

# IoT Based Advanced Accident Detection, Alert and Prevention System

Meena L U<sup>1</sup>, Rakshitha M R<sup>2</sup>, Sahana J K<sup>3</sup>, Sahana R<sup>4</sup>, Rekha P S<sup>5</sup>

<sup>1,2,3,4</sup>Student, Department of Electrical and Electronic Engineering & SJBIT, Bengaluru, 560060

<sup>2</sup>Assistant Professor, Department of Electrical and Electronic Engineering & SJBIT, Bengaluru, 560060

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**Abstract** - In the current day-to-day life, the rapid increase in the accidents can be seen. There is an increase in vehicles usage, due to increase in employment. This has led to the occurrence of accidents. Nowadays, due to high speed, the lives of the people are under risk, because of unavailability of immediate medical assistance. An alert system for detecting vehicle accidents has been introduced to reduce the rate of accident in our country. The motto is to send the message and location to the registered mobile number when the accidents takes place. This will happen with the help of Node MCU module. Mem sensor, the device which is used to detect the accidents in the proposed module. In case of remote areas where there is no availability of network, buzzer and indicators works as indication of an accident.

The amount of alcohol consumed by the driver can be detected with the help of gas sensor. Since it detects the presence of alcohol from the person's breath, it is known as breath analyser. In addition to this, heart rate sensor and temperature sensor (LM35) are used to monitor the victim's health condition

**Key Words:** IoT, node mcu, accelerometer, accident detection, Bluetooth, alert system, android application.

## 1. INTRODUCTION

The upcoming technology deals with Internet of Things. This IOT technology helps in connecting physical objects and exchanging the messages among themselves without any involvement of humans.

Nowadays along with the economic and population growth rate, there is a simultaneous rapid growth in the usage of vehicles. Due to road accidents, the death rate has been increased. 25% of the road accidents are on account of two wheelers. Lack of immediate medical assistance has led to increase in number of deaths in road accidents. With the increase in immediate medical assistance, the fatality rate due to accidents can be reduced. Thus, in order to detect the accident and its seriousness, accident alert system has been introduced. In this model, a budget friendly alert system has been introduced to provide immediate medical aid by sending message to the registered mobile number with the real-time data of heart beat and temperature. The location of accident is also sent through telegram.

In this system, we also have accident prevention system like LDR, gas sensor, Brake sensor and IR sensor which prevents accident by alerting the driver with a buzzer. The gas sensor (alcohol detector) acts as breath alyser detects the consumption of alcohol by the driver and displays alcohol detected. LDR is used to control the headlight (LED) intensity. if the high intensity light is detected the LDR senses and makes the light dim.

The close proximity of the object will be detected with help of IR sensor. If any object is in close proximity for example, that is within 5 cm then the LCD displays object is detected also alerts the driver with buzzer. If there is any brake failure in the vehicle then the brake sensor alerts that driver and stop the vehicle. Mem sensor helps in detecting the accident precisely. This also helps in knowing the angle of tilt of the car via the message. In this way we can detect, alert and prevent the road accidents using IoT technology.

## 2. LITERATURE SURVEY

This paper offers a number of different ways to both the public as well as private sectors using IoT technology. An immediate notification in response to the scene can be sent using IoT. With the help of a mem sensor and a node mcu module alert message along with current location will be sent to the registered mobile number. The message will indicate the severity of the accident. Using node mcu coordinates, the ambulance will be notified with the accident spot quickly [1].

The main objective of this system is to increase the chances of life of a person met with an accident. This device helps the paramedics to reach to the accident location within the minimum time frame as it provides the alert message as soon as the accident occurs. Accelerometer as it facilitates in identifying the vicinity. Given x, y, and z direction coordinate values in cycle per second. If on the detection of any accident, and also the movement of the vehicle is larger than the predefined worth within the code, then it'll set the condition to true and also the code written for initiating the SMS alert gets initialized [2].

The Accident Detection System consist of a module. The main objective of the system is to detect the accident using accelerometer, to alert the driver using buzzer and indicator and also to prevent the accident using IR, LDR, Brake sensors. If the accident has occurred, through telegram using NodeMCU, notification in terms of message is sent to the registered mobile number [4].

## 3. OBJECTIVES

To provide immediate treatment by monitoring the victim's health condition such as temperature and heart rate at the same time using a temperature sensor and a heart rate sensor while transporting the victim to the hospital. To send real-time data from the victim to the hospital, so that the victim can be treated as soon as he or she arrives, with no delay.

Using NodeMCU, notify the victim's relative via text message. To prevent the accident by alerting the driver about alcohol consumption, brake failure, near object detection. If the high

intensity light is detected the LDR sensor senses and makes the light dim and vice versa.

#### 4. SYSTEM COMPONENTS

##### A. Arduino Uno

Six analogue inputs, a sixteen MHz quartz crystal, a USB connection, a power jack, and a reset button are all included in addition to the 14 digital pins, six of which can be utilized as PWM outputs. The key command station for signaling an accident is the Arduino Uno. It gathers information from memory sensor, infrared sensor, alcohol sensor, brake sensor, LDR, and Nodemcu, and then displays the results on a display or sends a text message.

##### B. DC motor

Any electrical device that transforms direct current electrical energy into mechanical energy is referred to as a DC motor. The majority of DC motor types have an internal mechanism, either electronic or electromechanical. DC lighting power distribution systems are now used to power DC motors. While designing the shaft it should be properly fitted to blade. The shaft has height of 63cm so as to easily fixed between the wheels.

##### C. H Bridge

An electronic H bridge circuit modifies the polarity of a voltage provided to the load. An H Bridge is a group of 4 switches that have been put together to allow for the decoupling of any load impedance from a DC power rail and ground. The circuits are frequently employed in numerous applications to enable the forward or reverse operation of direct current motors.

##### D. NodeMCU

NodeMCU is an open source platform built on the ESP8266 that connects to the object and enables protocol-based data transfer. Additionally, by offering some of the key microcontroller functionalities, such as GPIO, PWM, etc. Sending a series of instructions to the Arduino board's microcontroller allows us to direct it what to do. The Arduino IDE Software can be used to achieve this.

##### E. Buzzer

A buzzer is a compact and effective part that enhances our system's audio capabilities. The two-pin structure is incredibly tiny and modest.

##### F. Gas sensor

The Gas Sensor useful for detecting Alcohol, Benzine, Hexane, LPG etc. The output of this sensor is in analog form. This needs to be connected to any one Analog socket. It is possible to connect the Gas sensor to Arduino Uno directly by using jumper wires.

##### G. Heartbeat sensor

A heartbeat sensor is a piece of technology that monitors the heartbeat (speed of the heartbeat). A sensor and a control circuit make up the heartbeat sensor. The sensor portion of this sensor is made up of an IR, LED, and photo diode that are all mounted on a clip.

##### H. Mem sensor

The Mem sensor (ADXL335) is a comprehensive 3-axis, low power, tiny, thin accelerometer with voltage outputs that depend on signals. The suspended mass produces the difference in electric potential when the sensor tilts. A change in capacitance is used to determine the difference in electric potential.

##### I. LDR

A Light Dependent Resistor is an equipment which has a variable resistance that varies with the light intensity.

##### J. Brake sensor

The brake sensor precisely informs the driver about the current condition of the vehicle's brake pad. Anchored to the brake pad, one sensor for the rear and one sensor for the front axle has to be installed to decide and indicate the replacement by the driver.

##### K. IR sensor

An IR sensor act as vicinity sensors. These are usually used in obstacle detection systems.

##### L. Temperature sensor

An electronic device, such as a thermocouple or a resistance temperature detector, known as a temperature sensor, that measures temperature and transmits that information in readable form via an electrical signal.

##### M. LCD

LCD (Liquid crystal display) is a sixteen-pin device which has two rows that can display sixteen characters each.

##### N. LED

LED is an electronic device which are tiny, powerful lights that are used in multiple applications.

#### 5. PROPOSED MODEL

If the power supply is given, the system starts to move and the LCD displays accident monitoring system the Heartbeat and temperature of the driver will be monitored. If an accident has happened, a message with the accident's current location is sent via telegram to the registered cellphone number. If any object is in close proximity then the LCD displays object is detected within 5 cm then the driver will be alerted with buzzer. If the high intensity light is detected the LDR sensor senses and makes the light dim and vice versa.

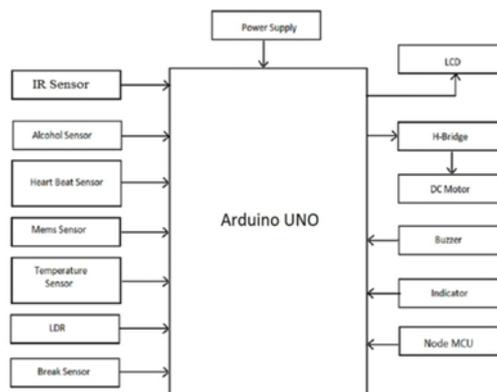


Fig-1: Block diagram

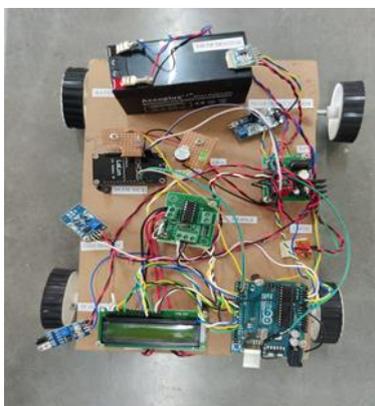
If the gas sensor acts as breathalyzer detects the consumption of alcohol by the driver and displays alcohol detected. If there is any brake failure in the vehicle then the brakes sensor alerts that driver and stop the vehicle with a parking light.

If an accident occurs, a message stating "Vehicle Fall Down" and the current position of the accident will be delivered through telegraph to the registered cellphone number. If any object is in close proximity i.e. within 5cm then the LCD displays "object is detected" and the driver will be alerted with buzzer. If the high intensity light is detected then the LDR sensor senses and makes the light dim automatically and versa. The gas sensor acts as breathalyzer. It detects the consumption of alcohol by the driver and displays "gas detected". If there is any brake failure in the vehicle then the brakes sensor alerts the driver and stops the vehicle immediately with parking light on.

## 6. RESULT

The suggested model makes use of the IoT to track automobile accidents utilizing Node MCUs and to detect accidents and alert family members. In this project, we created an advanced accident detection, alarm, and prevention system based on the Internet of Things. The system which as safety, more security and has good prevention is fully automatic.

The system we use employs user-friendly wireless sensors to alert drivers. Each sensor operates independently and generates an alarm. It can be improved in the future by locating this usage in network-less areas.



**Fig-2:** Project prototype

## 7. CONCLUSIONS

To detect an event of accident, the following system has been developed. The proposed system includes accident detecting, alerting and preventing system. It gives the exact location (latitude and longitude) of the vehicle that has encountered with an accident and sends the current location to the registered mobile number. The transferring of the messages to the various devices in the system is done using Arduino. Mem sensor monitors the accident. With the help of Node MCU module, the information will be transferred to the registered number.

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