IOT BASED SPEED CONTROL AND ACCIDENT AVOIDANCE USING AI ROAD SIGN

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ABSTRACT

This project aims to design and implement an IoT-based speed control and accident avoidance system using AI-powered road sign recognition. The system combines IoT sensors, AI algorithms, and vehicle control mechanisms to automatically detect road signs such as speed limits, stop signs, and hazard warnings. A camera integrated with the system captures real-time images, which are processed using AI-based computer vision techniques to identify road signs.

Upon recognizing a road sign, the system communicates with the vehicle's control unit via IoT to adjust the speed or issue alerts to the driver. The system also includes features such as obstacle detection and collision warning using ultrasonic sensors. By automating road sign compliance and accident prevention, this system reduces human error, ensures adherence to traffic rules, and enhances overall road safety. The proposed solution is cost-effective, scalable, and suitable for both autonomous and semi-autonomous vehicles.

I. INTRODUCTION

The rapid advancement of the Internet of Things (IoT) and Artificial Intelligence (AI) has opened new avenues for improving road safety and traffic management. In recent years, accidents due to speeding and failure to obey road signs have become major concerns worldwide. To address these challenges, IoT-based speed control and accident avoidance systems leverage AI-powered road sign recognition. These systems ensure vehicles

automatically detect, interpret, and adhere to road signs, preventing speeding and minimizing the risk of collisions.

The proposed system integrates IoT devices, sensors, and AI algorithms to create a smart, connected transportation network. Cameras and sensors installed in vehicles capture real-time road conditions and detect road signs using AI-powered image recognition.

II. LITERATURE REVIEW

S.NO	AUTHOR NAME	TITLE OF THE PROJECT	YEAR	DESCRIPTION
1	H. Luo, Y. Yang, B. Tong	Traffic sign recognition using a multi-task convolutional neural network	2017	Traffic sign ROIs from each frame are first extracted using maximally stable external regions on gray and normalized RGB channels.
2	Chen, T., Lu, S	Accurate and efficient traffic sign detection using discriminative AdaBoost and support vector regression’	2016	An Adaboost and support vector regression (SVR) for discriminative detector learning.
3	Z. Huang, Y. Yu, J. Gu	An efficient method for traffic sign recognition based on extreme learning machine	2017	A computationally efficient method for traffic sign recognition (TSR).
4	J. Greenhalgh and M. Mirmeh**di**	Recognizing text-based traffic signs	2015	A novel system for the automatic detection and recognition of text in traffic signs

III. EXISTING SYSTEM

The existing system focus on the accident detection method, it will send the location to the near by hospital, friends and relatives by using GSM/GPS.

Built-in speed, location, pressure, sound, and g-force sensors of the vehicle to detects the problem and reports an accident to the nearest hospital.

Also the previous fatigue method works with eye blink sensor to detect drowsiness of a driver.

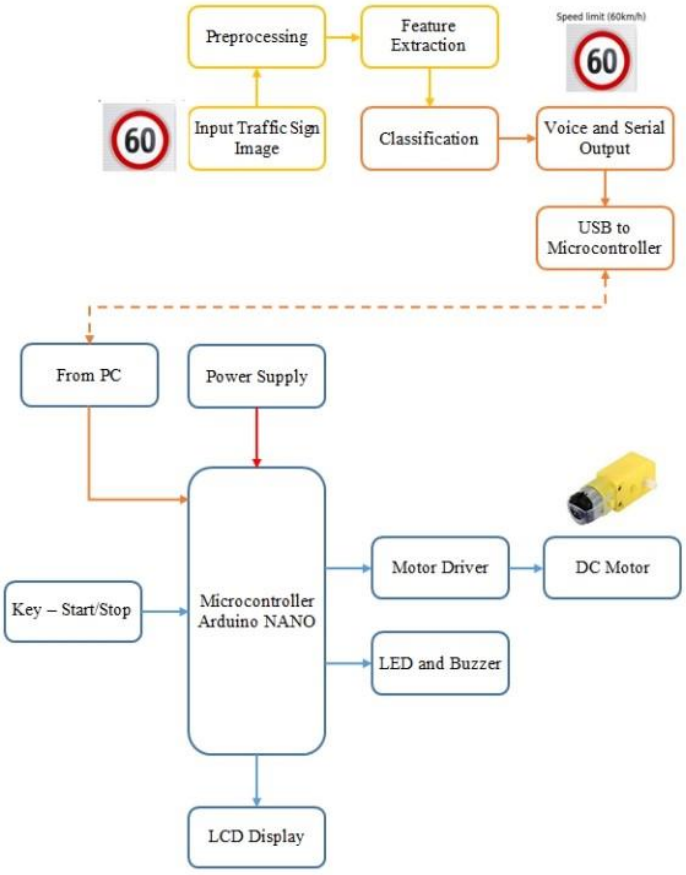

Fig 1: Basic Block Diagram Of CNN

IV. PROPOSED METHODOLOGY

• Arduino IDE

– Embedded C Programming for Microcontroller.

• Proteus 8 Professional

– Its used to draw a circuit diagram for our project

implementation.

• Python

– Traffic Sign Detection

V. ADVANTAGES

- ◆ Our system is very efficient in real time and precise in providing the service immediately after it has taken place.
- ◆ The automatic speed control which would result in the reduction of human error
- ◆ Increase in reliability also reduce the chances of vehicle collisions.

VI. DISADVANTAGE

- ◆ The system requires the driver to wear an eye blink sensor frame while driving.
- ◆ The implementation of the system have limited detection and recognition of vehicle collision.

◆ The notification were send after the accident occurred.

VII. APPLICATION

◆ Vehicle Collision Prevention and Detection
◆ Accident Avoidance in CAR and BIKE
◆ Autonomous Car Control
◆ Vehicle Traffic Sign Detection
◆ Object Detection

VIII. RESULT AND CONCLUSION

The future scope of IoT-based speed control and accident avoidance systems is expansive, potentially transforming road safety, traffic management, and vehicle automation. As IoT and AI technologies mature, these systems will become smarter, more reliable, and integral to next-generation transportation ecosystems.

IX. FUTURE SCOPE

1. **Adaptive Speed Limits:** AI-enabled road signs can dynamically adjust speed limits based on weather, traffic, and road conditions, further reducing accidents.

Real-Time Hazard Detection: Integration with IoT sensors can allow the system to detect hazards like potholes, black ice, or sudden obstacles and relay this information to vehicles instantly.

2. **Integration with Autonomous Vehicles**

Vehicle-to-Infrastructure Communication (V2I): IoT devices and AI-powered

road signs can interact seamlessly with autonomous vehicles, ensuring they adhere to traffic rules and respond to changing conditions in real time.

Predictive Navigation: AI algorithms can predict traffic congestion or hazardous conditions ahead and guide vehicles to safer and faster routes.

3. **Smart City Development:**

Centralized Traffic Management: IoT-enabled road signs can communicate with traffic management systems to optimize traffic flow, reduce congestion, and lower emissions.

Incident Reporting: AI road signs can report accidents or unusual traffic patterns directly to emergency services, enabling quicker responses.

4. **Personalized Driving Assistance:**

Driver Alerts: AI-powered systems can provide personalized alerts to drivers about upcoming sharp curves, pedestrian crossings, or speed zones based on their driving behavior.

Connected Ecosystem: Integration with wearable devices or smartphones could provide additional layers of safety, such as alerting distracted drivers.

X. REFERENCES

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