behavior and violations for analysis by experts.

Conclusion: The system architecture facilitates the comprehensive monitoring of vehicle safety parameters and promotes driving behavior. By integrating sensor data processing, alert transmission, and data logging functionalities, the system contributes to enhanced road safety and reduced environmental impacts.

V. Technology Necessity

In urban environments characterized by high vehicle density and construction activities, mitigating noise pollution is crucial for public health and well-being. The integration of innovative technologies is essential for effectively addressing these challenges. Here, we discuss how the proposed technology meets the requirements:

1.Noise Reduction Equipment for Construction Sites: Installing noise reduction equipment on hydraulic breakers at construction sites helps to mitigate noise pollution in honking zones. By reducing the noise generated during construction activities, this technology minimizes disturbances to nearby institutions, such as hospitals, schools, colleges, and old-age homes.

2.Comprehensive Noise Evaluation Method: Developing a method to evaluate not only the physical level of noise but also the level of displeasure felt by individuals owing to vehicle-related noise pollution enhances the effectiveness of noise reduction efforts. This comprehensive approach enables targeted interventions to address specific sources of noise and their impacts on communities.

3.Noise-Reducing Materials: Utilizing noise-reducing materials developed through research on vibration characteristics enables the creation of effective noise reduction solutions. These materials, tested through mock-up tests and measurements, provide a practical means of mitigating noise pollution from various sources, including vehicular traffic.

4. Technological Advances in Noise Monitoring: Leveraging technological advancements allows for real-time monitoring and control of noise levels in urban environments. By integrating sensors and intelligent systems, such as those used in the proposed project, it is possible to measure and regulate noise pollution dynamically, ensuring compliance with noise regulations and promoting a healthier urban environment.

5. Enhanced Vehicle Alert Systems: Extending existing vehicle alert systems such as buzzer systems to include functionalities for smart honking zones improves road safety and reduces noise pollution. By integrating these systems with the infrastructure of honking zones, drivers can be alerted to comply with the regulations regarding horn usage, thereby minimizing unnecessary noise.

6. Promotion of Responsible Driving Behavior: Encouraging responsible driving behavior through educational and awareness initiatives reinforces the importance of adhering to speed limits and noise regulations. By instilling a culture of compliance with traffic rules, cities can create safer and more livable urban environments for residents.

By addressing these technological necessities, the proposed project aims to significantly reduce noise pollution in honking zones and improve overall quality of life in urban areas. Cities can effectively manage noise pollution and promote sustainable development by integrating innovative solutions and collaborative efforts.

VI. Materials and Methods:

The following components and tools were used in developing the system:

- Microcontroller (Arduino Uno)
- RF Transmitter and Receiver modules (433 MHz)
- Motor driver module (L298N)
- DC motors
- Buzzer
- Power supply
- Buzzer
- GPS
- GSM
- Accelerometer
- IR Sensor
- Vibration Sensor
- MQ2 Sensor

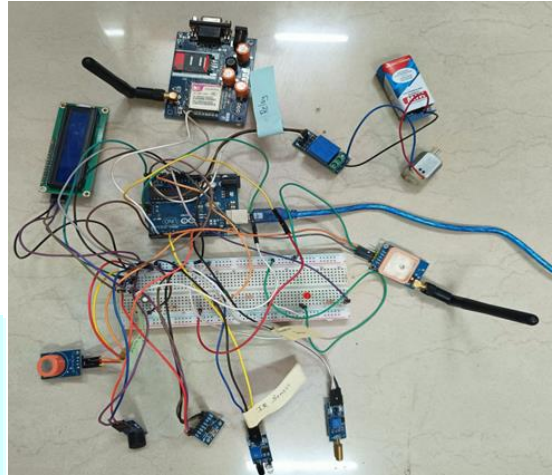
The RF transmitter is placed in designated zones and broadcasts zone-specific data. The receiver on the vehicle reads this data and controls the motor speed accordingly. The buzzer alerts the driver in honking-restricted areas.

VII. Results and Discussion:

The prototype was tested in a controlled environment mimicking a hospital zone. When the vehicle entered the RF range, speed was automatically reduced and honking was disabled. These tests confirmed the successful execution of the system under predefined conditions. Compared to previous models, this approach integrates both speed and noise control, improving overall driver compliance.



Dig 1.2: Home Page(software)



Dig 1.3: Hardware

VIII.CONCLUSION

This system offers a comprehensive solution for addressing road safety and noise pollution issues. By addressing factors such as excessive speed, alcohol consumption, and unnecessary honking, safety is enhanced and a peaceful commuting experience is promoted. Utilizing GPS technology for precise interventions and curbing noise pollution contributes to a safer and more serious environment for travelers. Overall, this initiative fosters responsible driving behavior and promotes a safer and more harmonious journey for all.

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