International Journal of Research Publication and Reviews, Vol 5, no 3, pp 1224-1230 March 2024

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

# Ardunio Based Vehicle Accident Detection Using IOT

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**ABSTRACT—**

The main cause of death in two-wheeler drivers is over-speeding, drunken driving and careless driving. Numerous lives could have been saved if emergency medical service could get accident information and reach in time to the scene. To resolve these current issues, we are developing a device which gives best solution. The objective of our project is to design a low-cost intelligent device that is capable of identifying alcohol consumption, speed detection and thereby preventing road accidents. The main purpose of this smart device is to provide safety for rider. This is implemented by using advance features like alcohol detection using alcohol sensor, accident identification using vibration sensor, location tracking using GPS and speed detection using speed detection sensor. This device has to be connected to the vehicle, so that without enabling this device, ignition switch of the vehicle cannot be power ON. If the rider is drunk and attempt to start the vehicle, the alcohol sensor will sense it and it will not allow vehicle engine to start off as the sensor will give data to microcontroller which will cut off the power to the engine. If over speed is detected, the speed sensor will sense it and it will not allow vehicle engine to start off as the sensor will give data to microcontroller which will cut off the power to the engine and thereby the vehicle will be stopped. In case of accidents, the vibration sensor will sense it and it will give data to microcontroller which will send a message automatically to their registered mobile number with their current location. It provides a feature to receive a data in IoT platform.

***Keywords— Alcohol detection, speed detection, Automatic, IOT .***

## I. Introduction

Security in automobiles is paramount, and driver alertness is a critical factor. The continuous monitoring of driver alertness is contingent on various factors, notably physical and psychological balance, despite safety considerations. Individuals facing physical or psychological challenges pose a heightened risk when driving, even with efforts to promote fitness and mental well-being. Drunken driving significantly contributes to global road accidents, with an annual increase in the accident death rate in Europe and a staggering 34.1% of accidents in China attributed to alcohol consumption. This paper focuses on detecting inebriated drivers, activating alarms for both passengers and drivers, utilizing technologies like Arduino, GPS, GSM, and an alcohol sensor (MQ3). Beyond alcohol-related accidents, the project addresses timely emergency response by integrating accident detection, vehicle location tracking, and alert message dissemination to relatives. In densely populated areas, this ensures swift alerts and specific location information to expedite emergency responses. The proposed automated system aims to enhance overall automobile safety, emphasizing interconnected modules of accident detection, location tracking, and alert messaging for family members, thus mitigating risks and improving emergency services.

## II. Literature review

[1] The literature by Kinage V and Patil P explores an IoT-based intelligent system for real-time vehicle accident prevention and detection. The research addresses the limitation of existing alternatives, proposing a mobile device-based crash notification system utilizing accelerometer and GPS data. However, a drawback is noted regarding the extended time taken to transmit accident messages.

[2] The literature by Alvi U et al. provides a comprehensive study on IoT-based accident detection systems, emphasizing the crucial need for immediate healthcare intervention during vehicle accidents. The integration of GPS and GSM in vehicles is proposed as an alert mechanism to transform conventional vehicles into smart vehicles, aiming to enhance healthcare response and reduce the overall death rate.

[3] The study by J. Haritha et al. introduces a Vehicle Accident and Alcohol Detection System, emphasizing the need for swift response during accidents. The proposed model integrates Arduino UNO, GPS, GSM modules, MEMS Accelerometer for coordinates, 16x2 LCD for displaying accident details, and an Alcohol sensor for detecting impaired driving, collectively providing a comprehensive automated alert system for emergency services and family members.

[4] The study by Panwar SK et al. explores Vehicle accident detection using IoT and live tracking with geo-coordinates. Leveraging sensors, GPS, GSM, and IoT, the system detects accidents and precisely tracks the vehicle's location through Google Maps API, facilitating rapid emergency response. Additionally, an Alcohol sensor is integrated to control engine ignition, aiming to prevent accidents caused by impaired driving.

[5] D. Mahesh Kumar et al.'s project introduces an Arduino-based accident prevention system, addressing the issue of unattended individuals post-accident. The comprehensive system integrates GPS, GSM, and various sensors to detect crashes, irregular driving, fatigue, and environmental risks, enabling proactive warnings and incident reporting. This approach fosters a preventive stance towards road safety concerns.

[6] J. Haritha et al.'s project aims to minimize rescue delays post-accident by introducing an Arduino-based automated alert system. The proposed model integrates Arduino UNO, GPS, GSM, MEMS Accelerometer, 16x2 LCD, and an Alcohol sensor for comprehensive accident detection. This aligns with literature emphasizing the need for swift responses using advanced technologies in accident scenarios.

[7] Adarsh H.J. and Bhaskar Reddy P.V.'s project addresses rising automobile mishaps by emphasizing the critical issue of delayed emergency response. Utilizing various sensors, GPS, and ANPR through MATLAB, the system aims to detect and alert authorities about vulnerabilities and accidents promptly. The implementation of GSM ensures real-time SMS notifications, presenting the project as a pivotal advancement in vehicular safety monitoring.

## III. Proposed work

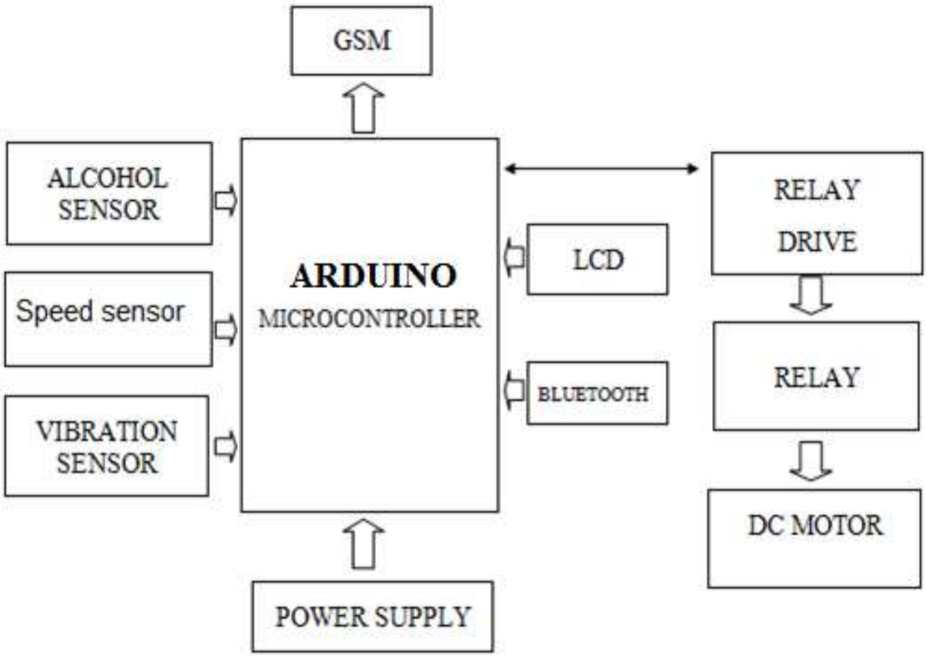



Fig. 1. Systematic Block diagram of Proposed work

The envisioned system represents a pioneering approach to driver safety, centered around a helmet-based model designed for both accident detection and monitoring of risky behaviors. Upon the wearer donning the helmet, the integrated system springs into action. A built-in vibrator sensor discerns vibrations indicative of a crash or collision, with the system promptly categorizing the incident based on the intensity of these vibrations, ensuring accurate accident detection. In the event of an accident, the system swiftly deploys a warning message to nearby locations or hospitals via an encrypted directory, facilitating expedited rescue operations.

Moreover, the alert message not only relays the live location of the accident but also provides the capability for remote viewing through the Internet of Things (IoT). This real-time visibility empowers emergency services to respond promptly and effectively. Additionally, the system incorporates advanced features for detecting instances of drunk driving or surpassing speed limits. In such scenarios, automated messages detailing fines for speeding are instantaneously sent to the driver's registered number, introducing a proactive mechanism to address and discourage unsafe driving practices.

By seamlessly integrating sensor technologies, real-time communication, and IoT functionalities, the proposed system emerges as a holistic solution to revolutionize accident detection, emergency response, and the monitoring of driver behavior, contributing significantly to the creation of a safer road environment and expediting critical emergency assistance.

*A. Arduino Atmel*


Figure:2 Atmel

*The Atmel AT89S52, an 8-bit microcontroller in the AT89 series, offers 8 Kbyte of embedded Flash memory and 256 bytes of RAM, showcasing low-power, high-performance features. Its in-system programmable Flash memory, compatibility with the 80C51 instruction set, and on-chip reprogramming make it a flexible and cost-effective solution for embedded control applications, bolstered by the combination of in-system programmable Flash memory and a versatile 8-bit CPU for enhanced adaptability and power in circuit development.*

*B. Bluetooth module*


Figure:3.Bluetooth Module Hc-05

*The Bluetooth module HC-05 operates as a MASTER/SLAVE module with a default factory setting of SLAVE; the configuration of its role (Master or Slave) is possible only through AT COMMANDS, where the slave modules can't initiate connections but can accept them, and the master module has the capability to initiate connections, making it suitable for various applications such as serial port replacement in MCU-GPS or PC-embedded project connections.*

*C. Vibration Sensor*


Figure:4. Vibration sensor

The vibration sensor detects vibrations in its environment and produces a digital output signal based on the presence or absence of vibrations. It acts as a switch, triggering the Arduino when vibrations are detected.

*D. Alcohol Sensor*

Figure:5. Alcohol sensor

The alcohol sensor is an electronic device that detects the presence of gases in the surrounding environment. Typically, it works on the principle of gas absorption causing a change in conductivity, which is then converted into an electrical signal. This signal is processed by the Arduino to determine the gas concentration.

*E. Relay*


Figure:6. Relay

A contactor is a high-power relay designed for direct control of electric motors, while solid-state relays utilize semiconductors for switching in power circuits, and calibrated relays with multiple coils protect electrical circuits from overload or faults, with modern systems using digital instruments termed "protective relays."

The DC motor is the device being controlled in the system. It is connected to a relay module, which acts as a switch controlled by the Arduino. When the Arduino sends a signal to the relay, it either opens or closes the circuit, turning the motor on or off

*F. IOT Platform*

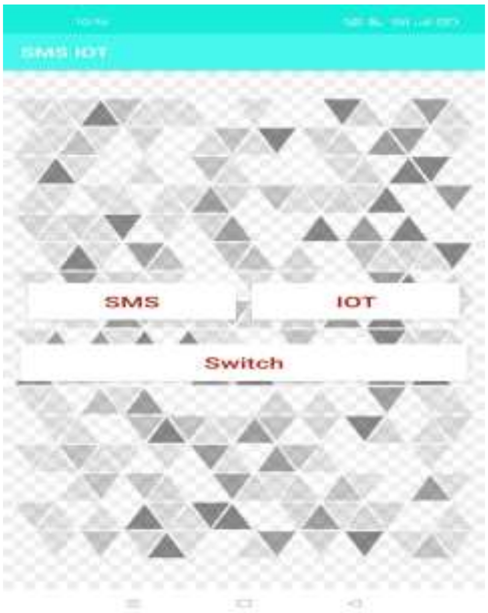
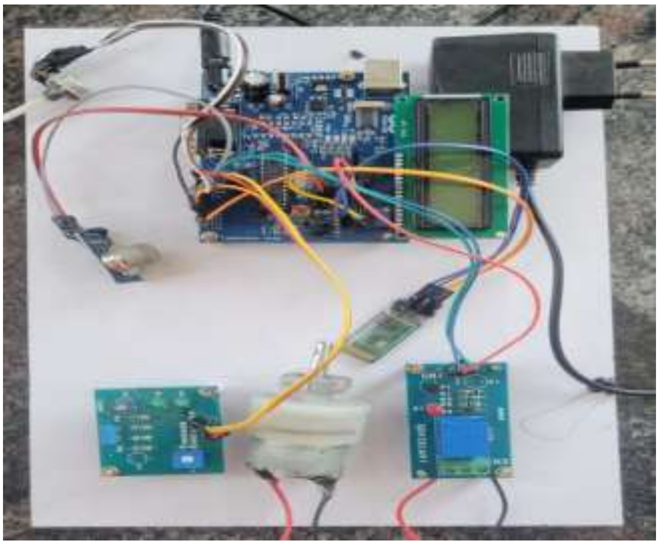



Fig 7 : Connect Page To The IOT


Fig 8 . Real time SMS based monitoring

A web page is used to provide a suitable interface between the user and the Microcontroller Based Swapping Of Batteries For Electric Vehicles with health condition monitoring System. A particular IP address is provided for the particular industry and this IP does not change as it is hosted on Amazon Web Server. The screenshot in Figure 4.8 depicts the connecting page as seen on the user's mobile phone. The screenshot shown in Figure 4.9 is the home screen that is displayed once login is successful. This contains the different columns representing different data. This is continuously updated every second and keeps track of previous data too server.

**Detailed Operation Flow**



**1.1 Initialization:**

Upon startup, the Arduino initializes all necessary components and pins.

This includes setting the gas sensor pin as an analog input, the vibration sensor pin as a digital input, and the potentiometer pin as an analog input.

It also initializes the motor control pin connected to the relay module as an output.

**1.2 Continuous Monitoring:**

The Arduino enters a continuous monitoring loop where it reads sensor data and adjusts motor speed accordingly.

It reads analog signals from the gas sensor and potentiometer, and digital signals from the vibration sensor. Sensor readings are processed to determine gas concentration, vibration presence, and motor speed.

**1.3 Speed Control:**

The Arduino maps the analog signal from the potentiometer to a range of motor speeds. This mapping allows the user to control the speed of the motor by adjusting the potentiometer. The mapped speed value is then used to control the motor's speed through PWM (Pulse Width Modulation) output.

**1.4 Over-Speed Monitoring:**

The Arduino compares the current motor speed with a predefined maximum speed threshold. If the current speed exceeds the threshold, indicating over-speed, the Arduino takes corrective action. It triggers the relay to turn off the motor, preventing any potential damage or hazards due to excessive speed.

## IV.RESULTS

The implemented system was tested efficiently and tested for proper working. The initialization of the IOT and working of the sensors were verified. Messages were obtained after each alert and corresponding data uploaded on to the cloud storage

## V.CONCLUSION

This smart safety device enables users to control the vehicle unit easily, it reduces the nuisance caused by a drunken driver. Also, it adds on to the preventing of any unwanted accidents that happen due to alcohol consumption or due to the negligence by the rider. It acts as a safety measure to the rider; it significantly reduces the accident possibilities. The user has to enable the device to ride the vehicle, and hence, traffic rules will follow with this. This easy and efficient functioning system provides better safety and security to the riders.

## FUTURE SCOPE

Further, this technology can be implemented with deep learning algorithm to predict the accident chances and to curtail the accident before it happens. The system can be further improved by incorporating machine learning algorithms for more accurate predictions of collision detection. Additionally, our project can be extended to include more advanced features such as predictive maintenance, driver behavior analysis, and traffic management. The data collected by various sensors can be analyzed to predict potential maintenance issues and alert the driver before any major breakdown occurs.

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