Automatic Speed Control System In Restricted Zones For Automobiles

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Abstract- *This system is used to monitor speed of the vehicle and to slow down the vehicle to slow speed or the programmed limit speed by using wireless sensors. As for Indian road transport scenario is concerned, accidents are becoming a day to day cause . An attempt has been made in this project to reduce such mishaps.This automated speed controlling system is built using the microcontroller-based platform of the Arduino Uno board. Here the Arduino is programmed in such a way that, the prescribed speed limit was incorporated in the transmitter unit which transmits the signals, and it was received by the receiver in the vehicle using wireless communication technology and the speed of the vehicle was automatically controlled by the input signals by the receiver, with the help of speed encoder sensor. Once this technique was implemented the accidents will be reduced on a larger rate, and also reduce the nuisance by some drivers.*

I. INTRODUCTION

The Automatic Vehicle Over Speed Controlling System for School Zone using RFID and IR sensor sensing stop function during object detect is a system designed to control the speed of vehicles passing through school zones. The system uses RFID and IR sensors to detect the presence of a vehicle and to determine its speed. If the vehicle is exceeding the speed limit, the system will activate a stop function to slow the vehicle down. This system is intended to improve the safety of school zones by preventing accidents caused by speeding vehicles.

This system is used to monitor speed of the vehicle and to slow down the vehicle to slow speed or the programmed limit speed by using the proximity and wireless sensors. As for Indian road transport scenario is concerned, accidents are becoming a day to day cause an attempt has been made in this project to reduce such mishaps. In our report a high-speed indication is given and automatic braking is applied by cutting off the fuel supply to the engine when the setup speed is exceeded.

This automated speed controlling system is built using the microcontroller-based platform of the Arduino Uno board. Here the Arduino is programmed in such a way that, the prescribed speed limit was incorporated in the transmitter unit which transmits the signals, and it was received by the receiver in the vehicle using wireless communication technology and the speed of the vehicle was automatically controlled by the input signals by the receiver, with the help of speed encoder sensor. Once this technique was implemented the accidents will be reduced on a larger rate, and also reduce the nuisance by some drivers.

The system also includes an emergency stop function that is activated if an object is detected in front of the vehicle. This is achieved using the IR sensor, which detects the object and sends a signal to the onboard computer, which applies the brakes and stops the vehicle to prevent any collision.

Advantages :

- Enhanced safety: The Automatic Vehicle Over Speed Controlling System helps to enhance safety in the school zone by ensuring that vehicles are travelling at a safe speed.
- Reducing accidents: By controlling the speed of vehicles, the system helps to reduce the number of accidents that occur in the school zone.
- Improved traffic flow: The system helps to improve traffic flow in the school zone by ensuring that vehicles are not travelling too fast, which can cause traffic congestion.
- Easy to install and maintain: The system is easy to install and maintain, making it a cost-effective solution for schools and other institutions.

II. LITERATURE REVIEW

According to a recent study, the highest rate of major road High unmanageable speed than the necessary speed restriction in the particular zone, as well as due to blind barriers. The most difficult responsibility for the car manufacturer, traffic government officials, and automotive research and development companies is reducing the number of accidents and their worst effects. The driver's awareness of

the limited area when operating a vehicle is crucial, and it can be done through an auditory or visual alert to remind them of the impediment in front of the road.And while this technology is currently offered in automobiles as a separate option, future vehicles will need to have higher levels of safety in their driving controls. intelligently in every single car. In India, one of the main types of transportation is by road. All across the country, India is connected by a vast network of roads. When compared to other countries in the world, our country experiences the most accidents and accidental deaths. According to a data from the Ministry of Road Transport & Highways, there is one fatal road accident in India per minute of every year.

Amarnarayan, et.al., Automatic over speed controlling of vehicle

The author's primary goal is to limit the speed of the car in order to prevent accidents that might occur near hospitals, on curved roads, or in areas where there are deep cuts. The arm-7 microcontroller and ZigBee technologies can be used for this. The transmitter module incorporates the recommended speeds for that area, and when the vehicle's receiver picks up the signal, an arm-7 microcontroller checks to see if the driver has reduced their speed temporarily. Without the driver's intervention, the vehicle decelerates when the timer has run out of time by sending a signal to the motor to run at a lower speed.

Amulya A M, et.al., Intelligent vehicle speed controller:

In this article, the authors focused on automatically preventing vehicle collisions caused by overspeeding in speed-restricted areas. Embedded systems and RF transmitter and receiver modules can be used to do this. The driver must manually reduce the vehicle's speed when it enters a zone with speed restrictions. If the driver did not reduce the speed of the vehicle, the electronic controller would take over and do so by detecting the signal from the transmitter in that area. The Arduino microcontroller would then use that signal to process and send a signal to the motor to control its speed. Here, they locate the restricted area using an RF transmitter and receiver.

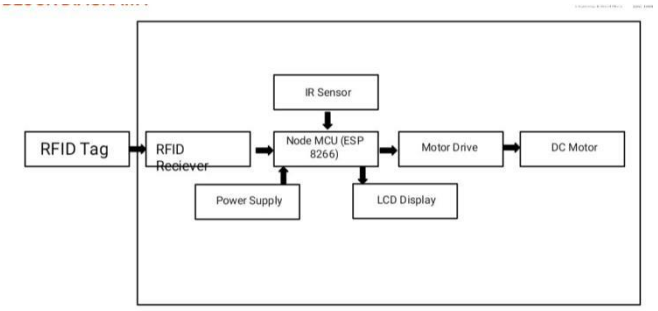
Vaishal B. Niranjane, et.al., Automatic vehicle speed control system :

They described how their system works , which makes use of Zigbee technology .It operates in three distinct zones where the speed wants to be reduced automatically. They are in the silent , normal zone and zone with a speed limit. Through the microcontroller 8051, the motor's rotating direction is reversed to reduce speed. When the vehicle enters that area, the signal is picked up by the vehicle's Zigbee receiver thanks to the Zigbee transmitter that has been placed in that area, such as a hospital. The vehicle's speed is compared to the established speed in that vicinity. The microprocessor intervenes to lower the vehicle's speed if the zone's speed is higher, and it turns off the horn if the zone is silent.

III. HARDWARE IMPLEMENTATION

Components of the system:

1. Arduino uno
2. ESP 8266
3. RFID tags
4. RFID Reciever
5. Motor Driver
6. DC motors
7. Power supply
8. LCD



Arduino UNO :

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing. Over the years Arduino has been the brain of thousands of projects, from everyday objects to complex scientific instruments. A worldwide community of makers - students, hobbyists, artists, programmers, and professionals - has gathered around this open-source platform, their contributions have added up to an incredible amount of accessible knowledge that can be of great help to novices and experts alike.

Arduino was born at the Ivrea Interaction Design Institute as an easy tool for fast prototyping, aimed at students

without a background in electronics and programming. As soon as it reached a wider community, the Arduino board started changing to adapt to new needs and challenges, differentiating its offer from simple 8-bit boards to products for IoT applications, wearable, 3D printing, and embedded environments. All Arduino boards are completely open-source, empowering users to build them independently and eventually adapt them to their particular needs. The software, too, is open-source, and it is growing through the contributions of users worldwide.

Wifi Module:

The ESP8266 is a low-cost Wi-Fi chip with full TCP/IP stack and MCU (Micro Controller Unit) capability produced by Shanghai-based Chinese manufacturer, Espressif Systems

The chip first came to the attention of western makers in August 2014 with the ESP-01 module, made by a third-party manufacturer, AI-Thinker. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands. However, at the time there was almost no English-language documentation on the chip and the commands it accepted. The very low price and the fact that there were very few external components on the module which suggests that it could eventually be very inexpensive in volume, attracted many hackers to explore the module, chip, and the software on it, as well as to translate the Chinese documentationThe ESP8285 is an ESP8266 with 1 MB of built-in flash, allowing for single-chip devices capable of connecting to Wi-Fi.

RFID:

Radio frequency identification (RFID) is a general term that is used to describe a system that transmits the identity (in the form of a unique serial number) of an object wirelessly, using radio waves.

An RFID System can be visualized as the sum of the following three components:

1. RFID tag or transponder
2. RFID reader or transceiver
3. Data processing subsystem

An RFID tag is composed of an antenna, a wireless transducer and an encapsulating material. These tags can be either active or passive. While the active tags have on-chip power, passive tags use the power induced by the magnetic field of the RFID reader. Thus passive tags are cheaper but with lower range (<10mts) and more sensitive to regulatory and environmental constraints, as compared to active tags.

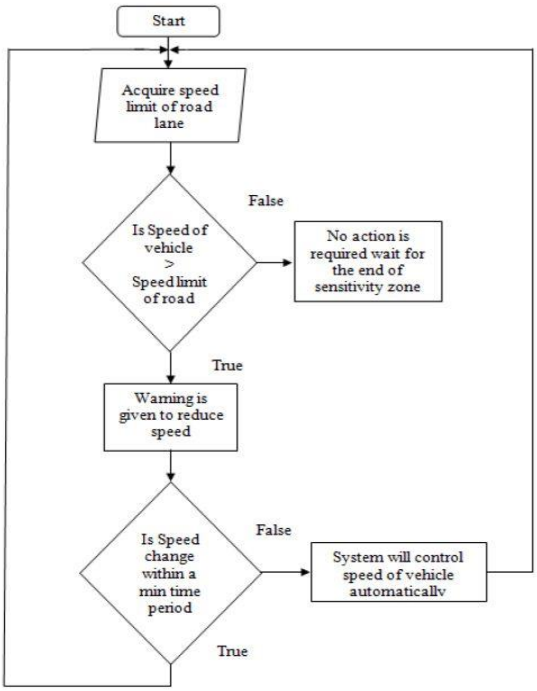
An RFID reader consists of an antenna, transceiver and decoder, which sends periodic signals to inquire about any tag in vicinity. On receiving any signal from a tag it passes on that information to the data processor.

The data processing subsystem provides the means of processing and storing the data.

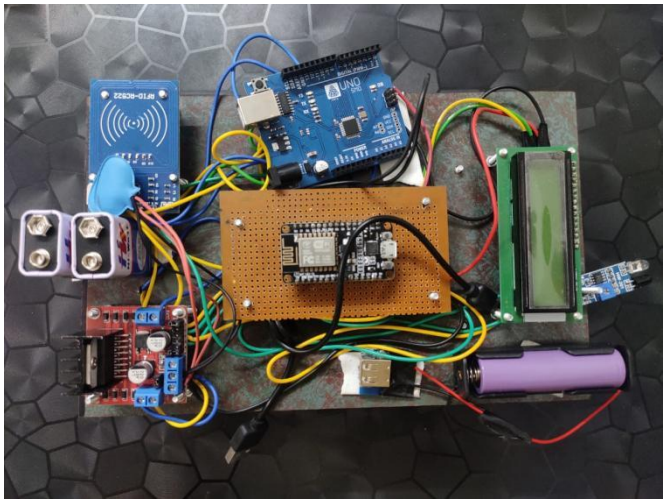
Motor Driver(L298N 2A):

L298N 2A Based Motor Driver is a high power motor driver perfect for driving DC Motors and Stepper Motors.It uses the popular L298 motor driver IC and has an onboard 5V regulator which it can supply to an external circuit. It can control up to 4 DC motors, or 2 DC motors with directional and speed control.This motor driver is perfect for robotics and mechatronics projects and perfect for controlling motors from microcontrollers, switches, relays, etc. Perfect for driving DC and Stepper motors for micro mouse, line following robots, robot arms, etc.H-bridges are typically used in controlling motors speed and direction but can be used for other projects such as driving the brightness of certain lighting projects such as high powered LED arrays.

FLOWCHART



Working Explanation:



The Automatic Vehicle Over Speed Controlling System for School Zone is a device designed to control vehicle speed in the school zone area, ensuring the safety of students and pedestrians. The system is equipped with IR sensors and an RFID tag that can detect the presence of an object in the vicinity of the school zone.

The system works by detecting the speed of the incoming vehicle using the IR sensor. Once the speed of the vehicle crosses the set threshold, the system activates the RFID tag reader to detect the RFID tag of the school or emergency zone. If the RFID tag is detected, the system initiates the stop function, causing the vehicle to slow down and eventually come to a complete stop.

The system is built using an Arduino Uno micro controller board and a Node MSP board, which are responsible for controlling the system's various components, such as the motor and sensors. The motor is used to control the vehicle's speed and bring it to a stop when required.

The IR sensor is used to detect the speed of the vehicle, and the RFID reader is used to detect the RFID tag of the school or emergency zone. The system also includes an LCD display that provides real-time information about the vehicle's speed and the presence of an object in the school zone area.

Overall, the Automatic Vehicle Over Speed Controlling System for School Zone using IR sensor for object detection, RFID tag for school or emergency zone, Ardino Uno, Node MSP, and motor provides an effective solution for ensuring the safety of students and pedestrians in the school zone area by controlling the speed of vehicles passing through it.

Future Enhancements

1) Integration with other safety systems: The system could be integrated with other safety systems, such as CCTV cameras and alarm systems, to provide a more comprehensive safety solution for school zones.
2) Cloud-based management: The system could be enhanced by providing a cloud-based management system that allows administrators to remotely monitor the system and access data in real-time.
3) Improved accuracy: The accuracy of the system could be improved by using more advanced sensors and algorithms. For example, machine learning algorithms could be used to improve object detection and speed control.
4) Mobile app integration: The system could be enhanced by providing a mobile app that allows parents and school administrators to receive real-time notifications when the system is activated, providing an additional layer of safety.
5) Solar power: The system could be enhanced by incorporating solar power to reduce energy consumption and make the system more sustainable.
6) Pedestrian detection: The system could be enhanced to detect pedestrians in addition to vehicles. This would help to ensure the safety of pedestrians in school zones and reduce the risk of accidents.
7) Cost optimization: The cost of implementing the system could be optimized by exploring alternative materials, reducing the number of components required, and exploring alternative power sources.

IV. CONCLUSION

In conclusion, the Automatic Vehicle Over Speed Controlling System for School Zone using RFID and IR sensor sensing stop function during object detect is a system that has the potential to reduce accidents caused by speeding vehicles in school zones. While there are a few limitations to the system, these can be addressed through further research and development. Overall, the system is a step in the right direction towards creating safer school zones and promoting road safety for everyone.

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