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# Enhanced Autonomous Speed Control System for Integrated Cars

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**ABSTRACT**

The Automated Vehicle Speed Control System (AVSCS) is an embedded framework that utilizes specialized hardware and software components to automatically regulate a vehicle's speed. This system is designed to be implemented in a variety of vehicles, including cars, trucks, and autonomous vehicles, to enhance safe and efficient driving. The AVSCS comprises several essential elements: sensors, a processor or microcontroller, a control calculation algorithm, and a user interface. The sensors gather real-time data about the vehicle's current speed, weather conditions, and surrounding road environment, including wheel speed, GPS, radar, LIDAR, and cameras. The microcontroller or processor processes the sensor data and employs control algorithms, such as PID (Proportional-Integral-Derivative) controllers or advanced Model Predictive Control (MPC) techniques, to calculate the optimal vehicle speed. This information is then used to adjust the throttle or braking mechanisms accordingly. Additionally, the user interface allows drivers to customize the system or set their desired speed preferences, providing a seamless and personalized driving experience. The integration of the AVSCS into various vehicle types can significantly increase security, streamline traffic,, and reduce energy consumption, making it a crucial component of the connected and autonomous vehicle ecosystem.

**Keywords:** vehicle speed regulator, GPS, radar, LIDAR, and cameras

## I.. INTRODUCTION

Innovative plans aimed at making our streets safer, more efficient, and simpler to use have emerged as a result of the intersection of automobile innovation and public health. The incorporation of an eye flicker sensor and implanted technology into vehicle speed control remains a demonstration of the steady development of automobile frameworks among these advancements. This ground-breaking combination promises a promising solution to the well-known issue of careless or sluggish driving, heralding a new era of intelligent and responsive automobiles. In a period where vehicles have transformed into a fundamental piece of our everyday schedules, the essential for safer driving behaviors are more expressed than ever before. Slow driving is a big contributor to road accidents and setbacks, necessitating cutting-edge security systems. Vehicle Speed Control with Eye Squint Sensor Using Installed Innovation is a cutting-edge system technology that considers the driver's physical condition in addition to the vehicle's speed. This opens up the possibility of improving both the safety on the road and the overall experience of driving. At its middle, this structure uses an embedded microcontroller, undeniable level eye flash sensor advancement, and sharp control estimations to endlessly screen the driver's eye improvements and unravel their availability level. the viewpoint of the driver and offers suitable solutions by assessing flicker designs. The structure can carefully change the vehicle's speed to match the driver's condition, ensuring that carelessness or languor doesn't mull over. In addition, it improves ease of use and proficiency, in keeping with the trend toward intelligent transportation frameworks.

Powertrains with enlistment engines are becoming a sensible affordable option for high-power electric cars (EVs). This article presents an electric vehicle that uses two open-end winding induction motors (OEWIM) to provide differential four-wheel drive (D4WD). Each OEWIM is powered by two voltage source inverters (VSIs) that are connected to two separate battery packs. The suggested drive control computation synchronizes the distribution of the uniform condition of charge (SoC) and the shortfall lenient action. An efficient two-stage lookup table (LUT)-based direct torque control (DTC) technique is suggested to determine the appropriate redundant VSI voltage vectors to balance the SoC of batteries. The suggested LUTDTC scheme is less susceptible to changes in motor parameters and performs well both in the steady state and during transients.

**II. Existing System of the vehicle speed control system is automated.**

Conventional components like manual driver input, standard speed cut-off points, and journey control frameworks are fundamental to the current vehicle speed control system. The following are some important aspects of the current framework.

Information for the Manual Driver: The traditional system grants the driver complete control over the vehicle's speed. They accelerate with the gas pedal and slow down or stop with the brake pedal. Maintaining a safe and appropriate speed is dependent on the driver's awareness and judgment under this framework.

In terms of how simple the task is, programmed frameworks are advantageous; human labor won't be as reliable in this regard. As a result, our system has a number of obstacles, the good reasons for which we looked at in issue Confronted. We can modify the system to include an effective slowing mechanism in connection with the carburettor's management of wind current. The enlisted passing of taken vehicles and their contrast allow one to identify the taken car.

Neural networks can be used to increase accuracy. The system may be utilized efficiently even at night and in low light by utilizing state-of-the-art image processing libraries and algorithms. can be used as traffic counters to ascertain the number of vehicles utilizing an expressway.

Using an Android application, the license plate of a car that has exceeded the speed limit can be sent off a portable device held by local traffic police. Expanding the number of remote sensor organizations and adding new vehicle location detection organizations will be interesting applications that will open up a lot more application zones. Information security during correspondence may be one more important task for the project's future development.

Amulya A. M. et al., Intelligent Vehicle Speed Controller: The focus of this research was to prevent vehicle collisions caused by over speeding in speed-restricted areas by without fail. The RF transmitter and receiver modules as well as embedded systems can be used for this. The driver in a restricted region must manually lower the vehicle's speed when it enters the speed limit. The electronic controller would take the lead in controlling and reducing the vehicle's speed if the driver did not slow down after obtaining the signal from the transmitter in that zone. Through that when the Arduino microcontroller got a signal, it processed it and sent a signal to the motor to regulate speed. Here, the RF transmitter and receiver are primarily used to identify the limited area. [5]

Automatic vehicle speed control system: Vaishal B. Niranjane et al. They provided three distinct explanations [6] of how their method operated. zones where Zigbee technology is used to automatically lower the pace. The three are designated as normal, quiet, and speed limit zones. By using the microcontroller 8051 to reverse

the motor's rotational direction, the speed is decreased. When a car approaches a designated area, like a hospital, the Zigbee transmitter is positioned there, and the vehicle's Zigbee receiver picks up the signal. The vehicle's speed is contrasted with the posted speed limit in that region. The microcontroller acts to slow down the car if the speed is higher in that zone; if it is a quiet zone, it disables to make the signal to reduce the speed of the motor.
clinics, in areas with speed limits, etc. In today's fast-paced environment, none of the people groupings have a position [7]. Driver intervention is not required for speed control when the device operates autonomously in key zones or situations. A key component of slowing down is installing an RF receiver in the car and placing a transmitter in the vital areas. By obtaining information from the speed meter, the controlling system will calculate the vehicle's speed [8]. Recurrent neural networks (RNN) and long short-term memory (LSTM) algorithms were developed by Saleh et al. [9] to classify driving behaviors using sensors.
Convolutional Neural Network (CNN) approach of the ML algorithm was proposed by Jabbar et al. [10] to identify microsleep and tiredness. In this work, A camera can be used to detect the driver's facial landmarks, which are then fed into a CNN algorithm to accurately determine drowsiness. Here, several data sets, such as those with and without glasses for daytime or nighttime vision, are used to do the experimental classification of eye detection. Thus, it can accurately and successfully detect drowsiness using Android modules.

## III. Working Proposed Method for Automatic Vehicle Speed Control System.

For the miners' convenience, the suggested solution makes use of an external intelligent coat or wearable gadget. Unbelievably, a coat is more helpful than the continued structures that employ a cap, which might put the digger at danger at the hour of short out and harm the frontal brain. The temperature and heart rate of coal mine shaft workers are tracked using a temperature and heart rate sensor. A gas sensor will detect the leak, and the Blynk application on the Internet of Things will infer it. The flame sensor will identify the fire, and the sound sensor will notify Alert. Employees in coal mines use GPS to pinpoint their whereabouts.

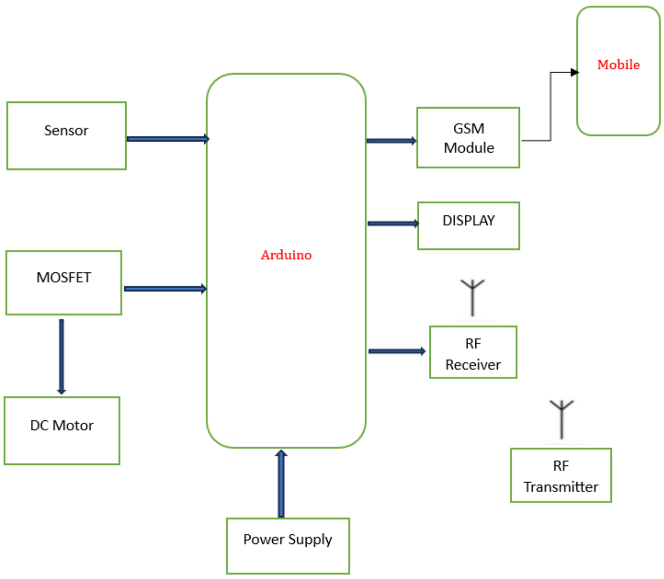


Figure 1: Block Diagram of speed controller Unit.

i. Radio Frequency Module

The radio frequency module is composed of the radio frequency transmitter and receiver. This pair runs at a frequency of 434 MHz. The RF TX accepts serial data and uses its antenna, which is linked to the fourth pin, to broadcast it wirelessly. Operating at the same frequency as the transmitter is the RF RX. When a vehicle is in a speed-restricted area or traveling at a typical pace, the RF module is utilized to indicate this [9].

ii. DC Motor

Here, the vehicle speed is shown by the DC motor. The working concept of this motor is based on the idea that a current carrying object in a magnetic field gains mechanical energy [10]. POWER MOSFET The most popular switching device is a voltage-controlled power MOSFET.

iii. Optical coupling

In essence, the opto-coupler is an LED and a phototransistor all rolled into one. An LED light source emits light when it is stimulated. The phototransistor receives the light that is emitted. After that, an electrical signal is created from a light signal.

The number of revolutions per minute of a DC motor can be indirectly determined by the electrical pulse [13].

Configuration of the Model

The suggested concept employs radio frequency (RF) communication to link[14,15] the vehicle controller system with the speed sign post. Here, a motor is used to represent a vehicle. The speed restriction for that specific route is transmitted to the vehicle system by the RF speed sign post as a vehicle approaches it. There won't be any adjustments made to the system's speed if it was traveling slower than the posted speed limit.

If the vehicle's speed was manually increased to a higher number, on the other hand, the controller will apply the speed limitation and reset the speed value to the limit. Thus, if the user attempts to If the vehicle's speed was manually increased to a higher number, on the other hand, the controller will apply the speed limitation and reset the speed value to the limit. The technology now prevents the user from increasing speed until it gets within range of the RF speed sign post. Figure 1 depicts the suggested model, while Figure 2 displays the entire hardware configuration.

Algorithm

Step 1: Get the process underway.

Step 2: Start the power that is provided to the car session, the GPS, and the GSM.

Step 3: Assign the vehicle session and pedestrian limit as the two stages.

Step 4: Designate the two locations as restricted regions and normal speed zones.

Step 5: Use GPS to locate the location.

Step 6: Use an LCD to display the message.

Step7: The speed is automatically decreased in accordance with the cap.

Step 8: The procedure returns to its initial condition when it is finished.

Step 9: Complete the process.

The Autonomous Speed Control System (ASCS) algorithm outlines a comprehensive process for enhancing driving safety and efficiency in integrated cars. The system starts by initializing the necessary components, including the vehicle session, GPS, and GSM. It then designates two distinct zones: restricted regions and normal speed zones, utilizing GPS to determine the vehicle's location. The ASCS continuously monitors the environment, displaying relevant messages on an LCD. When the vehicle enters a restricted region, the system automatically adjusts the speed to comply with the predetermined limit. Once the vehicle exits the restricted zone, the system returns to its initial state, ensuring seamless operation. This systematic approach leverages advanced technologies to provide a robust and intelligent speed control solution for the connected car ecosystem.

## IV SYSTEM OVERVIEW

Both Input and Output View the mapping between the ATmega328P ports and Arduino pins. The mapping is the same for the Atmega8, 168, and 328. Using pin Mode (), digital Write (), and digital Read () functions, each of the 14 computerized pins on the Uno can be used as an information or result. They run on five volts. As advised, each pin contains an inbuilt pull-up resistor rated for 20–50k ohms, which is default unconnected and capable of supplying or receiving 20 mA.
Concept Operational Every time the ultrasonic waves hit a barrier, they are reflected off of things, and the microcontroller is informed of this information. The motor's speed is managed by the microcontroller through the use of ultrasonic signals. The motor speed is managed by the PWM pulses shown in fig 2.

To avoid irreversible damage to the microcontroller, the maximum value that can be applied to each I/O pin is 40 mA. Interaction Several capabilities allow the Uno to communicate with other microcontrollers, a computer, or another Uno board. Sequential communication between [15] UART and TTL (5V) can be accessed by computerized pins 0 (RX) and 1 (TX) of AMega328. This sequential correspondence is channeled over USB by an ATmega16U2 on the board, which appears to programming on the PC as a virtual com port.

An external driver is not required because the 16U2 firmware uses the built-in USB COM drivers. Windows, however, need the a.inf file. You may send simple text data to and from the board using the serial monitor that comes with the Arduino IDE. When data is delivered to the computer via the USB-to-serial chip and USB connection, the RX and TX LEDs on the board will illuminate (but not for serial communication on pins 0 and 1). Any digital pin on the Uno may be used for serial communication thanks to the Software Serial library.

The ATmega328 also has SPI and I2C (TWI) communication capabilities. To enhance the use of the I2C transport, the Arduino Programming Interface (IDE) integrates a Wire library; the documentation contains further information. For SPI communication, the SPI library is utilized. Software Reset Automatically The Uno board is not meant to need to have the reset button physically pressed in order to upload; instead, software operating on a linked computer can reset it. A 100 nano-farad capacitor connects one of the ATmega8U2/16U2's equipment stream control lines (DTR) to the ATmega328's reset line. Upon the declaration of this line (taken low),

The chip is reset when the reset line reaches that position. By simply pressing the transfer button located in the connection point toolbar, the Arduino Programming Interface (IDE) makes use of this feature to enable code transfer. This means that a shorter bootloader timeout can be achieved by timing the DTR's lowering to occur at the same moment as the upload starts. This arrangement has extra implications. When the Uno is linked to a Linux or Mac OS X computer, it resets itself each time a software connection is made over USB. For the next thirty seconds or so, the Uno's bootloader is in operation. Though it's designed to disregard incorrect data (that is, anything other than an upload of new code), it will intercept the first few bytes of data transmitted to the board after a connection is made. Make sure that if the sketch receives one-time configuration or other data when it initially starts, the program it communicates with waits a second after Opening the connection and before providing his data

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## V. Experimental Results and Discussion

Results at Different Zones and Obstacles Through a GSM modem, the user's mobile phone receives the data that the speed control system has detected. incorporates the ultrasonic sensor's range

**Table 1: Experimental Results of the Proposed System**

| Zones of Obstacle/Speed Limitation | RPM | DIAMETER (cms) | DISTANCE (cms) | SPEED (m/s) | RF - SIGNAL |
|---|---|---|---|---|---|
| CAR | 140 | 4 | 238 | 0.115 | NO |
| SCHOOL ZONE | 120 | 4 | 30 | 0.13 | YES |
| PEDESTRIAN CROSSING | 124 | 4 | 60 | 0.081 | NO |
| HOSPITAL ZONE | 120 | 4 | 30 | 0.10 | YES |

The table provided showcases the different zones and corresponding parameters for the Autonomous Speed Control System (ASCS) in an integrated car. It highlights the varying obstacles and speed limitations encountered in diverse scenarios. The "RPM" column represents the revolutions per minute, while the "DIAMETER" and "DISTANCE" columns indicate the size and proximity of the obstacles, respectively. The "SPEED" column specifies the vehicle's velocity, and the "RF-SIGNAL" column denotes the presence of radio frequency signals to facilitate communication. This comprehensive data set enables the ASCS to dynamically adjust the vehicle's speed and adapt to the changing driving environment, ensuring enhanced safety and efficiency for the connected car ecosystem.

The formula is used to calculate the speed from the measured Revolution Per Minute (RPM):

SPEED= 3.14*Diameter*RPM (1) ----------------------- 1

RF signal = Speed Limit Zones (YES- Inside the Zone, No-Outside the Zone)


Figure 2: Range of Obstacle and Speed limit zone indication in LCD

If the embedded system receives the RF signal which is in the speed limit zones, LCD displays the message RF- YES otherwise displays RF-NO shown in fig 2.

The optocoupler is used to measure the motor's RPM level, which is shown. This measurement of RPM is completed by tracking the pulses per second, which is then translated into pulses per minute.

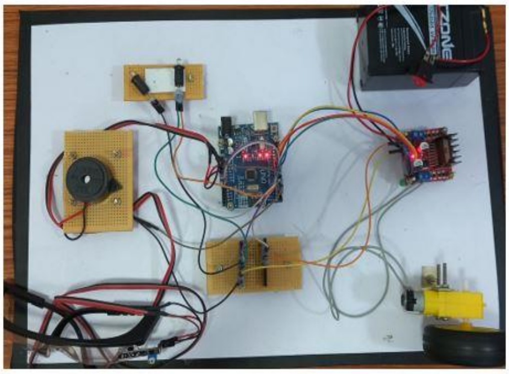

Figure 3: Experimental setup for automatic Speed control system

## VI. Conclusion and Future Work:

A unique method for improving driver awareness and street safety is the PWM-controlled DC Stuff Engine-based Programmed Vehicle Speed Control Framework with Risk Recognition and Signal Alarm. This well-organized framework supports the development of pattern-setting technologies, such as microcontrollers, sensors, PWM control, and analysis frameworks, to create a comprehensive response for managing road conditions and averting accidents. Compromise of Microcontroller: The brains behind the framework are microcontrollers. It controls several components, processes sensor data, and makes control calculations. This microcontroller-driven technique continuously takes into account clever dynamic. Information-Sorting Sensors: The vehicle's direction and speed are determined by an accelerometer, and ultrasonic sensors. For future work putting in place a wireless sensor and expanding the number of vehicle detection wireless sensing networks Another intriguing use that will lead to many more application areas is the network.

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