

DEVELOPMENT OF IOT BASED ACCIDENT PREVENTION SYSTEM

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ABSTRACT -

This paper leverages Internet of Things (IoT) based on Accident Prevention System, this innovative approach aims to proactively address the issue of road accidents caused by driver fatigue. The system integrates ultrasonic sensors, IoT connectivity, and real-time data analytics to continuously monitor the driver's physical condition and vehicle behavior. According to the National Highway Traffic Safety Administration, an alarming number of police-reported crashes - approximately 100,000 each year - are attributed to drowsy driving. Drowsiness ranks among the primary causes of accidents, alongside drunk driving, distractions, and other factors. Implementing sensor-based solutions could significantly mitigate this issue by detecting and alerting drivers, potentially preventing life-threatening situations. Bio-indicators can be used to detect signs of drowsiness in the driver's facial expressions and issue timely alerts to prevent potential harm. In addition, a buzzer can be activated to alert the driver if abnormal eye-blink patterns are detected.

INTRODUCTION –

The prevalence of road accidents are caused by fatigue, tiredness, and similar factors. Around 50% of these accidents are road related. They can occur due to inadequate driving practices, especially when the driver is either an alcoholic or drowsy . Driver drowsiness and intoxication have become major contributors to road accidents posing significant challenges in developing effective prevention systems. IoT-based innovations prove to be much more practical, as they operate in real-time and can transfer all necessary data without human interaction.

Fatigue continues to pose a significant safety issue worldwide, primarily due to its difficult-to-detect characteristics. In contrast to substances like alcohol and drugs, which have distinct signs and accessible testing methods, drowsiness is more complex to quantify or identify. An Internet of Things (IoT) system has been developed to mitigate the risk of accidents resulting from drowsy driving by tracking eye movements and monitoring dizziness.

We will concentrate on the issue of drowsiness, followed by examining alcohol detection and drowsiness detection. Finding a solution for drowsy driving is a new initiative that is underway. This paper discusses how IoT sensors and methods can help prevent drowsy driving, offering advanced services that can significantly change daily life. Fatigue is a safety concern that many countries have not fully addressed due to its complex nature. Unlike alcohol and drugs, which have clear signs and easy tests, drowsiness is hard to measure or detect. An IoT-based system aims to prevent many accidents caused by drowsy drivers by monitoring eye movements, dizziness, and other health factors. The primary goal of this project is to create an effective system that predicts driver drowsiness and health conditions using sensors to alert drivers and help reduce the rising number of accidents.

LITERATURE REVIEW -

Authors: Arvinda B., Chaithra Lakshmi C., Deeksha Ashutha K.

This paper presents a sensor-based accident prevention system. The system employs an ultrasonic sensor, which is also known as an obstacle sensor, to detect the presence of a vehicle before a curve. The sensor sends a pulse signal, and if a vehicle is present, the signal will hit the vehicle and be received by the sensor. This, in turn, will cause a LED light to illuminate on the other side of the curve, alerting oncoming drivers to the presence of a vehicle.

In the absence of a vehicle, the LED light will not illuminate, as the sensor will not receive a reflected signal. This system aims to enhance road safety by providing early warning to drivers, allowing them to adjust their speed and maneuver accordingly, thereby reducing the risk of accidents on curves.

The research paper titled "IoT-Based Accident Prevention & Tracking System for Night Drivers" presents an internet-based system called the "Eye Blink and Head Movement Monitoring System." This system aims to assist drivers in detecting and addressing drowsiness, thereby enhancing road safety for nighttime drivers.

RESEARCH OBJECTIVES -

The primary objective of this research is to design and develop an IoT-based petrol measurement device that provides accurate, real-time data on petrol levels in storage tanks. Additionally, the research aims to evaluate the device's performance in terms of accuracy, reliability, and cost-effectiveness compared to existing methods.

METHODOLOGY/PROPOSED WORK -

The system proposed in this document aims to reduce the frequency of numerous incidents caused by drowsy drivers. In contemporary society, driver fatigue is a significant contributor to road accidents globally. Therefore, it is essential to implement a smart alert system or vigilance mechanism within vehicles, which is the primary goal of this initiative. To assess various behavioral and visual indicators of the driver, measurements of facial movements and eye blinks are utilized to evaluate the driver's condition. In this context, particular emphasis is placed on eye blinks as a means to identify driver drowsiness.

PROBLEM DEFINITION & TECHNICAL BACKGROUND -

The IoT module or server transmits the detected data to a program script developed in Python. This particular programming language is favored for its dependable communication capabilities with the connected sensors. In the event of a vehicle crash, the relevant sensors produce data that identifies both the severity of the incident and the collision's location, which are subsequently stored in a database, the accident location is retrieved from a Google Maps link.

RESULTS & ANALYSIS -

This section presents a successful experimental outcome derived from the proposed method during driving. Drowsiness is assessed by monitoring the driver's eyes. This procedure indicates whether the eyes are open or closed, thereby supplying data regarding

the potential impact of collisions on the count.

CONCLUSION-

This research introduces an effective method for detecting driver drowsiness and assessing collision severity by integrating two systems into one non-intrusive solution. Unlike current psychological or vehicle-based methods that can disrupt the environment, this system uses a camera to monitor facial landmarks and calculate the Eye Aspect Ratio (EAR). If the EAR exceeds a threshold, the system remains unchanged, indicating the driver's eyes are open. If it falls below the threshold, an urgent alert is sent SMS to the family members. Collision severity is measured using sensors and a GPS and GSM module to track accident locations, enabling timely alerts to medical services for emergency assistance.

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