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# AUTOMATIC SPEED CONTROLLER FOR VEHICLES USING RFID

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**Abstract:** Automated Braking System can automatically start emergency braking if necessary and can also control a vehicle's speed based on school and college zones. Safety is crucial for cars in order to limit the likelihood of collisions in speed-restricted areas.It reduce the loss of lives and property. Recent polls show that over the past few years, accidents near hospitals, schools, and abrupt turns have significantly increased due to people's hasty attempts to reach their destinations. Controlling vehicle speed has therefore been an important factor to take into account. This research report introduces the use of RFID to construct a smart automatic braking system to regulate vehicle speed. A vehicle prototype is created and put into action. The NodeMCU will carry out emergency braking in accordance with a pre-burnt code after the system uses the sonar sensor to detect obstructions. The device also offers options for speed control. To reduce damage or collision from an accident, the vehicle's speed will be decreased or increased based on how close an object is to the moving vehicle. As a result, an automated collision avoidance system that is accessible to everyone is suggested. As a result, every car can now have an automated smart speed control and braking system. After this method is used, accidents will decrease more quickly, and some driver's annoyance will also decrease.

**Keywords:** Collision, RFID, NodeMCU, Accident zones, Emergency braking.

## I. INTRODUCTION

The Indian Law Commission has issued a recommendation to decrease traffic accidents, limit speed in sensitive areas and promote public tranquilly. Due to some driver's rash driving, the current techniques are still unable to reduce accidents [1]-[2]. Thus, speed control must be implemented in all automobiles. Installing an automated speed control system in cars, notably in constrained areas, is our brand-new recommendation. A gadget is set up as a transmitter in this case[3].The microprocessor analyses the vehicle's current speed to the specified limit and automatically adjusts the speed after receiving the measurement from the dc motor. This system uses Zigbee technology, which has a range of up to 10 to 100 meters, to communicate between the transmitter and receiver. [3]-[5] Compared to other options, this is less expensive. As a result, this system controls and monitors every vehicle in the area it covers. In our quick-paced environment, accidents are decreased by using this approach. People in both developed and developing nations experience inconvenience from traffic accidents and vehicle jams caused by drivers who disobey the law in a restricted zone, where the speed must be limited according to the zone's regulations. Zigbee technology is used in automated speed control systems to limit the speed automatically. [6]-[9] It is sufficient to mention at this point that the introduction of several highway safety measures, including speed limits, among others, has significantly lowered the frequency of these incidents. The problem is that safe driving policies alone won't solve this; engineers must also play a part because the root cause of the problem is an engineering product (the motor vehicle). Many drivers have been forced out of necessity to make the trip through dark areas while also being quite fatigued. Doing this isn't necessarily a bad idea. Many examples that have been reported include drivers who fell asleep at the wheel; when they finally awoke, a head-on accident may have occurred. Few people have had the good luck to immediately stop this. Therefore, it is essential to take into account the benefits of an early warning system where the driver is informed of a potential collision a significant period of time in respective time interval [10] –[ 11].

## II. PROPOSED SYSTEM

An Arduino UNO serving as a microcontroller is in charge of managing the entire system. The key benefits of adopting this controller over others include faster processing rates and the capacity to manage numerous inputs and outputs simultaneously without sacrificing output accuracy and precision. This Arduino UNO has sufficient processing power to handle the data from the Zigbee receiver. Processing the signal from the Zigbee transmitter that the receiver receives is the processor's primary function. Arduino UNO processes these input signals and activates the corresponding relays, which in turn causes the processor to produce the output signals.

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This particular board can also be connected to a computer for simple implementation or modification of the code, which serves as the processor's "brain" and regulates operations. To examine an analogue or graphical representation of both inputs, the board can communicate with the computer using special software. This suggested project aims to automatically control the speed of any vehicle in cities as well as in restricted locations like hospitals, parks, and speed- restricted regions. We offer a method for controlling speed without endangering others. The recommended embedded technology eliminates the need for the driver to manually control speed while driving. The control unit device is an ultrasonic sensor and the NODE MCU is used to calculate the object's distance. IoT displays, the object distance, vehicle speed, and warning. An LED is used in this situation to alert danger. When an object is detected, the LED blinks as a warning, and the IoT display also shows the alert status.

## III. RFID MECHANISM

The term "RFID" refers to a group of technologies known as Automatic Identification and Data Capture (AIDC). AIDC techniques automatically identify objects, capture information about them and input that information directly into computer systems with little to no human involvement.

RFID techniques employ radio waves to reach this fundamental level. An RFID tag or smart label, an RFID reader, and an RFID transmitter comprise an RFID system. RFID tags have an integrated circuit and an antenna that are used to transmit data to an RFID reader (also known as an interrogator). The radio waves are then converted by the reader into a more useful kind of data. The information obtained from the tags is then sent to a host computer system via a communications interface so that it can be kept in a database and later evaluated. An RFID tag is made consisting of an integrated circuit and an antenna. The tag also contains a shielding material that holds the components together and protects them from various environmental influences. The protective substance is determined by the application. The flow chart of the proposed system is shown in Fig. 1.

A cruise control system, usually referred to as an automatic speed controller, is intended to keep a vehicle's speed constant without the driver's input. The system is typically controlled by an electronic module that interacts with the engine and transmission systems to maintain a specific speed. Here is a general overview of how an automatic speed controller works:

1. The driver sets the desired speed using a control on the steering wheel or dashboard.
2. The controller uses sensors to determine the vehicle's current speed and compares it to the driver-set target speed.
3. If the current speed is lower than the desired speed, the controller signals the engine to increase power output.
4. The controller instructs the engine to reduce power output if the current speed exceeds the intended speed.
5. The controller continuously adjusts the engine's power output to maintain a constant speed.
6. The system can be disengaged by the driver by applying the brakes or pressing a button on the steering wheel or dashboard.

Due to its capacity for accurate speed control, DC motors are frequently utilized in automatic speed controllers. A voltage controller can easily manage the motor speed because the speed of a DC motor is directly proportional to the voltage provided to it. The voltage provided to the motor is often adjusted using a feedback mechanism in an automatic speed controller in order to maintain a constant speed. A speed sensor, such as a tachometer or encoder, is often part of this feedback system. It monitors the motor's real speed and feeds that information to the control system. In order to maintain the required speed, the control system then compares the actual speed to the desired speed and modifies the voltage provided to the motor. A closedloop control system that continuously measures the speed and modifies the voltage provided to the motor can be used to achieve this. In an automatic speed controller, the fundamental idea behind a DC motor is to use feedback control to modify the voltage delivered to the motor in order to maintain a constant speed. As a result, the motor speed may be precisely controlled, and the automated speed controller is able to keep the motor running at a consistent speed even when the load or other external factors change.

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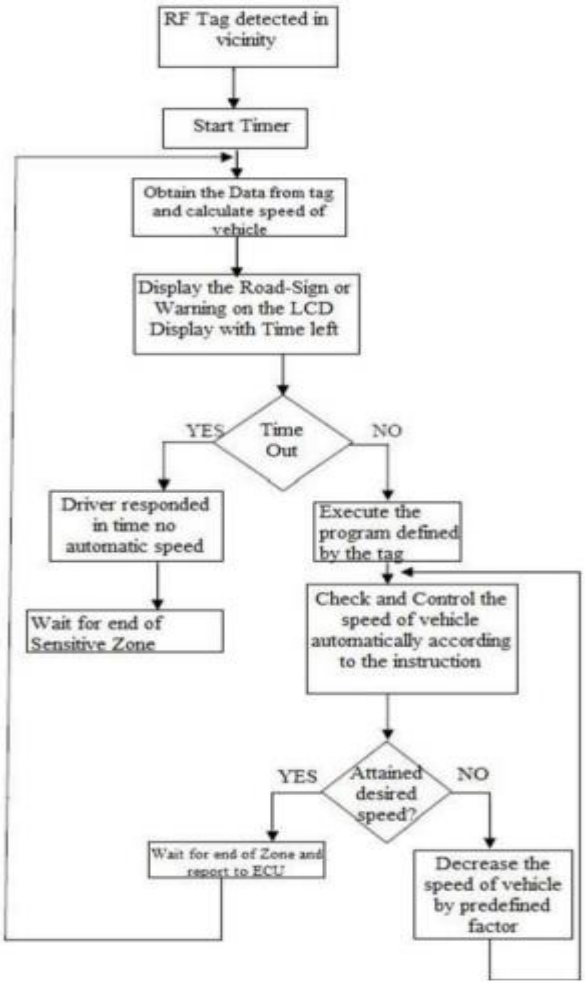


Fig.1 Flow chart of the proposed vehicle speed control system

In an automatic speed controller system, an LCD (Liquid Crystal Display) is commonly used to display information related to the speed and other system parameters to the driver. The LCD receives input signals from the system control unit, which processes the data from various sensors and control modules in the vehicle. The LCD display receives the input signals and uses a backlight to illuminate the display. The LCD display can display various symbols and numbers to provide information to the driver about the vehicle's speed and other system parameters.

## IV. HARDWARE SETUP

The hardware setup of the proposed model is shown in Fig. 2. It analyses the vehicle's speed with the maximum permitted speed in low speed zones or signal zones and then automatically restricts the vehicle's speed by turning on the speed restriction device. In the zone, the vehicle's speed is lowered to the minimum. At the beginning and finish of speed limit zones, passive RFID tags are stored. The tag that is attached to the speed limit indicator at the start of the speed restriction zone is detected by the RFID reader installed in the vehicle as soon as it enters the speed limit zone. Since the speed of a DC motor is inversely proportional to the flux per pole, the speed of the motor can be changed by altering the flux applied to it. A variable resistor or rheostat is connected in series with the field coil to control the flux. Three crucial parts, including a voltage regulator/BEC (Battery Eliminator Circuit), processor and FETs for switching can be used to create an electronic speed controller.

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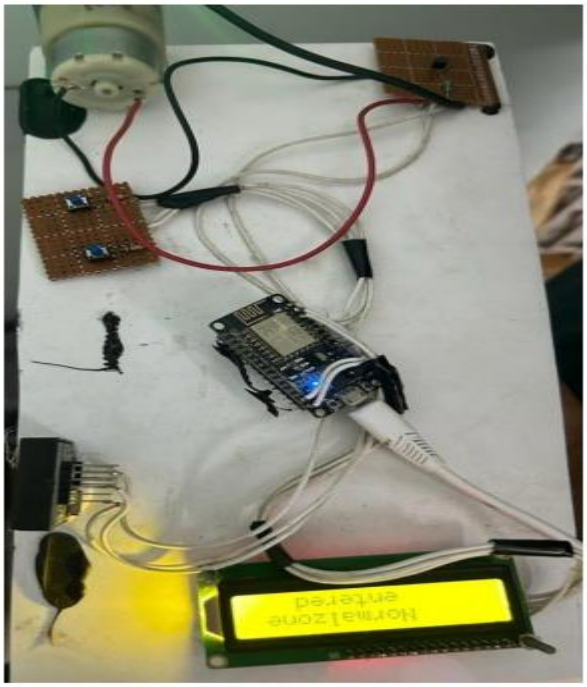


Fig.2 Hardware prototype of the proposed model

## V. RESULT AND DISCUSSION

The software is put on the microcontroller for the automatic vehicle speed control system. Anytime there is a change in the load, the engine will automatically maintain a constant speed within the defined limits. Through the use of this speed-limiting device, the vehicle's speed can be managed and accidents can be avoided. Results at various Zones and its Challenges are analyzed. The user's mobile phone receives the data picked up by the speed control system, which also includes the range of the ultrasonic sensor, via a GSM modem.

**Table I Different Zones and its corresponding parameters**

| OBSTACLE/SPEED LIMIT ZONE | RPM | DIAMETER (CMS) | DISTANCE (CMS) | SPEED (M/S) |
|---|---|---|---|---|
| CAR | 60 | 4 | 137 | 0.125 |
| PEDESTRAIN CROSSING | 67 | 4 | 153 | 0.14 |
| SCHOOL ZONE | 39 | 4 | 90.7 | 0.083 |
| HOSPITAL ZONE | 52 | 4 | 120 | 0.11 |

The formula is used to calculate the speed from the measured Revolution per Minute (RPM).

SPEED= 3.14*Diameter*RPM

RF signal = Speed Limit Zones (YES Inside the Zone, No-Outside the Zone)
Here, the speed is found by dividing the diameter by the number of revolutions per minute (RPM) and pi. The graph in Fig.3 depicts the speed of vehicle in different zones and their possible speed limit that the vehicle should go in the respective zone.

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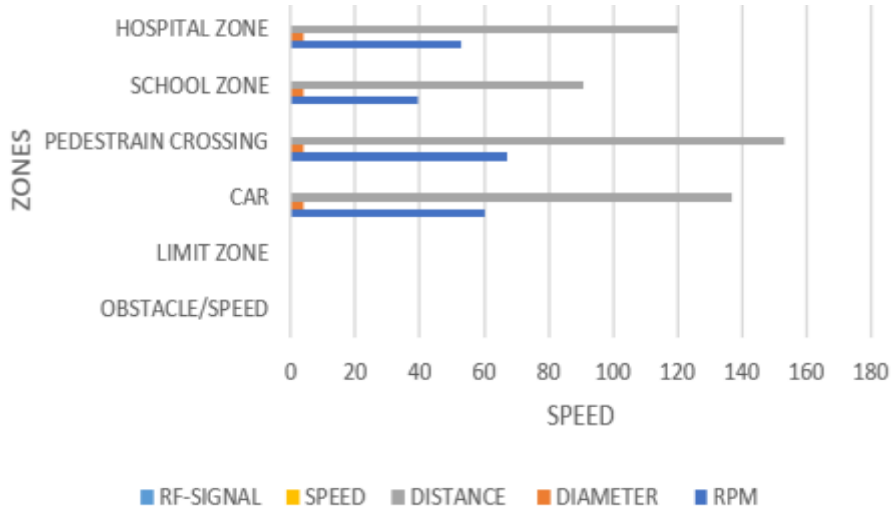


Fig.3 The speed of vehicle in different zones

## VI. CONCLUSION AND FUTURE SCOPE

This study highlights the benefits of automatic speed decrease for raising pedestrian and road user safety. Using a vehicle speed control system has been found to considerably reduce the amount of collisions brought on by negligent drivers who ignore signs displayed along the road in restricted areas. Every car in the future will be equipped with a system of this kind, which will lower the number of deadly collisions. This system can increase its compatibility by using ultra-sonic sensors. Ultra-sonic sensors can detect any hurdles on road such as breakers, buildings etc. The ultrasonic sensor system will be highly useful when driving in steep terrain with tight curves, especially at night. Due to its ability to automatically recognize the car in front of it and maintain a safe distance and speed, this technology will help lessen vehicle collisions on the road when overtaking or travelling at a fast speed.

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