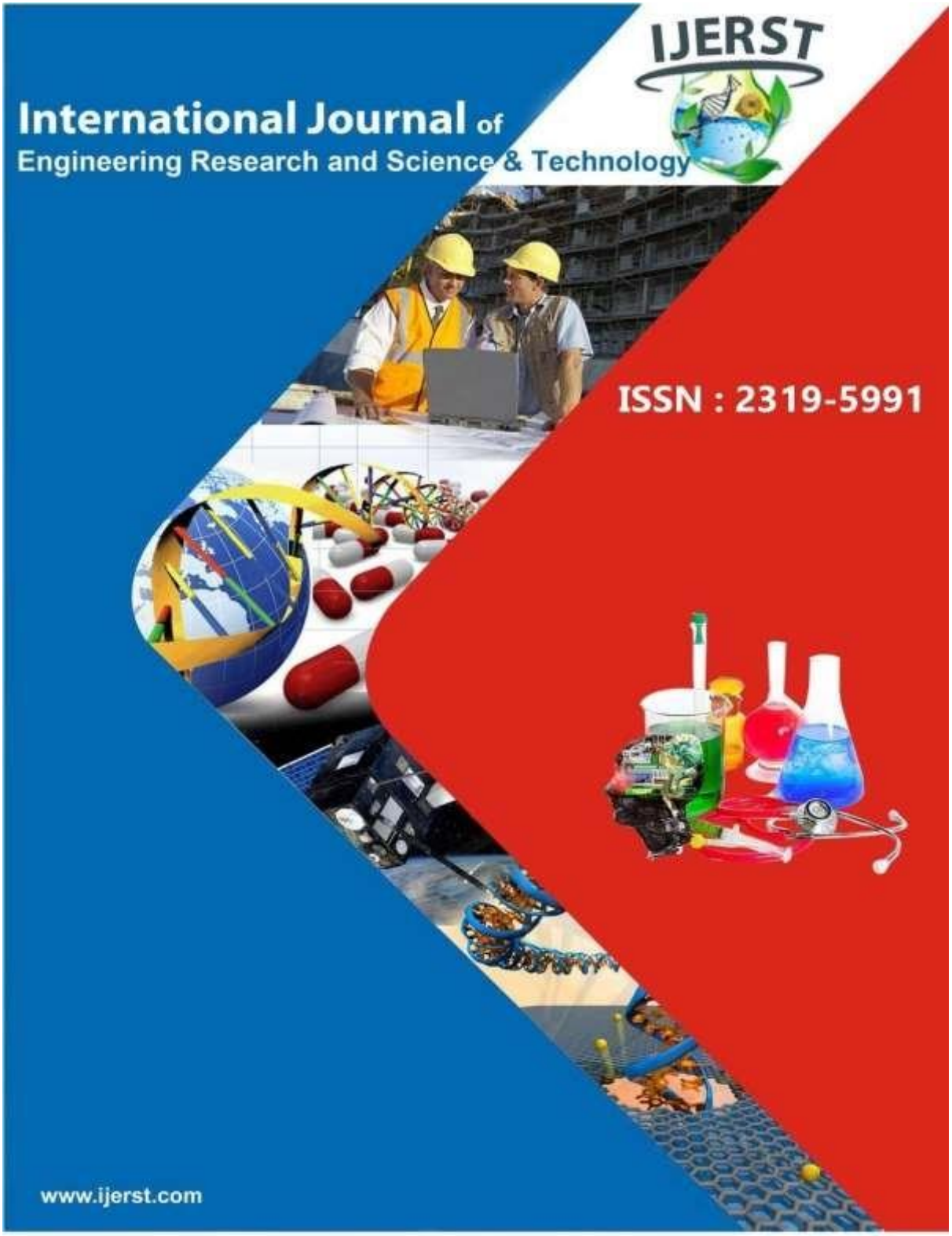

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ADVANCED TRAFFIC VIOLATION CONTROL AND PENALITY SYSTEM USING ESP32 AND IMAGE PROCESSING TECHNIQUE

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ABSTRACT

The number of new vehicles entering the road is rising quickly, which leads to extremely congested highways. Few drivers disobey traffic laws by running red lights since they can wait so long. Because to the significant increase in traffic accidents caused by this, it is crucial to automatically identify vehicles that have violated the signal. Controller-based traffic violation detection systems can automatically send information about the offending vehicle to the relevant traffic police station, allowing for prompt punishment of the offending car. The proposed system can be implemented using a vehicle ID card that is already installed in the vehicle. If the vehicle moves forward while a red light is on, vehicle information, such as the registration number, type of vehicle, owner's name, and vehicle color, will be automatically sent to the concerned authorities via concerned mobile phones.

All vehicles must be outfitted with these affordable wireless ID cards so that the vehicle data can be relayed continuously to demonstrate the concept practically. The demonstration module includes a mock road and a miniature automatic traffic signal post. The system is set up so that if any vehicle crosses the zebra lines while the red signal is activated and during this time, the system receives the vehicle data and communicates it.

The primary processor must be located close to the traffic lights because it regrettably cannot collect vehicle data while there are yellow and green signals. One toy vehicle with its wireless ID card is included in the demo module. Key construction pieces include an Arduino MCU-designed main processor, an ESP32 controller chip-designed wireless ID card, an alarm, an IR LED, a 5V power supply unit, a toy vehicle, and a simulation of a single-lane road with traffic signal posts and zebra crossings. Using radio frequency identification (RFID) technology, this project aims to create an intelligent traffic system. It is developed and operated in such a way that fines are tracked independently.

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INTRODUCTION

This project deals with providing instantaneous penalty messages to the violator about their violation. The camera is to identify the violators and for license plate recognition. The messages are sent to the respective vehicle owners through the online platform Twilio.

The social situation in India is fundamentally extraordinary because of issues, for example, neediness, and joblessness just as extensively lower in regard to rules. This makes it unfeasible to go for a programmed tollbooth. The business requires a programmed vehicle grouping framework in India not to decrease or wipe out human intercession or work, yet to guarantee that human mediation doesn't bring about any budgetary acts of neglect. The business requires a framework that runs out of sight and simply keeps a cross-beware of the manual. The conventional OCR-based methodology for number plate acknowledgment doesn't work for the varieties in the painting style of the number plates. In the proposed strategy an advanced camera is utilized to catch the pictures and concentrate highlights of the vehicle number plate. These highlights are coordinated against a predefined set of the same vehicle number plate pictures in the database. The character pictures are coordinated in a proficient way to make it a continuous arrangement.

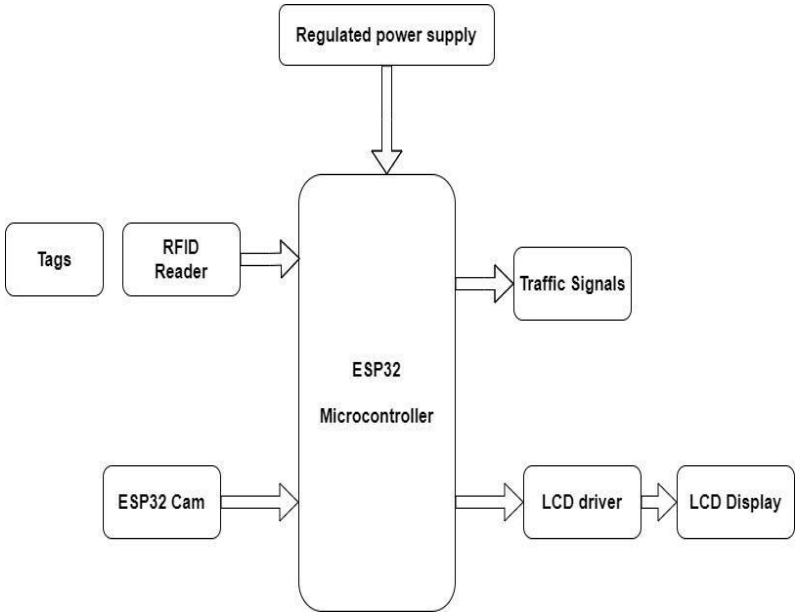

Figure.1 Block Diagram

OBJECTIVE OF THE PROJECT

The objective of this paper is to create a Real Time Traffic Accident Detection System using RFID Technologies. Based on the alert signal, the monitoring station tracks the location where the accident has occurred and directs alert to the authorities concerned. This can be done by

using embedded board, wireless module and RFID tags.

LITERATURE SURVEY

Check Journals and Conferences: Look for articles in relevant journals (e.g., IEEE Transactions on Industrial Informatics, Robotics and Automation Letters) and conference proceedings (e.g., IEEE International Conference on Robotics and Automation, International Conference on Industrial Internet of Things).

The Automatic Number Plate Recognition (ANPR) technology described in this article identifies automobiles that ignore traffic lights by reading license plate information from digital photographs. Using MATLAB software to extract the vehicle's license plate, an Arduino and GSMmodule (SIM900) are then used to send the offender an SMS within a minute of the violation. Thisbook emphasizes the tracking of traffic signal infractions and the fines that go along with them. IoT and image processing are the foundations of the strategies used to resolve these violations. Inorder to address problems like changing the license plate or disguising the Fastrack tag, RFID andimage processing techniques are coupled, for example. By providing a warning about the imposedfee, the use of GSM technology lessens the possibility that the owner of the automobile would escape penalty. Especially on highways and other roads with limited visibility, a sudden stop in traffic is a major contributing factor in car accidents. To solve this issue, static traffic sensors are commonly used, although not all highways and roads have them. The alternative solution discussedin this article, an IoT Cloud system that uses Open GTS and Mongo DB to track traffic and deliveralarms, is explored. The tool's timely reaction times enable drivers to get warnings and take actionto avoid hazardous collisions. Motorcycles are the VRUs that are most affected in cities (Vulnerable Road Users). Recognizing and properly monitoring International Journal of ResearchPublication and Reviews,Vol4,no5,pp1374-1380May.

This study focuses on the algorithms used to identify and locate motorbikes using theCCTV surveillance system. Also, it discusses the markers of present performance, publicly available data, and impending difficulties. In the end is a list of suggestions for more research. This study examines the categorization of traffic offences in Indian cities using an automated method for issuing e-challans (electronic traffic violation receipts). A temporal analysis found thatthe number of e-challans issued during festivals varied significantly, and it was found that 57% of Ahmedabad's unique automobiles are utilized in repeat offences. Also, because there are several distinct hotspots, different violation categories are allocated differently. The study also demonstrates that severe punishments may not have a long-term effect on reducing traffic offences. To keep track of traffic offences such excessive speeding, reckless driving, drunk driving, and seat

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belt violations, the police department is developing a system.

The system incorporates seat belt detection, alcohol detection, speed monitoring, anda smart device that is mounted in the vehicle. The controller sends emergency information about a rule violation to the cloud, where the RTO receives updates on the cars involved. Any of the requirements that are breached will result in a fine and notification of the Department of Motor Vehicles. RFID and ELP data are used to make short-term traffic flow forecasts more accurate formanaging collisions and urban traffic control. On an urban road segment, an extensive short-termmemory neural network with a fresh wavelet neural network (WNN) (LSTM) are merged with animproved WNN and LSTM to provide a new prediction value. More and more new automobiles are being driven on the road, which is leading to a rise in traffic accidents. Systems that identify traffic violations using computer vision are useful for decreasing violations by keeping track of them and enforcing the law. The recommended system was created using YOLOV3 object detection to track down traffic offences such signal jump, vehicle count, and speed. Detection of speed violation accuracy was 89.24%, while accuracy in detecting the number of vehicles was 97.67%.

RESULTS

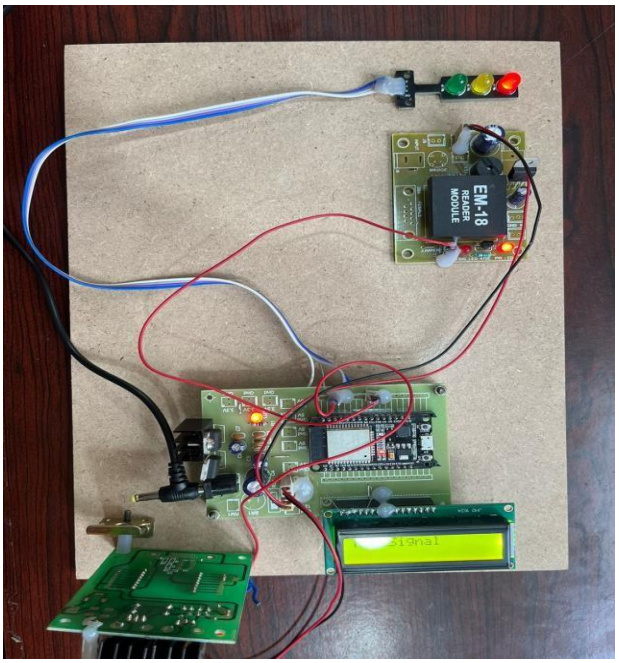

Figure.2 Practical device

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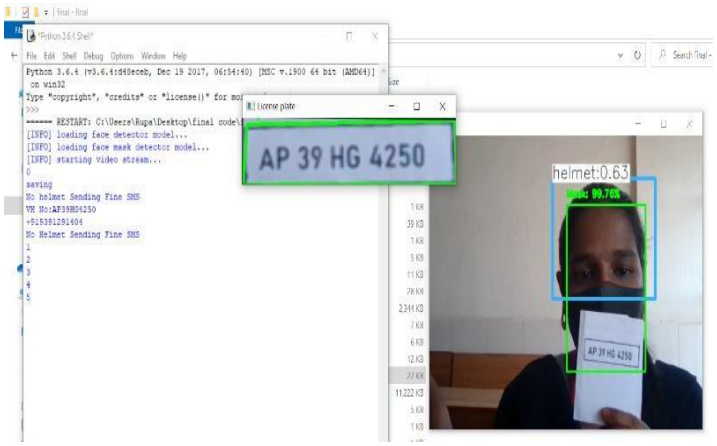

Figure.3 image capture output

ADVANTAGES

- Real-time violation detection for immediate action.
- Automated and accurate detection of violations
- Prompt notification and response to authorities.
- Improved efficiency for traffic enforcement.
- Deterrent effect on potential violators.
- Data-driven insights for traffic management.

APPLICATIONS

- Traffic management and control systems.
- Law enforcement and traffic violation monitoring.
- Smart city initiatives.
- Public transportation management

CONCLUSION

In conclusion, a new system has been created to reduce traffic law breaches, which might result in more orderly traffic around the country.

The development of an automated traffic violation detection system holds immensepotential for improving road safety and traffic management. By leveraging technologies such asRFID, image processing, and data analytics, the system can accurately identify and track various traffic

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violations, enabling timely enforcement and deterrence. The system's advantages, such as real-time monitoring, automated violation detection, and efficient data management, make it a valuable tool for traffic authorities in ensuring compliance with traffic regulations. Moreover, the future scopeof this system, including the integration of advanced AI/ML algorithms and smart communication technologies, promises even more robust and intelligent traffic management solutions. With continued advancements and implementation, this system has the potential to greatly contribute to creating safer and more efficient road networks.

After experimentation and simulation, it is concluded that the purposed method can be implemented in the existing system and provide reliable results. The purposed method shows clear scope to reduce the probability of error in traffic violation control. However, this work can be improved further by using more advanced image processing techniques and adding new features. As a result, we have developed a system that will automatically impose penalties for violations of traffic laws, resulting in more disciplined traffic in our country. We expect that these efforts will aid in the reduction of many traffic-related issues that cause disruption throughout the system, as well as the reduction of the number of accidents, traffic jams that waste our time, and pollution to some level. Our technology only monitors traffic at signal poles, but it may also be used to monitor no-entry zones, one-way routes, and other areas.

FUTURE SCOPE

Future scope of this system includes the integration of advanced artificial intelligence (AI) and machine learning (ML) algorithms to further enhance the accuracy and efficiency of traffic violationdetection. By leveraging AI and ML techniques, the system can adapt and learn from real-time data,improving its ability to identify and classify various types of violations.

Another potential future development is the integration of smart communication technologies, such as vehicle-to-infrastructure (V2I) and vehicle-to-vehicle (V2V) communication. This would enable real time communication between vehicles and traffic infrastructure, allowing for more intelligent traffic management and enforcement. Additionally, the system could benefit from the integration of automated enforcement mechanisms, such as automated ticketing or fines, to streamline the process of penalizing violators and promoting adherence to traffic regulations. RFID defence technologies and applications and use of RFID to monitor and track items safely and securing securely in the military supply chain. RFID retail technologies applications which allow retailers to improve on shelf availability increase sales cut labour costs and improve customer care. In healthcare, logistics, manufacturing, Pharmaceuticals etc.

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