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REVIEW PAPER ON SMART GHATTRAFFIC MANAGEMENTAND NATURALCALAMITIES DETECTION SYSTEM USING IOT

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Abstract : The "Conflict Avoidance and Landslide Update System for Vehicles in Deep Curves" project aims to make driving safer in areas with sharp bends and landslide risks. By combining technologies like Arduino Uno, IR sensors, MEM sensors, and LCD displays, this system provides real-time assistance to drivers. It detects obstacles, monitors vehicle dynamics, and updates drivers about road conditions. Mountainous roads with deep curves and landslide threats present significant dangers, including reduced visibility and sudden obstructions. This project addresses these challenges by offering a comprehensive solution to help drivers navigate safely. It includes features like warning displays for oncoming vehicles, IR sensors to detect vehicles, motor-operated gates for safe passage, and sensors to detect landslides and heavy rainfall. By implementing these techniques, the project aims to prevent accidents and save lives by keeping drivers informed and alert on hazardous roads.

I. INTRODUCTION

Curved roadways in mountainous regions, known as ghat sections, present unique challenges for traffic management and safety due to their winding nature and susceptibility to natural disasters like landslides and heavy rainfall. In an effort to mitigate accidents and enhance safety on these treacherous roads, this paper proposes a comprehensive system leveraging IoT technology. The system integrates various sensors, including IR transmitters, receivers, accelerometers, rain sensors, and cameras, with an ArduinoUno microcontroller to detect and respond to potential hazards in real-time. By employing motor-operated gates, warning LCD displays. The system aims to provide timely warnings to drivers and automate safety measures to prevent accidents. This paper outlines the design, implementation, and potential impact of the proposed smart ghat traffic management and natural calamities detection system using IoT, with a focus on saving lives and improving road safety in ghat regions.

II. LITERATURE SURVEY

Much research has been carried out in this smart ghat traffic management and natural calamities detection system. One of them are given below:

In An IoT Platform for Vehicle Traffic Monitoring System and Controlling System Based on Priority is presented in this paper. The proposed method in this paper aims a system that employs an array of ultrasonic sensors to detect vehicle traffic levels at road intersections. The data from these sensors is transmitted to a web server through a Wi-Fi module, where it is analyzed and stored. The system controls traffic signals based on the detected traffic levels, prioritizing lanes with higher traffic volumes by allocating more green signal time. It provides a reliable, user-friendly, and cost-effective solution for real-time traffic monitoring and control, addressing traffic-related challenges in modern cities.

III. SYSTEM ARCHITECTURE

The system uses IoT and wireless tech for real-time traffic monitoring. Ultrasonic sensors on roadsides detect traffic levels, connected to a controller transferring data to a server via Wi-Fi. Roadside sensors at intersections prioritize lanes with higher traffic. A Road Side Unit integrates controlling units, a web server, Wi- Fi, RF transceivers, and a vehicle priority system. Traffic signal timing adjusts based on sensor data. Microcontrollers process and transmit data to the server, while RF transceivers communicate with the priority system.

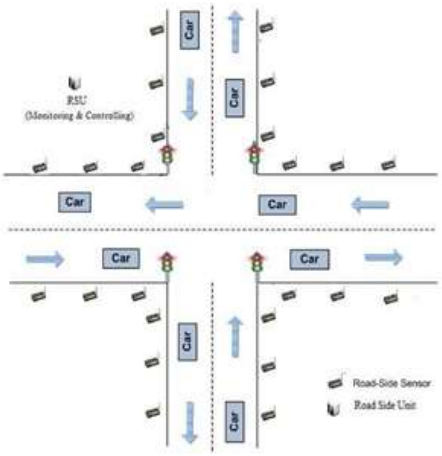

Figure 1: System Architecture

Hardware

The proposed hardware includes an array of ultrasonic sensors (HC-SR04) for traffic detection, an ARM 7 controller (LPC2138) for data processing, a PIC microcontroller for monitoring and control, a keypad for traffic status selection, a 16*2 LCD for output display, a Wi-Fi module (ESP8266) for data transfer to the Internet, and an RF transceiver (CC2500) for transmitting and receiving traffic-related messages.

Software

Real-time traffic data is analyzed using open-source IoT analytics, with ultrasonic sensors transmitting data to a server via Wi-Fi. Embedded C language is used for uploading code, enabling real-time result display and future data analysis. Monitoring, control, and priority system code is user-friendly and implemented using Keil software.

Block diagram

The system integrates ultrasonic sensors with an ARM 7 controller for input. It includes components like a keypad, RF transceiver, LED signals, LCD display, and Wi-Fi module for internet data transfer. The vehicle priority system involves a PIC microcontroller with a keypad, LCD, and RF transceiver for user interaction. The system is divided into hardware and software components.

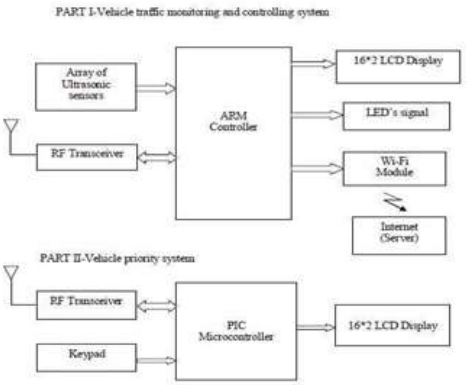

Figure 2: Block diagram of proposed system

Conclusion

The proposed real-time traffic monitoring system addresses our country's high traffic-related issues by utilizing IoT technology. It offers reliability, user-friendliness, and affordability.

Result

The system efficiently controls signal timings, prioritizing emergency vehicles, to reduce travel times, fuel wastage, and air pollution

Collision avoidance at hairpin curves using sensors aims to tackle India's high rate of road accidents, particularly on hairpin curves. These accidents often happen due to high speeds and poor visibility, especially at night. The current solution of convex mirrors helps during the day but not at night. The proposed solution suggests using sensors at these curves, which work well both day and night. Placing sensors on both sides of the curves, they trigger a light signal when a vehicle approaches within 10 meters, alerting oncoming traffic. This approach aims to reduce accidents on deep curves, improving overall road safety.

IV. PROPOSED MODEL

This project aims to prevent accidents at hairpin curves by using sensors to detect obstacles within a 10-meter range. Ultrasonic sensors are placed on both sides of the curve, with one sensor on the uphill section and the other on the downhill section. When a vehicle approaches within 10 meters of the curve, the sensors send a signal to an ESP8266 device, which triggers warning LEDs and a buzzer to alert oncoming drivers. This system helps control vehicle movement intelligently, improving safety at hairpin bends.

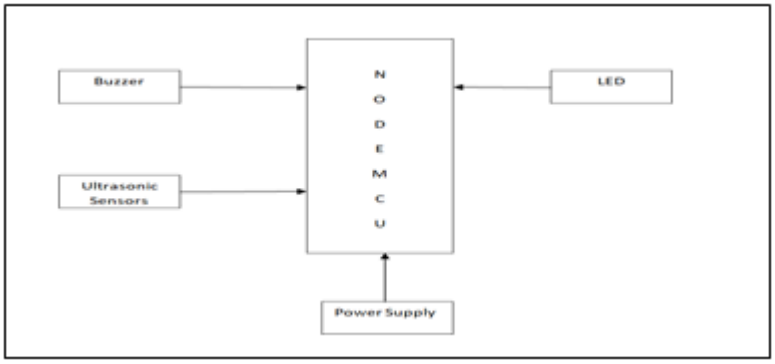

Figure 2: System Architecture

V. CONCLUSION

The Collision Avoidance System offers a promising solution to improve road safety, especially in tricky areas like hairpin curves. Traditional methods struggle to keep up with the challenges posed by growing populations. However, by combining insights from different research fields and using advanced technology, our system takes a proactive approach to prevent accidents. Looking ahead, continued research and development in this area can lead to even safer roads for everyone.

VI. RESULTS

The Collision Avoidance System, comprising NodeMcu Esp8266, ultrasonic sensors, warning LEDs, and a buzzer, was implemented successfully. Through rigorous testing and analysis, it was found to be significantly more effective than traditional traffic mirror setups. The system accurately detects obstacles within a 10-meter range of the vehicle and promptly alerts drivers with warning lights and audible signals

VII. CONCLUSION

The proposed system offers a practical solution to address the high rate of road accidents, particularly on hairpin curves, prevalent in India's mountainous regions. By implementing sensors that work efficiently day and night, the system aims to enhance road safety by providing timely warnings to drivers approaching these curves.This approach mitigates the risk of accidents, especially in low visibility conditions, ultimately contributing to the well-being and safety of individuals. Additionally, the system offers a cost-effective and feasible solution to the challenges associated with hairpin curves, potentially reducing the overall accident rate and improving road safety in India and similar regions worldwide

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