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# IOT SMART ZONE-BASED VEHICLE SPEED CONTROL AND AVOID ACCIDENTS USING GPS

[1]CH.GAYATRI, [2] Dr.M.RAKESH, [3]D.SNEHA, [4]L.HYMAVATHI, [5]S.RADHIKA
*[2]Associate.Professor, ECE Dept, RISE Krishna Sai Prakasam Group of Institution, Ongole 523001, AP*
*[1,3,4,5]Students, ECE Dept, RISE Krishna Sai Prakasam Group of Institution,Ongole-523001, AP*
*([1] chgayatrichetala@gmail.com; [2] rakesh.info2025gmail.com;[3] snehadepuri@gmail.com; [4] hymalaveti29072004@gmail.com;[5] sabburadhika143@gmail.com)*

**ABSTRACT**
Road accidents brought on by excessive speeding in delicate places like hospitals, schools, and emergency corridors continue to be a major global safety concern. Static signboards and driver compliance are the mainstays of current speed regulation strategies, which frequently fail to stop infractions .This study suggests an Enhanced AI-Based Vehicle Speed Control and Intelligent Braking System that uses dynamically detected traffic zones to autonomously control vehicle speed. The system divides operational areas into pre-established zones, such as emergency, hospital, and school zones, each of which has a set speed limit. To guarantee seamless and flexible speed control, artificial intelligence-based decision logic continuously monitors vehicle speed, zone data, and driving circumstances.

**Keywords:** IoT, GPS, Geofencing, Intelligent Transportation Systems, Speed Control, Accident prevention, Embedded Systems, Real-Time Monitoring

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## I INTRODUCTION

Over-speeding-related traffic accidents in delicate locations, such as schools, hospitals, and accident-prone neighborhoods, continue to be a major worldwide issue. Conventional speed control techniques rely mostly on traffic signs and driver awareness, which are frequently disregarded or overlooked. Passengers, pedestrians, and other road users are put at greater risk as a result. Intelligent solutions that automatically control vehicle speed based on location can now be developed thanks to the Internet of Things' (IoT) and smart transportation technologies' explosive expansion. Vehicles can recognize when they enter designated smart zones, such as school zones or high-risk regions, by employing Global Positioning System (GPS) technology. The car's speed is then automatically restricted by the system without the need for driver input. The suggested smart zone vehicle speed control system based on the Internet of Things. Vehicles can recognize when they enter designated smart zones, such as school zones or high-risk regions, by employing Global Positioning System (GPS) technology. The car's speed is then automatically restricted by the system without the need for driver input. By integrating GPS, integrated controllers, and wireless communication, the suggested IoT-based smart zone vehicle speed control system seeks to improve road safety. This system enforces speed limits in real time by continuously tracking the vehicle's location and comparing it with zone data that has been saved. The method helps prevent accidents and promotes the construction of safer and more intelligent transportation infrastructure by lowering human dependency and enabling automatic speed regulation.

## II LITERATURE SURVEY

To enhance vehicle speed management in restricted areas, numerous studies have been conducted. Although they were restricted to single-zone operation, early systems, including the 2013 Intelligent Vehicle Speed Control utilizing RFID, used RFID tags, readers, and microcontrollers to control speed. RF communication-based smart zone systems

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were first implemented in academic research in 2015, but they lacked automation and required manual calibration.

IoT-based zone speed control systems utilizing microcontrollers were presented in more recent research in 2023, but they encountered scalability problems when used to several zones over wide areas. Another study from 2023 showed automatic speed reduction utilizing RFID with Arduino and DC motors, however the system had a short communication range. Advanced RF-based smart zone speed retarding devices that are connected to electronic cars and the Internet of Things were created in 2024. These systems demonstrated security flaws and communication dependability problems even as they increased automation. According to the literature, the majority of current approaches rely on RF or RFID technology, which have drawbacks in terms of security, scalability, adaptability, and range. These shortcomings underscore the need for a more dependable and location-aware system that makes use of GPS and IoT to offer broad coverage and real-time speed regulation.

## III EXISTING SYSTEM

RFID (Radio Frequency Identification) technology is the foundation of the current smart zone vehicle speed control system. This approach involves placing RFID tags in certain areas, such as hospitals, schools, and accident-prone areas. Information on the speed limit for that specific zone is stored on each tag. The car has an RFID reader fitted. The reader uses radio waves to identify the RFID tag when the car enters a smart zone. The microcontroller, which serves as the system's primary control unit, receives this detection signal. The microprocessor compares the detected speed restriction with the vehicle's current speed, which is measured by a speed sensor (such as a wheel encoder). The controller alerts the motor driver to slow down by restricting the throttle or managing the brake system if the vehicle is traveling faster than permitted. The driver may also be alerted to the speed limit by a display and alarm unit.


Block diagram of vechicle speed control using RFID

Therefore, when a car enters a restricted area, the system uses RFID-based communication to try and automatically manage the vehicle's speed.

## IV PROPOSED SYSTEM

The suggested system offers a GPS-based smart zone vehicle speed regulation and accident prevention system based on the Internet of Things. It is intended to automatically control vehicle speed when it enters designated restricted zones, such as hospitals, schools, and accident-prone locations. A battery supply powers the system's GPS module, RF receiver module, microprocessor (controller), motor driver, and vehicle motors. To broadcast zone- specific information, such speed limits, RF transmitters are placed in various zones. The GPS module transmits position data to the controller while continuously monitoring the vehicle's current location. The RF receiver simultaneously gathers signals from neighbouring RF transmitters that specify the kind of zone and the speed limit that goes along with it. The controller serves as the system's central processing unit. To ascertain whether the car is in a restricted area, it examines both RF zone signals and GPS location data. The controller instructs the motor driver to lower the vehicle motors' speed by adjusting the throttle or driving power if the vehicle's speed beyond the allowed limit. Compared to previous RFID-based systems, this combined use of GPS for wide-area location monitoring and RF transmission for zone identification offers more dependable, scalable, and real-time speed control. Consequently, the suggested strategy greatly lowers the likelihood of accidents in sensitive areas and improves road

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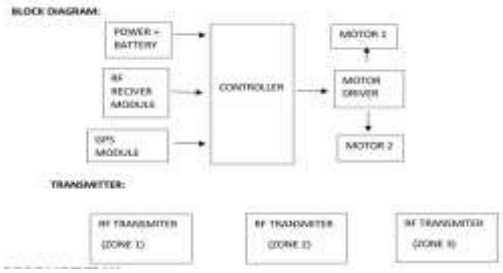
safety.

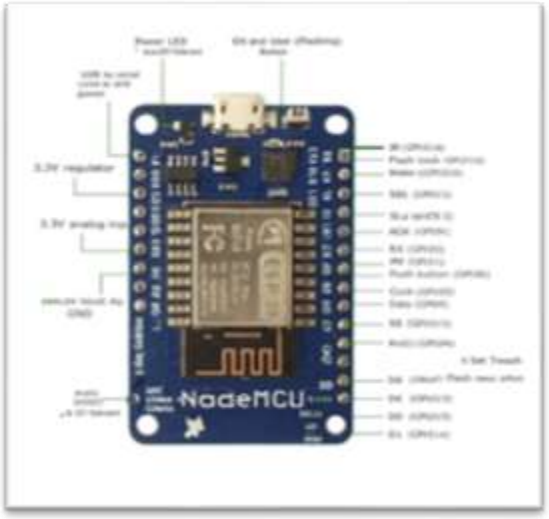
**Block Diagram:**




## V HARDWARE DESCRIPTION

### Node-MCU(ESP8266)

In order to create digital devices and interactive objects that can sense and control both physically and digitally, NodeMCU (ESP8266) is a popular open-source firmware and development board based on the ESP8266 Wi-Fi SoC. It enables rapid prototyping of IoT applications by combining a microcontroller with built-in Wi-Fi capabilities and a user-friendly programming environment.




### GPS Module

The GPS module is used to determine the real-time location of the vehicle. It receives latitude and longitude data from satellites and sends this information to the Arduino. By comparing the vehicle's position with predefined smart zone coordinates, the system identifies whether the vehicle is inside a restricted zone. This enables location-based automatic speed control


### RF Transmitter and Receiver Module:

The RF communication module is used for wireless data transmission between roadside units and the vehicle unit. The RF transmitter installed in smart zones sends speed limit or zone information, while the RF receiver mounted in the vehicle receives these signals. This improves zone detection reliability, especially in areas where GPS signals may be weak.


### Motor Driver Module

The motor driver module is used to control the speed of the vehicle's motor. It receives control signals from the Arduino and adjusts the motor speed accordingly. When the vehicle enters a smart zone, the motor driver reduces speed to a predefined safe limit, and restores normal speed when the vehicle exits the zone.

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**Power Supply**

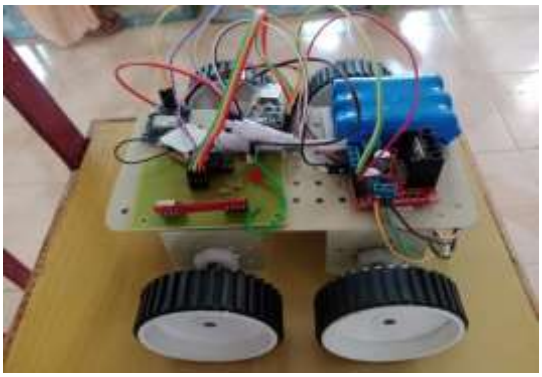
The power supply unit provides the required regulated DC voltage to all hardware components, including the Arduino, GPS module, RF module, motor driver, LCD, and buzzer. It ensures stable and reliable operation of the entire system.

**GPS Antenna**

GPS antennas enhance the performance of GPS systems by improving signal reception and accuracy with various types available for different applications. A GPS antenna is a small but essential device that receives signals from GPS satellites and passes them to a GPS receiver, ensuring accurate navigation, tracking, and timing. In India, they are widely used in vehicles, IoT projects, and embedded systems, with prices typically ranging from ₹150 to ₹800 depending on type and quality.

**Push Button switch**

A push button switch is a mechanical device tha t makes or breaks an electrical connection when actuated by pressing a button. Pushbutton switches are versatile components used in a variety of applications, from industrial machinery to consumer electronics. They offer reliable, tactile feedback and are available in numerous designs, including momentary and latching types. These switches are essential for user interfaces, allowing users to control devices with a simple press.



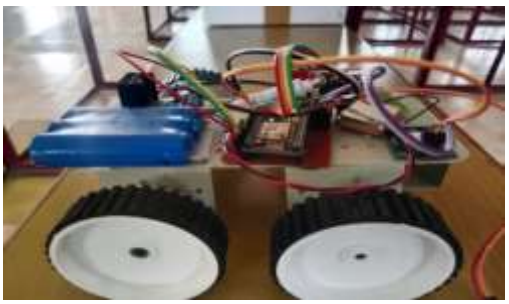


Figure1: hardware kit diagram

**VI RESULTS**

In order to assess the effectiveness of the suggested IoT-based smart zone vehicle speed control system in automatic speed regulation and accident prevention, it was tested under various simulated zone conditions. The technology used RF communication to effectively identify zone information and used GPS to precisely locate the car in real time. The controller quickly reacted by comparing the vehicle's current speed with the allowed speed limit when it entered a predetermined restricted zone. Without the need for driver intervention, the motor driver automatically lowered the

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speed if the vehicle went over the limit. The speed control transition was steady and seamless, guaranteeing safe operation without abrupt braking. When compared to independent RFID systems, the detection reliability was enhanced by the combination of GPS and RF modules. When compared to independent RFID systems, the detection reliability was enhanced by the combination of GPS and RF modules. The system's scalability and appropriateness for practical applications were confirmed by its efficient performance across several zones. Furthermore, the driver alert system improved driver awareness by giving explicit warnings prior to the application of autonomous control. Overall, the findings show that the suggested approach can lessen reliance on manual monitoring, successfully enforce speed limits in sensitive locations, and greatly aid in the prevention of accidents in smart transportation environments.

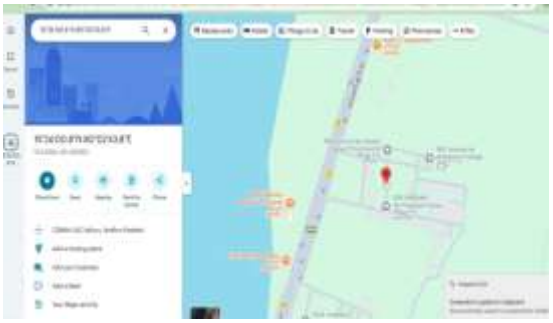

Figure 2: webpage of vehicle location tracking using gps


Figure 3: smart Vehicle speed monitor webpage

## VI CONCLUSION

At summary, In order to improve road safety in delicate and dangerous locations, this study described the design and implementation of an Internet of Things (IoT)-based smart zone vehicle speed regulation and accident prevention system using GPS. The drawbacks of conventional speed control methods that rely on driver awareness or short-range RFID technologies are addressed by the suggested solution. The technology allows for automatic and dependable vehicle speed control by combining RF-based zone identification with GPS- based real-time location monitoring. The controller uses a motor control mechanism to enforce speed limitations and continuously examines positional and zone-specific data to detect entry into restricted areas. This automated intervention lowers the possibility of accidents in school zones, hospital regions, and other vulnerable areas, assures compliance with traffic laws, and decreases human mistake. The suggested method is more suitable for widespread implementation in smart city settings and intelligent transportation infrastructures since it provides more coverage, scalability, and operational reliability than current systems. Its usability and affordability are further improved by the decreased reliance on substantial roadside gear. Cloud-based data integration, vehicle-to-infrastructure (V2I) connection, and AI-driven traffic risk analysis to enable centralized traffic monitoring and predictive safety measures are some potential future enhancements. With these developments, the suggested system might greatly aid in the creation of safer and more intelligent transportation networks.

## REFERENCES

[1] "Design and construction of an IoT-based motor vehicle security control and monitoring system with Google Assistant and GPS," Proc. Int. Joint Conf. UNESA, vol. 3, no. 1, 2025; Z.Aditya , M.Widyartono ,A.C.Hermawan , and R . Rahmadian.

[2] Int. J. Res. Appl. Sci. Eng. Technol. (IJRASET), 2025; S. Parikh, "Next-generation vehicle accident prevention and detection using intelligent control systems."

[3] "Kalman-powered tracking and geofencing," J. P. John et al., Int. J. Innov.

Sci. Res. Technol. (IJISRT), vol. 10, no. 8, 2025.

[4] Bhagwat, V. B. (2025). Simplifying Payroll Balance Conversions in Payroll Systems Implementation through the Use of Generative AI.

[5] Gaddam, S. (2025). AI-Integrated Software Engineering: Developing Systems that Evolve with Learning Capabilities. Journal of Information Systems Engineering and Management, 10(63s).

[6] Sushma Babburi. (2025). Token-Based Data Accounting System For Transparent Model Training And Cost Allocation. American Journal of AI Cyber Computing Management, 5(4), 463–474. https://doi.org/10.64751/ajaccm.2025.v5.n4.pp463-474.

[7] Vikram, S. (2025). Modernizing Data Infrastructure: How AI and ML are Transforming SQL and NoSQL Usage in Distributed Manufacturing.

[8] Geofencing in IoT: Improving location-based services, A. K. Vedantham, Int. J. Comput. Eng. Technol. (IJCET), vol. 15, no. 06, 2024.

[9] V. B. Shalini, IoT-Based Vehicle Tracking System and Global Positioning System (GPS), in Lecture Notes in Networks and Systems, Singapore: Springer, 2022.

[10] Ganji, M. (2025). Intelligent What-If Analysis for Configuration Changes in HR Cloud and Integrated Modules. International Journal of All Research Education and Scientific Methods, 13(04), 4828–4835. https://doi.org/10.56025/ijaresm.2025.1304254828

[11] Mallick, P. (2020). Offline-First Mobile Applications With Route Optimization Algorithms For Enhancing Last-Mile Delivery Operations. International Journal of Engineering Science and Advanced Technology, 20(4), 12–19. https://doi.org/10.64771/ijesat.2020.v20.i04.pp12-19

[12] Rongali, L. P. (2022). Fostering Collaboration and Shared Ownership in Globally Distributed DevOps Teams: Challenges and Best Practices. European Journal of Advances in Engineering and Technology, 9(6), 96-102.

[13] "Real-time vehicle tracking system using geofencing," R. Mishra, A. K. Tiwari, A. Singh, K. Gupta, and K. Srivastava, Lecture Notes in Networks and Systems, Singapore: Springer, 2024. https://www.ijesr.org/index.php/ijesr/article/view/1262

[14] A. V. Pugliese III, “Baggage check-in and security system and method,” Mar. 28 2000, uS Patent 6,044,353

[15] Todupunuri, A. (2024). Exploring the use of generative AI in creating deepfake content and the risks it poses to data integrity, digital identities, and security systems. Available at SSRN 5014688.

[16] J. Svec, “Methods and apparatus for luggage tracking and identification using rfid technology,” Dec. 20 2013, uS Patent App. 14/137,429.

[17] L. M. Ni, D. Zhang, and M. R. Souryal, “Rfid-based localization and tracking technologies,” IEEE Wireless Communications, vol. 18, no. 2, 2011.

[18] A. R. D. Balakrishna, “Rfid based airport luggage checking and tracking system using gsm technology,” IJSETR, vol. 03, no. 31, Oct. 31 2014.