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Iot based Collision Detection System

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***Abstract*— An accident is an unpredicted and unintentional event. Considering the alarming increase in the number of vehicle and the number of accidents happening in or country, this system aims at providing early detection of accidents and communicating the information immediately to provide quick assistance for the injured person. When the rider met with an accident and the helmet hits the ground, the vibration sensor which is embedded in the helmet or the top of the roof of an car, which senses the vibration frequency and transfers the value to the ESP32 module that is interfaced to it. While flex and mems threshold frequency exeeds the programmed maximum limit, the ESP32 board extracts GPS data from the GPS module and the notification with all the necessary information is sent quickly to the registered emergency contacts of the rider. The results give exact locations of the accident and also this system is enabled with the theft control using IOT technology.**

***Keywords*— GPS, Internet of Things, Push button, ESP32 module, mems, Flex Sensor.**

I. INTRODUCTION

Total count of registered motor vehicles in India is more than 21 million as per the report of 2015. The numbers of car users in India are 22,536,000 and around 17.6 million two-wheelers were sold to the customers in 2017. In India, 1214 road crashes occur every day. Out of total road crash deaths, 25% of them are two-wheeler accidents. Recent survey states the maximum number of road crash injuries occur in the state Tamil Nadu. Figure 1 depicts the Accident report of Indian Roads in the year 2016. One death occurs every four minutes due to a road accident in India[1].

Government of India revealed that more people died on road accidents in 2016 as compared to 2015 based on the survey published by transport research wing under ministry of road transport and highways. As per the data, 413 people died every day in 1,317 road accidents. Also, the data shows that at least 17 deaths occurred in road accidents every hour. Internet of things has now become an essential part in our day-to-day life. The usage of electronic and digital devices is increasing more than 13 billion, in equals of 2 devices per person. Suitable example for the IoT is “SMART HOME”, the smartest devices are developed with programmable and remote-controlled appliances. Future growth in IoT is basically from every sector of the economy like commercial, industrial, health care and public safety[2].

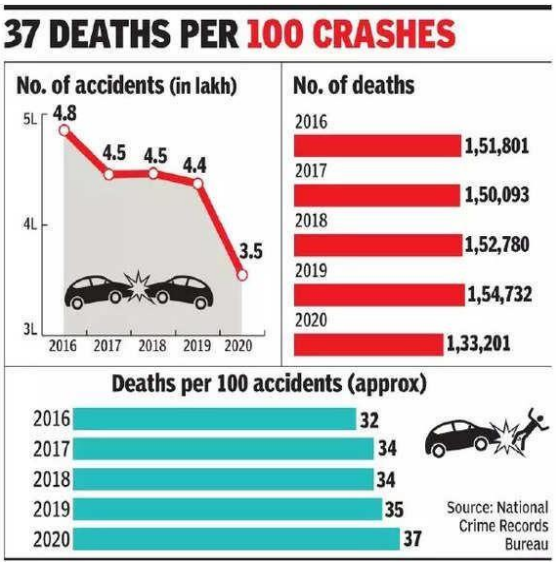

Fig .1. Accident report of Indian Roads

Existing System – In this existed system the device is implemented by the use of vibratory sensors without any detecting sensors. Because of this there will be no proper indication whenever accident occurs. As well as there will be no proper indication whenever rider is drunk. So to overcome this proposed system is implemented[6].

II. METHODOLGY

A. Vehicle Accident and reporting

During a road accident, locating the victim and informing their family and medical aid teams can be a daunting and time-consuming task. The victim's personal information is often not readily available, which can cause significant delays in the provision of medical assistance. This project aims to develop an IoT-based detection and reporting system that can quickly locate the victim and notify relevant parties of the accident's details. The system's unique feature is its ability to pinpoint the victim's location using a GPS module embedded in the car. An ESP32 module is used in conjunction with flex and mems sensors to detect and measure the intensity of the accident. The ESP32 module is

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programmed with a unique code to set a maximum stress limit threshold for the sensors. Once this threshold is reached, the system is triggered, and the GPS module sendsa signal to the victim's concerned family members and medical aid teams [5].

III. IMPLEMENTATION

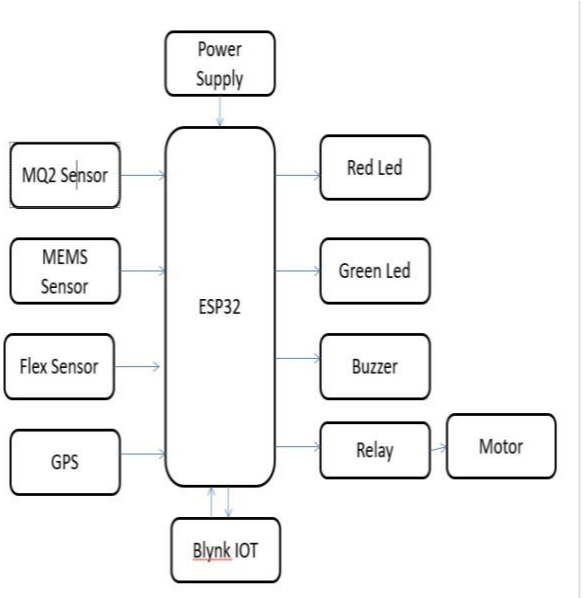

Fig.2.Block Diagram

IV. SYSTEM ARCHITECTURE

The system utilizes cost-effective, lightweight, and user-friendly components, enabling real-time device utilization for optimal efficiency. An accident detection system using IoT typically consists of the following components.

- *Vehicle Integration:* MEMS, Flex Sensor, and MQ2 Sensor are embedded in the vehicle's roof (MEMS) and bumper (Flex Sensor and MQ2 Sensor). These sensors monitor their respective parameters continuously.
- *ESP32 Module:* ESP32 board interfaces with the MEMS, Flex Sensor, and MQ2 Sensor. Monitors the sensor values and compares them to a programmed maximum limit.
- *GPS Module:* ESP32 board extracts GPS data from the GPS module installed in the vehicle.
- Emergency Response: The system alerts nearby medical services or emergency contacts about the accident. Notifications can be sent via SMS, email, or through a dedicated mobile application.

V. APPLICATION ARCHITECTURE

1. Create a user interface (mobile app or web app) for users to interact with the system.
2. Allow users to create accounts and manage their profiles.
3. Collect data from the vehicle sensors (MEMS, Flex Sensor, MQ2 Sensor) and send it to the server.
4. Process the sensor data and compare it against
5. thresholds to detect accidents.
6. If an accident is detected, extract GPS data and send notifications with accident details and location to emergency contacts.
7. Optionally, analyze historical data to improve the system's performance.

VI. WORKING

When the rider met with an accident, the mems, Flex sensor and MQ2 sensor which is embedded in the vehicle at the top of the roof of an car and bumper of the vehicle, which senses the frequency and transfers the value to the ESP32 module that is interfaced to it. While these sensors threshold frequency exceeds the programmed maximum limit, the ESP32 board extracts GPS data from the GPS module and the notification with all the necessary information is sent quickly to the registered emergency contacts of the rider. This system assures to provide immediate assistance to the victim of the accident. The user can also control the ignition of the vehicle from anywhere in the World by using relay. The main goal of the system is to alert the nearby medical services about the accident so as to provide immediate medical aid. This system can be used for all the Vehicles[7].

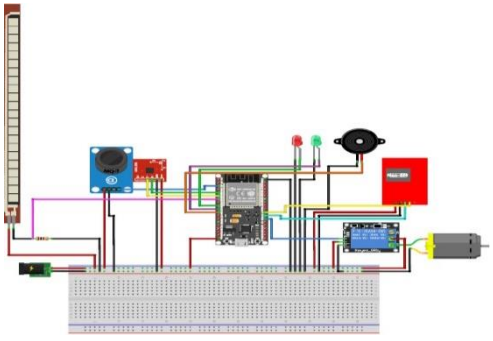

Fig.3. Construction

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VII. RESULT

The ESP32 board, with its efficient capabilities, is able to extract accurate GPS data from the GPS module. This data is then promptly utilized to notify the registered emergency contacts of the rider. The primary goal of this system is to ensure immediate assistance for anyone involved in an accident. The system quickly sends out notifications to the registered email addresses of the emergency contacts. By doing so, it effectively reaches out to the designated individuals who can provide necessary aid or take appropriate actions. These notifications are carefully designed to include all the crucial information about the incident, ensuring that the emergency contacts are well-informed and can respond accordingly.

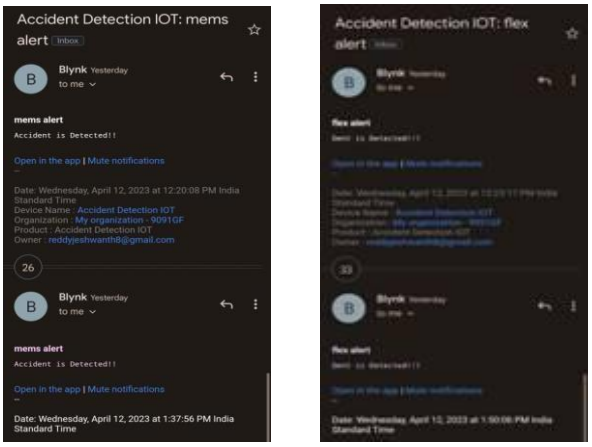

Fig. 3. Email Alert

Fig .4. Blynk App

In addition to notifying the emergency contacts, the system also takes proactive measures to alert nearby medical services. This ensures that medical assistance can be mobilized as soon as possible. By leveraging the GPS data, the system is able to determine the precise location of the accident and promptly communicate it to the relevant medical services or emergency responders. This enables them to quickly reach the scene of the accident and provide the necessary medical aid. Overall, this system acts as a reliable and efficient means of providing immediate assistance to accident victims. It leverages technology, such as the ESP32 board and GPS data, to swiftly notify the registered emergency contacts and alert nearby medical services, ultimately ensuring the prompt arrival of assistance in critical situations.

VIII. CONCLUSION

In conclusion, the accident detection system using IoT with sensors like Flex, MEMS, MQ-2, and GPS operating on Blynk app is a crucial technological advancement that enhances road safety. The integration of these sensors enables the detection of potential accidents by monitoring changes in the vehicle's orientation, gas or smoke detection, and any dents that may occur. The Blynk app plays a significant role in alerting emergency contacts in real-time through message and email notifications in case of an accident.

This system is designed to minimize response time during emergencies, which can ultimately save lives and prevent additional damage to vehicles.Moreover, this system's real-time monitoring of the vehicle's location through GPS enhances tracking and recovery in case of theft or loss. With its accurate and sensitive GPS signal acquiring device, the system can provide the vehicle's precise location, enabling quick retrieval.

IX. FURTHER SCOPE

An IoT-based collision detection system for vehicles has a range of compelling possibilities. Firstly, it facilitates vehicle-to-vehicle communication, enabling real-time exchange of collision data to warn drivers about potential accidents or hazards. This promotes proactive responses and enhances road safety. Secondly, by integrating with existing vehicle safety systems like airbags and automatic braking,the system improves their efficiency during accidents, minimizing injuries and damages. Lastly, leveraging predictive analytics through analysis of historical collision data, the system can identify high-risk areas, road

conditions, or driver behaviors, allowing for proactive measures to prevent accidents. These advancements contribute to a safer and more secure transportation environment for all.

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