

# Drowsiness Detection and Emergency Notification System

Jagadish N<sup>1</sup>, S Sujay Kumar <sup>2</sup>, Sumanth H S<sup>3</sup>, Bharathkumar M<sup>4</sup>, VELURU MOHANSAI<sup>5</sup>

<sup>1</sup>Assistant Professor, Department of Computer Science and Engineering, S J C Institute of Technology Chikkaballapur, Karnataka, India

<sup>2-5</sup>UG Student, Department of Computer Science and Engineering, S J C Institute of Technology, Chikkaballapur, Karnataka, India

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**Abstract** – An IOT based Drowsiness detection and emergency notification system is a safety technology which helps to put off accidents that causes due to driver drowsiness. A variety of studies have recommended that around 20% of all road accidents are due to drowsiness of the driver. This system consists of three major parts alcohol detection unit, drowsiness detection unit and emergency notification unit. In the first part, alcohol sensor is used to measure the content of alcohol in driver's breathe, if alcohol level is more than the threshold value, then driver is regarded as alcoholic, buzzer will be on, "alcohol detected" message will be displayed on the lcd and vehicle will not start. In the next part, driver has to wear any sunglass fixed with eye-blink sensor throughout his journey, which is used to detect drowsiness. If the driver doesn't blink his eyes for couple of seconds, then drowsiness will be detected, buzzer will be on, "drowsiness detected" message will be displayed on the lcd and the motor speed will be reduced. In the last part, after the alert system the notification system is used, if the driver detected with excess alcohol and drowsiness, then message along with the location details will be sent to the telegram application, so that the person can use these information to save the driver, who is in danger.

**Key Words:** Accident, Drowsiness, IOT, Alcohol sensor, Eyeblink sensor, Buzzer, Lcd, Telegram.

## 1. INTRODUCTION

For any vehicle accidents driver's faults are the most accountable aspect to cause dangerous problem to the society. Many drivers cannot control the vehicles due to different reasons it may cause severe accidents and sometime death. For vehicle accidents various factors involved such as drunk driving, over speeding, many distractions like texting while driving, talking with others, playing with children etc. one of the important factor is sleeping on the wheel.

People know the dangerous of alcohol consumption and run the vehicles but they not understand the seriousness of fatigue driving. In India, Ministry of Road Transport and Highway released a report in 2015, every day around 1,374 accidents may happen and almost 400 people deaths occur. Every hour because of vehicle accidents approximately 57 road accidents and 17 people dies. In that 54.1 percent of people are in the age group of 15 to 34 years are killed in vehicle accident. The Government of

India, Ministry of Road Transport and Highway Government of India prepare a strategy to diminish the amount of motorway accidents and losses by 50 % by 2020. Globally vehicle accidents have seemed one of the major community health problems. In India almost 5 lakh road accidents happened in the year 2015. A fatigue Driver those who falls asleep at the move fails to control the vehicle, not possible to take immediate action and results in a crash so it is necessary to monitor the drowsiness of the driver to prevent accidents.

## 2. LITERATURE SURVEY

Automatic driver drowsiness can be detected using artificial intelligence and visual information. System is to detect, track and examine face and eyes of drivers for this different real vehicle image of drivers are taken to validate the algorithms. It is a real time system work in different light conditions [1].

The numbers of accidents are increased due to several factor, one of the main factor is that driver fatigue. Driver's sleepiness is also implemented using video based approach. This system is non-invasive and human related elements are used. Band power and Empirical Mode Decomposition methods are used to investigate and extract the signal, SVM (Support Vector Machine) used to confirm the analysis and to categorize the state of vigilance of the driver [2].

The system designs to find the drivers drowsiness using the hypothesis of Bayesian networks. The interaction between driver and vehicle features are extracted to get reliable symptoms of driver drowsiness. It presents more suitable and accurate strategies to design drowsy driver detection system [3].

Brain and visual activity is used in drowsiness detection system. Electroencephalographic (EEG) channel used to monitor the brain activity. Diagnostic techniques and fuzzy logic are used in EEG based drowsiness detector. Using blinking detection and characterization for visual activity monitored. Electrooculographic (EOG) channel are used to extract the Blinking features [4].

Image processing and pattern classification used to take the driver facial pictures, tracking the features of driver face and categorizing the driver's sleepiness level. 17 different features points are determined after examining

the facial muscle activities using Active Appearance Model (AAM). KNN method applied to categorize sleepiness into 6 levels, driver’s smile also detected with this method [5].

Head posture estimation method is used for detection of drowsy driver. In this method Viola and Jones algorithm for driver face detection [6].

Support Vector Machine (SVM) is using for extracting the face from video frames and CHT is useful for mouth and eye state analysis [7].

### 3. SYSTEM ANALYSIS AND DESIGN

#### 3.1 SYSTEM ANALYSIS

**Existing System:** The system designs to find the drivers drowsiness using the hypothesis of Bayesian networks. The interaction between driver and vehicle features are extracted to get reliable symptoms of driver drowsiness. It presents more suitable strategies to design drowsy driver detection system.

**Limitations:** It is based on machine learning and drowsiness detection is based on the dataset, Computations are high so it may incur delay in recognizing the drowsiness.

**Proposed System:** The concept of drowsy driver detection system focuses on the functioning of all sensor modules used in the project. This helps explain the inputs received by modules and the outputs they produce. Alert will be sent to the vehicle owner/ care taken in case of drowsiness and also in the case of driver is drunk.

**Advantages:** Sensor modules taking real time data and takes less time to detect drowsiness or alcohol detection and swift alerts can be sent to the telegram application of the owner or care taker.

#### 3.2 SYSTEM REQUIREMENTS AND SPECIFICATION

##### Hardware Requirements:

- Processor : Intel 3 core 2.4 GHz
- Hard Disk : 500 GB
- Monitor : 15 VGA Colour
- Mouse : Logitech
- RAM : 4GB

##### Software Requirements:

- Operating system : Windows 7
- Coding Language : Embedded C

##### Sensors used:

IR eye blink sensor, 16X2 LCD, Alcohol sensor, GSM module, Arduino UNO.

### 3.3 SYSTEM DESIGN

The basic model of the system “Drowsiness detection and emergency notification system” includes microcontroller, eye blink sensor, alcohol sensor, lcd display, buzzer, gsm module units and are indicated in the following block diagram of the project.

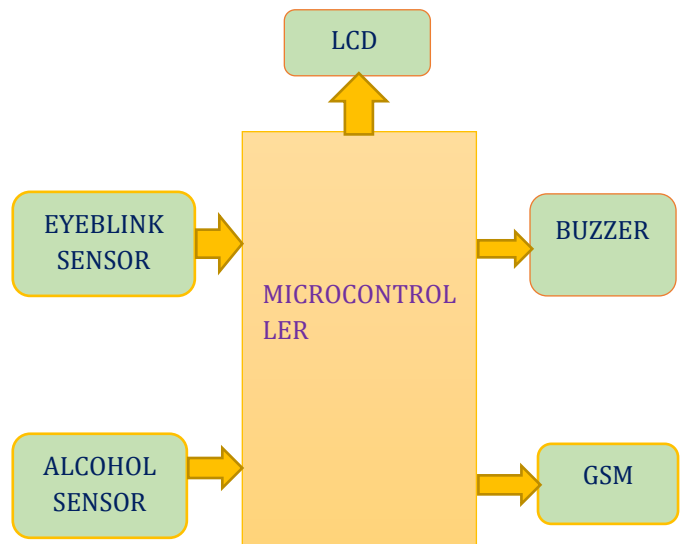


Fig -1: Block diagram

### 4. IMPLEMENTATION

The concept of driver drowsiness detection and emergency notification system focuses on the functioning of all sensor modules used in the project. This helps explain the inputs received by modules and the outputs they produce.

#### 4.1 ARDUINO MICROCONTROLLER

Arduino is an open source microcontroller through which we can perform logical computations. Arduino can be easily connected to the computer with the help of USB plug.

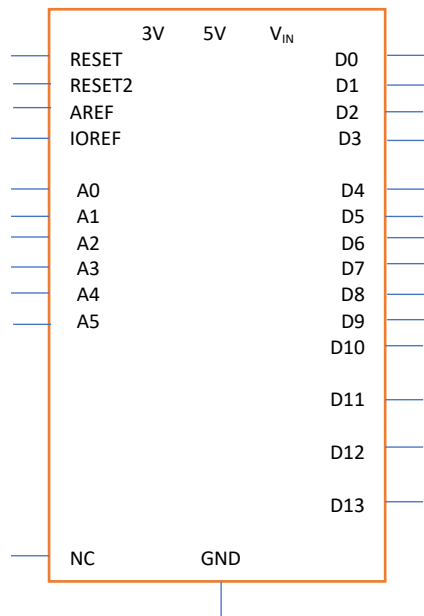


Fig -2: Arduino uno pin diagram.

### 4.2 Eye Blink Sensor

The eyeblink sensor module consists of the eyeblink sensor frame and a relay. The vibrator device is connected to the eyeblink sensor frame which has to be worn by the driver throughout the course of his journey. This vibrator vibrates whenever driver fall asleep. The frame consists of the IR transmitter which transmits the IR rays towards the driver's eyes and an IR receiver which receives the reflected rays when eyes are closed.

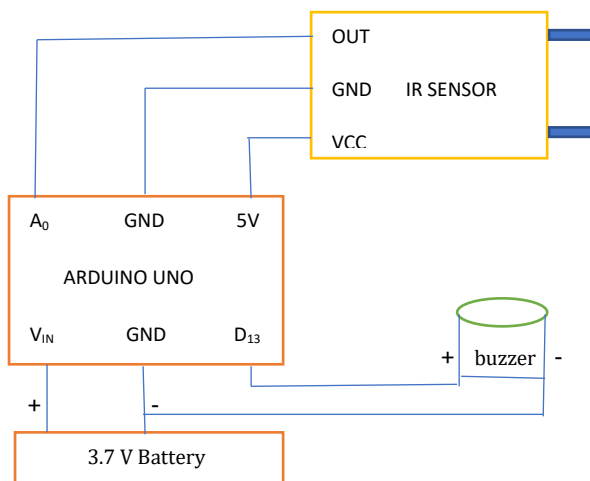


Fig -3: Eyeblink sensor connection with Arduino UNO.

### 4.3 ALCOHOL SENSOR

Alcohol level in the human breathe can be measured using MQ-135 gas sensor. It has a net like structure, which can be interfaced with lcd unit and the arduino. If the alcohol level exceeds threshold value, then "Alcohol detected" message will be displayed on the lcd,

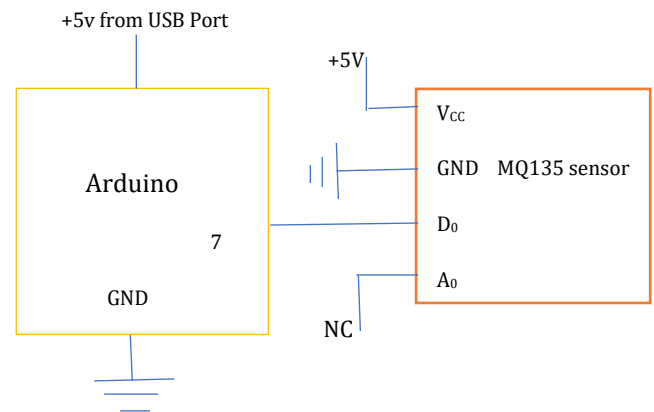


Fig -4: Alcohol sensor connection with Arduino.

### 4.4 LCD MODULE

LCD is a device which displays the messages in case the driver falls asleep. It is a 16\*2 lcd display module, in which one can print 32 characters. The message "Drowsiness detected" will be displayed on lcd when driver falls asleep and "Alcohol detected" will be displayed on lcd, when the driver as drunken above threshold level.

### 4.5 GSM MODULE

The module known as Neo- 6M GPS will be interfaced with Arduino uno. We can extract latitude and longitude details from this GPS module. This module consists of two components such as patch antennae and Neo 6 M GPS chip. If the driver drowsiness or alcohol is detected, then the message along with location details will be sent to the telegram application.

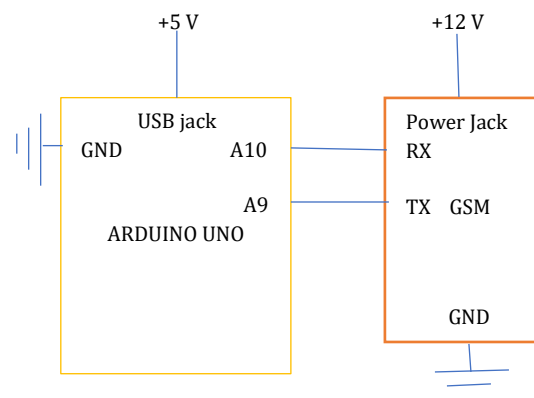


Fig-5. Connection between GSM module and Arduino.

### 4.6 DC Motor

The motor acts as the wheel of the vehicle and it rotates when the power is supplied to it through L298 chip. The speed of rotation is slowed down when the driver falls asleep as detected by the eye blink sensor, in the other case the wheel is stopped when the accident occurs.

### 4.7 STRUCTURE CHART

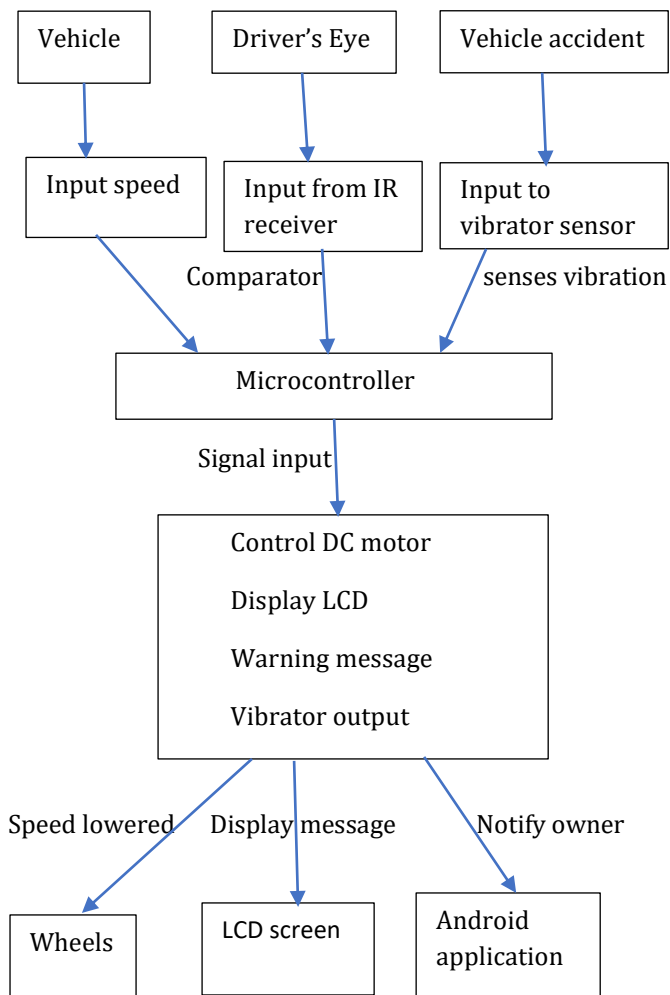


Fig- 6: Structure chart

## 5. TESTING

### 5.1 ALCOHOL TEST

Name of the test	Alcohol test
Future being test	Driver drunk test
Description	In this we are checking whether driver has consumed any alcohol or not
Sample input	Reading in ppm from MQ135 sensor
Expected output	Presence of alcohol should be identified
Actual output	Reading will be taken from MQ135 by arduino and displays message on 16*2 LCD, alert to the telegram and buzzer will be on
Remark	Test case pass

### 5.2 DROWSINESS TEST

Name of the test	Drowsiness test
Future being test	Driver drowsiness test
Description	In this we are checking whether driver is drowsy or not
Sample input	Reading data from eye blink sensor
Expected output	Drowsiness should be identified
Actual output	Readings will be taken from eyeblink sensor by arduino and displays message on 16*2 LCD, and alert to the telegram
Remark	Test case pass

## 6. SCREEN SHOTS

### 6.1 CONNECTION

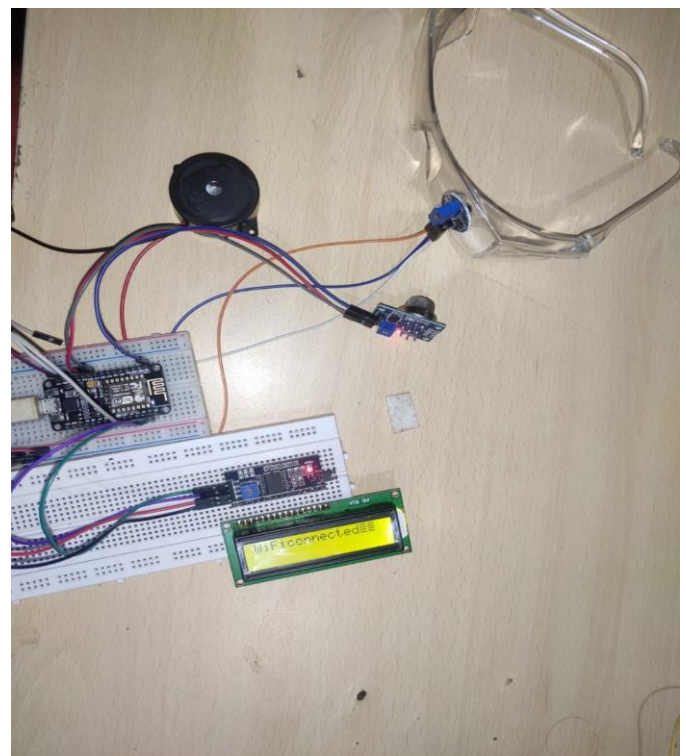
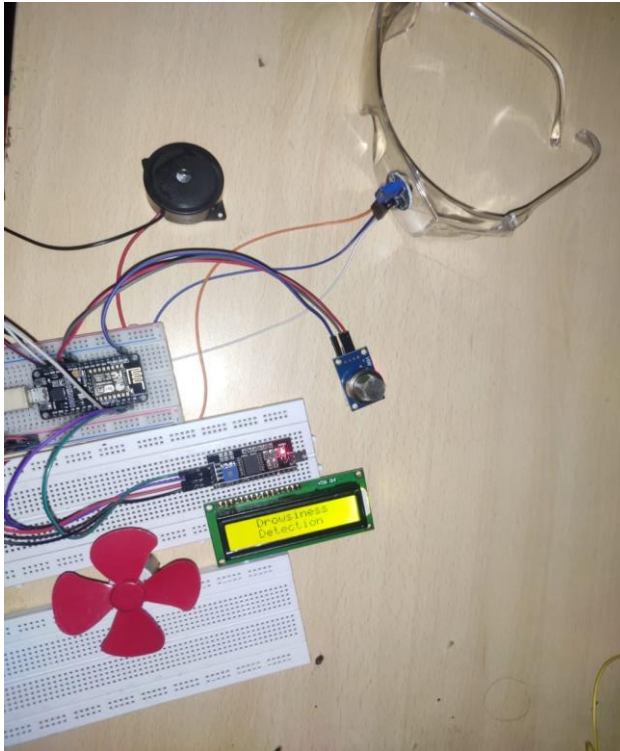


Fig- 7: Connecting the WiFi network to operate them

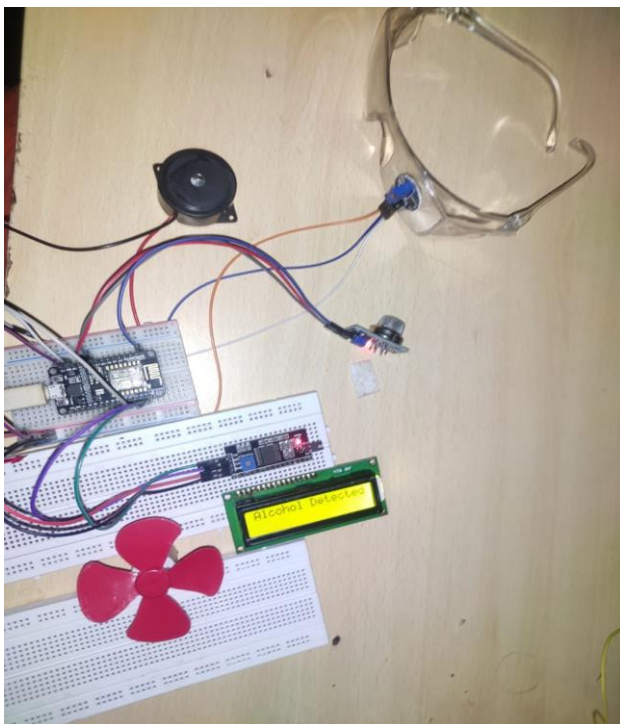


## 6.2 ALCOHOL DETECTION



**Fig -8:** Showing the Drowsiness detection

## 6.3 DROWSINESS DETECTION



**Fig -9:** Showing the Alcohol detection

## 7. CONCLUSION AND FUTURE ENHANCEMENT

The proposed system helpful to avoid vehicle accidents because of driver's sleepiness using eye blink sensor.

If the driver becomes drowsy the eye blink sensor's frame attached send info to the Arduino and also the LCD displays the warning messages.

It alerts the driver's through alarm sound to avoid the road accidents.

Alert message will be send to the telegram mobile application.

As a future enhancement live tracking of the vehicle and along with speed details will be read from the model itself.

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