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ACCIDENT CONTROL, RECOGNITION AND ALERTING USING NOTIFICATION SYSTEM

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Abstract: To improve road safety and reduce mortality, accident identification and prevention are essential. The design and execution of an advanced accident prevention, detection, and warning system utilising an Arduino Uno and a variety of sensors are presented in this work. The system incorporates a number of sensors, such as GPS modules for recording real-time position, and exact location of the accident, accelerometers for detecting sudden impacts on the vehicle, alcohol sensors for detecting drunk and driving, and ultrasonic sensors for obstacle identification.

Keywords: Road safety, impact detection, real-time alerting, GPS tracking, sensors, GSM Modules, Accelerometer, Arduino Uno.

INTRODUCTION

Road safety has become a major worry in today's fast-paced world because of the growing number of automobiles and resulting increase in traffic accidents. Reducing fatalities and injuries requires the development of intelligent systems that can detect, prevent, and notify in the event of an accident. This project offers a useful way to improve road safety by utilising an Arduino Uno and a number of sensors to create an accident prevention, detection, and alerting system**.** The Arduino Uno is integrated with several sensors by the system to monitor and react to possible accident situations. Accelerometers for impact detection like tilting of the vehicle, GPS modules for monitoring the exact location where the accident happens. The ultrasonic sensor is used for obstacle identification. The system may automatically send notifications to emergency services and predefined contacts with the location details, detect accidents when they happen, and warn the driver of impending crashes by continuously analysing the data from these sensors. By implementing preventive measures, the system will not only lessen the likelihood of accidents occurring, but it will also guarantee prompt emergency response, potentially saving lives and reducing the severity of injuries. Arduino Uno is at the centre of this system, in it is a microcontroller that is both affordable and adaptable. It processes data from the sensors in real time and quickly takes appropriate action.

This research demonstrates how intelligent algorithms and reasonably priced technology may be used to provide a reliable solution for raising vehicle safety. It illustrates how embedded technologies and the Internet of Things (IoT) can be used to create smart transport systems, and advancing the goal of safer roads for all.

LITERATURE REVIEW

Md. Sadad Mahamud et al [1] reviewed that, in order to increase the likelihood of fewer accidents occurring on the roads each day, accident prevention systems are being introduced with accident identification for vehicles. If an accident does occur, the system will automatically locate its location and notify the appropriate parties so they can take immediate action. Here, the Global Positioning System and the Global System for Mobile Communication technologies have been used to construct an Arduino-based system. Additionally, an accelerometer will be utilized to gauge the vehicle's speed and tilt when it collides with an object. A warning will be automatically triggered if the vehicle tilts or exceeds the specified limit speed for the road.

Deepa K B et al [2] proposed that, the system offers a special way to stop intoxicated and sleepy individuals. The cars are equipped with an eye blinking sensor and an alcohol sensor as part of this system. As soon as the driver starts the car, sensors detect his eye blinks, calculate how much alcohol is in his breath, and automatically transmit a signal to the buzzer, gsm, and LCD. The microcontroller in this system receives the sensor outputs for comparison. The gsm will automatically send the SMS, the buzzer will ring, and the LCD will show the message if the value reaches the predetermined limit.

ESTHER C et al [3] are proposed survey paper in the field of IoT and its applications has overcome the problem of facing Potholes and Speed Breakers can be solved. By the review taken from above papers, Sensors are used to detect the difficulties each person is facing in day-to-day life. They concluded that in future, the methods can be implemented with

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Voice Assistant to suggest a direction to move either left or right side of a road when a Pothole is encountered and to give a voice of alert when a Speed Breaker is faced.

Prashant Kapri et al [4] reviewed that, an accident could happen in a remote location where people aren't there to report it. Recently, hardware modules integrated into high-end cars have been created to identify and record collisions. Regretfully, such Devices are expensive and stationary. They suggested a system that uses physical context information and the smartphone's built-in sensors to identify accidents. The program and the server make up the system. In addition to serving as a sensor, the program serves as an interface so that outside observers can participate. details for the accident report. For mapping purposes, the software additionally makes use of Google Maps on the smartphone. reducing the congestion around that road via live update on map about accident.

Manuel Fogue et al [5] reviewed that, based on the ideas of data mining and knowledge inference, their research suggests a unique intelligent system that can automatically detect traffic accidents, alert them via vehicular networks, and determine their severity. Their system takes into account the most pertinent factors that can describe the seriousness of the collisions (e.g., vehicle speed, type of vehicle involved, impact speed, and airbag status). According to the results, a thorough Knowledge Discovery in Databases (KDD) approach that includes a sufficient number of pertinent elements enables the creation of estimating models that can forecast the seriousness of new incidents.

Usman Khalil et al [6] reviewed that Two ultrasonic sensor modules, HCSR04 [12], are utilized in the suggested system. The car's front windscreen has one sensor module, and the rear windscreen has the other module. Next, a measurement is made of the separation between the sensor modules and the corresponding bumpers. These two distances are known as threshold distances 1 and 2. The distance between the car and any item moving away from it is always larger than the threshold distances that have been set. The processing system activates when the threshold distance is crossed and an object strikes the vehicle. Using GPS, the device instantly determines the car's location and uses GSM to relay the information to the rescue agency.

Aarya D.S et.al [7] reviewed that, according to a formula put forward by Susan Joy and Leena Thomas, car accidents rank among the top causes of death. The period between the occurrence of an accident and the dispatch of emergency medical services to the accident site is a critical factor in accident survival rates. The car itself will have an accident detection and messaging system installed, which will be useful in an emergency since it will allow emergency personnel, the police, and the hospital to be notified right away. GSM and GPS are used to operate the system. A vibration sensor uses the piezoelectric effect a material's capacity to produce an electric charge when subjected to mechanical stress to identify collisions. Upon detection of the collision, the GPS module locates the accident site and utilizes the GSM module to transmit a message to both the emergency contact and the hospital.

Rajvardhan Rish et.al [8] reviewed that, the primary reason for traffic accident deaths is the delay in receiving medical assistance. By promptly notifying the authorities and emergency contacts, this can be avoided. The system is made up of GSM, GPS, an Arduino and an accelerometer. During an accident, it notifies the closest hospital, police station, family, and friends mostly by sensing changes in the accelerometer. The Arduino and GPS module are used by the system to send a link to a Google map. With the aid of the measurement system detector, the car uses the flag bit of the Arduino UNO to indicate that there has been an accident up until it notices an abrupt departure from the threshold values.

S. Kailasam et.al [9] reviewed that sleepiness and intoxicated driving are the main causes of traffic accidents; this study suggests creating a system to avoid these situations. The system that is suggested here seeks to leveraging a night vision camera to avoid and manage accidents. When the vehicle starts, this technology keeps an eye on the driver's face, which mostly aids in ongoing observation. It has two purposes: the first is to read the blinking of the eye, and the second is to detect the blinking. Systems for automated driving and braking are in addition to a controlling system. The vehicle will automatically slow down until the driver awakens and regains consciousness.

Rohith Kumar et.al [10] proposed a system capable of identifying potholes from video feeds in real time. Leveraging the YOLO algorithm, the system processes video captured by a car's front-facing camera to detect irregularities on the road. This enables real-time identification of potholes and provides timely alerts to drivers, enhancing road safety and improving driving conditions.

From all this review that highlights the significant advancements and innovative approaches aimed at enhancing road safety. It underscores the role of IoT technologies, real-time data processing, and machine learning algorithms in creating responsive systems that can detect accidents promptly and initiate alerts to reduce casualties and mitigate risks. Despite

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these advancements, challenges such as scalability, accuracy in diverse conditions, and cost-efficiency persist, leaving room for further research.

PEOPOSED METHOD

Using a night vision camera, the system that is being presented here seeks to avoid and regulate accidents. This device primarily aids in continuous observation by keeping an eye on the driver's face as soon as the vehicle starts. It has two purposes: One to the blinking of the eye should be detected first, then read. Automatic slowing down occurs till the motorist awakens and regains awareness. The suggested system warns the motorist depending on how he feels, and ensures he is not sleepy.

Delays in receiving medical attention are the main reason behind fatalities in traffic accidents. By promptly notifying the authorities and emergency contacts, this can be avoided. The Arduino, GSM, GPS, and accelerometer make up the system. It notifies family, friends, the closest hospital, and the police headquarters during the mostly by monitoring changes in the accelerometer at the accident moment. A link to a Google Map is sent by the system with an Arduino and a GPS module.

SYSTEM ARCHITECTURE

It takes a team effort to create an accident prevention, detection, and alert system using an Arduino Uno, GPS, GSM, and other sensors, including alcohol, eye blink, and accelerometer. An overview of a high-level system architecture that will direct the creation of one is provided below:

- The Arduino Uno microcontroller is used to process and handle data coming from all the modules and sensors.
- Alcohol Sensor: To find out if the motorist has any alcohol on their breath or it will detect that the driver consumed alcohol or not.
- Eye Blink Sensor: To track the driver's eye blink frequency and identify signs of fatigue, If the driver feels drowsy it will slow down the vehicle until driver become normal.
- Accelerometer: To identify abrupt motion variations that could be signs of an impending collision.
- GPS Module: To obtain the vehicle's coordinates, to get an Exact location where the accident is taking place.
- GSM Module: To notify designated contacts in the event of an emergency.
- Buzzer: For instant notification in the event that alcohol or drowsiness is detected.
- LCD Display: To represent alerts and status in real time.
- Integration of Sensors:

  Alcohol Sensor: This device reads alcohol levels by connecting to one of the Arduino's analog pins.
  Eye Blink Sensor: This device tracks how often the eyes blink by connecting to an analog or digital pin.
  Accelerometer: Attached to the analog pins so that motion detection data on the x, y, and z axes may be read.
  The goal of this project is to create and present a portable system that locates potholes using an accelerometer and a camera installed in the suspension strut of a motorcycle. The system notifies authorities of the pothole's location by sending a text message via GSM. The primary focus of this study is the portable device's small size, which can be installed on motorcycles of any kind.

- Integration of Modules:
  GPS Module: For real-time location data, the GPS module is serially connected to the Arduino.
  GSM Module: Used serial communication to connect to the Arduino in order to deliver SMS notifications.

- Thinking and Making Decisions:
  Alcohol Detection: The buzzer will sound and an LCD alert will be shown if the alcohol sensor reading rises above a certain threshold.
  Drowsiness Detection: Sound the buzzer and show an alarm on the LCD if the blink rate of the eyes suggests drowsiness.
- Accident Detection: Take into consideration a possible accident if the accelerometer notices a sudden change in motion that is greater than a predetermined threshold.

- Notification Mechanism:

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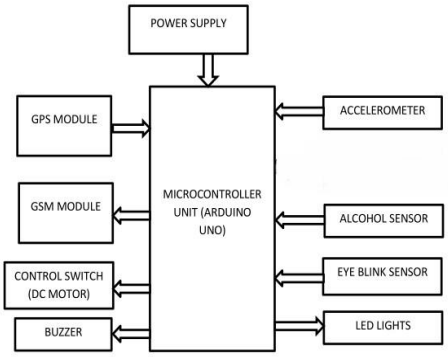
Any sensor that generates an alarm causes the Arduino to interpret the data and turn on the buzzer, which notifies the driver. To signify the specific alert (such as drinking, tiredness, or collision), the matching LED also illuminates.

- Tracking and messaging locations:
  The Arduino receives position data continually from the GPS Module. The Arduino gathers location information from the GPS Module and transmits it to the GSM Module in the event of an accident or other emergency that the sensors identify. The position coordinates and alert details are sent by SMS by the GSM Module to designated contacts, such as family members or emergency services.
  Using Arduino and a variety of sensors and modules, this design offers a thorough method for developing an accident prevention, detection, and warning system. The block diagram shows the system in detail.



Block Diagram

CONCLUSION

This system guarantees quick event identification an instant communication with drivers and emergency responders by combining real-time data recognition, timely alerts, and efficient alarm mechanisms. By allowing for prompt interventions, such a system not only lowers the possibility of serious injuries and fatalities but also promotes a more efficient traffic flow. In a larger sense, it encourages safer driving practices, cultivates a road safety culture, and is a big step toward communities that are smarter, safer, and more interconnected.

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