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INTELLIGENT TRAFFIC SAFETY ENHANCEMENT: AUTOMATED SPEED CONTROL AND ACCIDENT PREVENTION SYSTEM

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Abstract: **— These days, people drive incredibly quickly, which increases the risk of accidents and the loss of life from small driving mistakes in places like highways, slopes, and hospitals. In order to minimize accidents in restricted areas, alert drivers, and encourage them to slow their speed in such regions, the Highway Department has lazed the notice boards. However, there is a potential that such signboards won't always be visible, and accidents could still occur if drivers don't reduce their speed after viewing the signs. Using automatic technologies and an embedded system, it is possible to accomplish this. With the help of an RF module, this project aims to "automate speed control of vehicles" by identifying the catastrophe areas (such schools, colleges, hospitals, etc.). The transmitter and receiver devices are the two independent halves of the project. Upon receiving data from the restricted region, the embedded unit of the vehicle automatically lowers its speed in accordance with the specified speed limit.**

Additionally, a buzzer and display were included to notify the driver anytime the speed changed on its own.

Index Terms:
RF Module, Motor Driver, Arduino UNO, LCD, Buzzer, Encoder, Decoder.

1. INTRODUCTION

In today's fast-paced world, the increasing rate of accidents and pollution underscores the critical need for effective speed control measures on our roads. Despite the implementation of speed limits, many drivers disregard them, leading to a significant number of accidents, particularly in regions like India. enhance road safety, improve fuel efficiency, and optimize the overall driving experience. By preventing speeding and promoting adherence to speed limits, real-time automatic vehicle speed control holds the potential to significantly reduce accidents and mitigate their consequences. Moreover, it aligns with the broader goals of smart transportation systems and the development of autonomous vehicles, positioning it as a pivotal technology for the future of mobility. As we delve deeper into the realm of transportation innovation, real-time automatic vehicle speed control emerges as a crucial tool in fostering safer roads, reducing environmental impact, and advancing efficiency of our transportation network

2. LITERATURE WORK

A recent survey indicates that excessive speed, rather than necessary speed limits, and unawareness of obstacles contribute significantly to serious road accidents. Addressing this challenge is crucial for automotive manufacturers, traffic authorities, and research groups. Drivers need alerts, either audible or visual, about restricted zones and obstacles ahead. While some vehicles offer such features, future vehicles must prioritize intelligent driving controls for enhanced safety. India, with its extensive road network, faces a high rate of accidents and fatalities,

Traffic accidents claim the lives of almost 1.19 million people annually.When it comes to kids and teens between the ages of 5 and 29, road accidents are the main cause of fatality when it comes to driver error. This poses a particular risk in densely populated areas like schools and hospitals, where speed breakers are often manually controlled, leading to instances of uncontrolled speeding due to driver negligence.

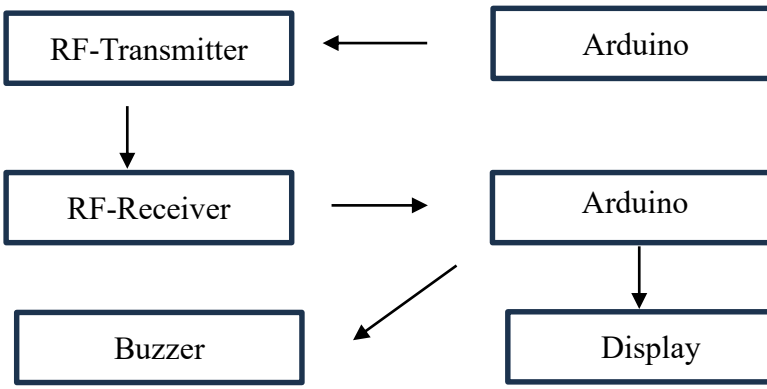


Fig 3.1Block diagram of Automatic speed control

3.IMPLEMENTATION

Transmitter section: When the vehicle gets to a preset spot, the transmitter in that particular area broadcasts a speed limit that is appropriate for that particular area. The transmission of this data is essential to guarantee that drivers approaching the area are provided with prompt and precise instructions regarding the right speed to maintain. The transmitter at different areas broadcasts different speed limits according to the requirement of that particular areas.

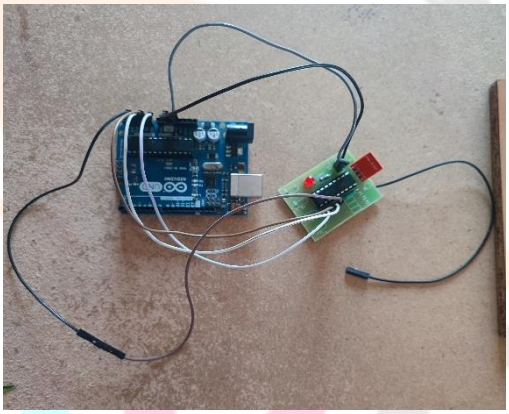
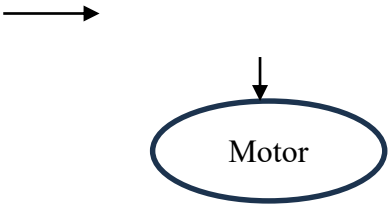


Fig 3.2 Transmitter Section



Receiver section: The speed limit that is intended for that particular site is received in the receiver section once it is transmitted from the transmitter. This data provides a solid platform for decision-making processes and is an essential input for further activities.

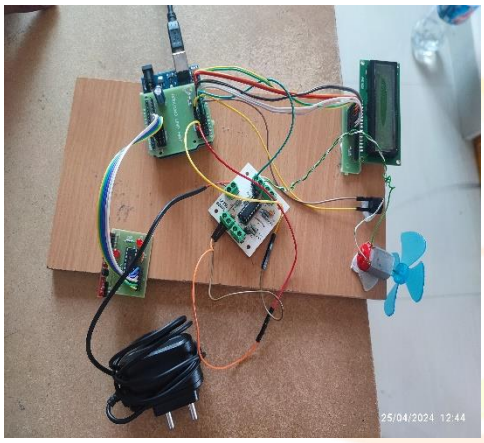


Fig 3.3 Receiver Section

Whole working process: The operational workflow of the system leverages an Arduino Uno for flexibility and cost-effectiveness. Its digital and analog input/output pins facilitate smooth interfacing with the RF transmitter, RF receiver, and L293D driver. Through its programmability, the Arduino enables the encoding/decoding of speed limits and the effectuation of real-time notifications to the driver via the alarm and the LCD. This ensures that any modifications to the speed limits are promptly communicated to the driver, maintaining safety and adherence to updated guidelines.

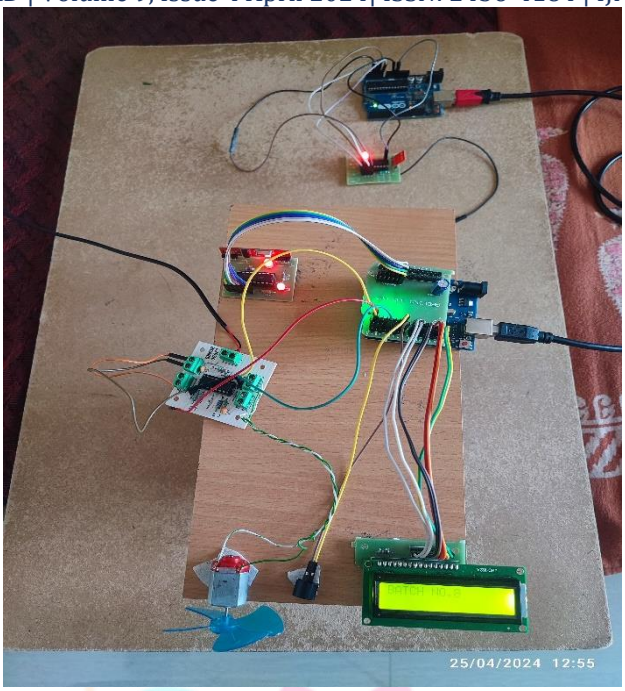


Fig 3.4 Circuit connections

Result:

Output LCD Display:

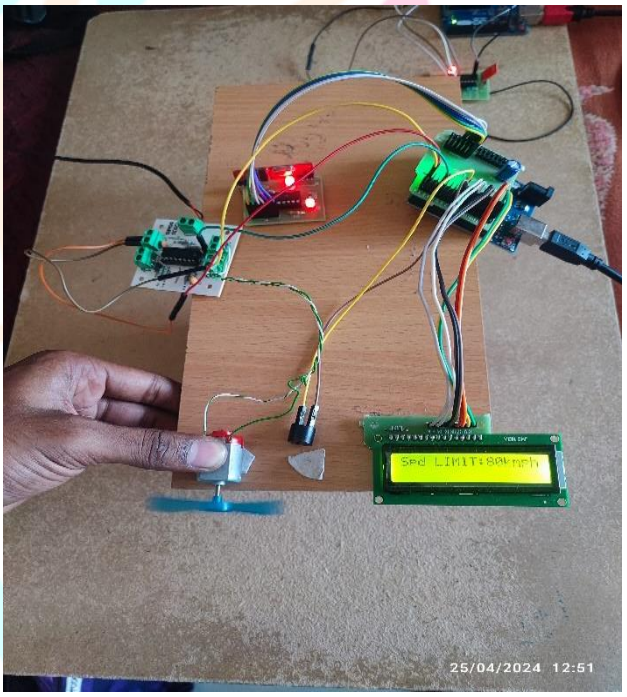


Fig 3.5 Displaying speed limit - 80kmph

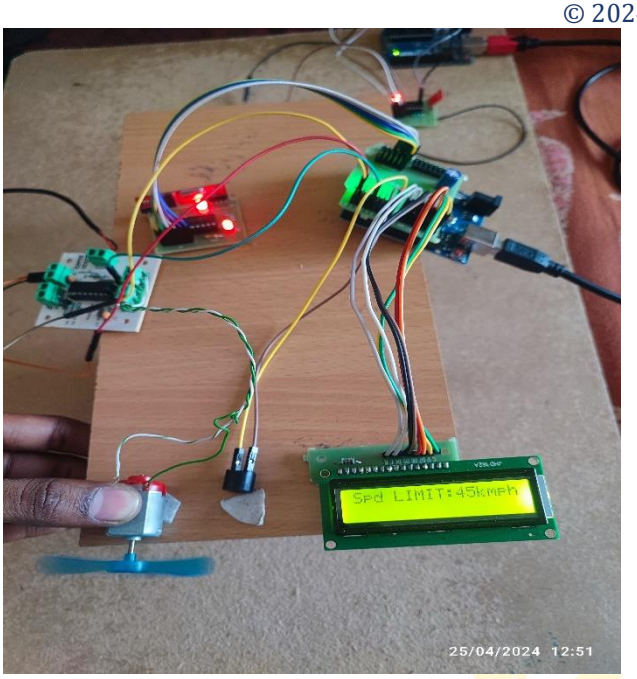


Fig 3.6 Displaying speed limit - 45kmph

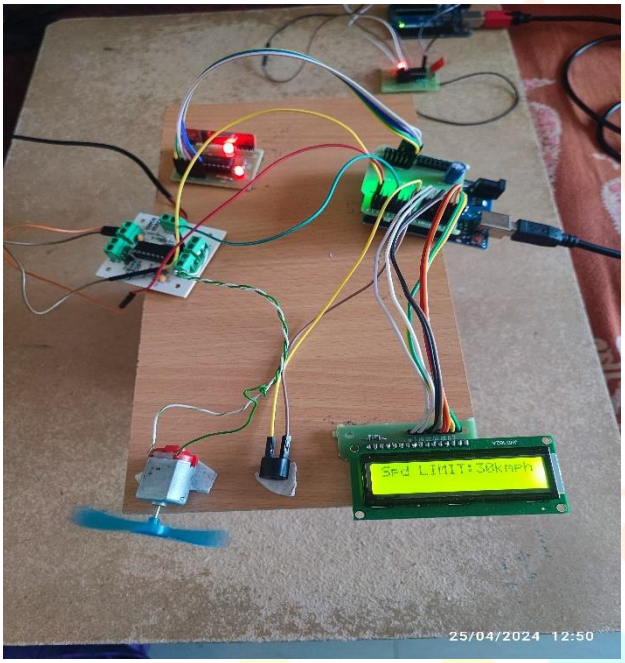


Fig 3.7 Displaying speed limit - 30kmph

Advantages:

1. Increased fuel economy through steady speed maintenance.
2. Lessened driver weariness, particularly during lengthy journeys.
3. Driving becomes smoother when one maintains a constant speed.
4. Aids in following speed limits by drivers.
5. Reduces the need for manual speed adjustments, increasing safety.

CONCLUSION:

In conclusion, the proposed solution aims to tackle the escalating issue of speeding vehicles in restricted areas through the implementation of an innovative automatic speed control system. By leveraging RF technology, this system will facilitate real-time communication between vehicles and designated zones, ensuring adherence to speed limits and enhancing overall road safety. Through proactive measures and automated orcement, we seek to mitigate the frequency and severity of accidents, fostering a culture of responsible driving and promoting greater compliance with speed regulations. Ultimately, our goal is to create a safer and more secure transportation environment for all road users.

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