A project report on

IOT BASED ACCIDENT AVOIDANCE SYSTEM

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ABSTRACT

Now a day‘s road accident is one of the major concerns in our country. Reckless vehicle driving is the major reason behind those road accidents. Alarming rate of accidents and uncontrollable car in the road demand an automatic system that would guide driver‘s immediate response in dangerous situation. When any obstacle (like human body, vehicle and other objects) comes in front or back of the vehicle, controlling the speed of the vehicle is one of the viable solutions to avoid accidents. And also when the driver is sleeping mode or in drowsy condition making the vehicle to stop is the best solution to avoid accidents.

We proposed a solution in our project to avoid road accidents and to control the speed of the vehicles. Eye blink Sensor which is integrated to the glasses of the driver will detect whether the driver is in either sleeping mode or normal mode and also Front Ultrasonic sensors of the vehicles detect obstacles, then Arduino UNO process the information and passes the signals to buzzer which gives alert to the driver and also to the motor to stop the vehicle. Furthermore, if any obstacle from the backside comes closer to the vehicle, immediately a buzzer will alert the driver. This is how the driver can be alerted during drowsiness.

The main objective of proposed eye-blink sensor is to monitor driver fatigue by sensing physiological signals like eye blink. It is necessary to find the blinking of the eye, since it is used to drive the device and to operate based on the situation.

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LIST OF ABBREVATIONS

ADC	Analog to Digital Converter
API	Application Program Interface
IDE	Integrated Development Environment
IOT	Internet Of Things
IP	Internet Protocol
LCD	Liquid Crystal Display
SDA	Serial Data
SCL	Serial Clock
CAN	Controller Area Network
NHTSA	National Highway Trafic Safey Administration
ARM	Advanced RISC Machine
RISC	Advanced RISC Machine
I2C	Inter Integrated Circuit
NO	Normally Open
NC	Normally Close
GND	Ground
IR	Infra Red
TX	Transmitter
RX	Receiver
LED	Ligh Emitting Diode
USB	Universal Serial Bus
PCB	Printed Circuit Board
CRT	Cathode Ray Tube
UART	Universal Asynchronous Receiver Transmitter
RST	Reset
TWI	Two Wire Interface
SPI	Serial Peripheral Interface
EEPROM	Electronically Erasable Programmable Read Only Memory
SRAM	Static Random Access Memory
CPU	Central Processing Unit

CHAPTER-1 INTRODUCTION

OVERVIEW:

According to the latest report of the American National Highway Traffic Safety Administration (NHTSA), the most influential factor in the occurrence of fatal singlevehicle run-off-road crashes is the driver performance. The factors that may be, falling asleep followed by alcohol and vehicle speed. In addition 3.6% of fatal crashes are associated with the driver‘s drowsiness and fatigue. Finding of new uses of technology in vehicles is increasing day by day. Some of well-known developing country already showed their capability over advancement of driverless car. To overcome such condition the existing state of art information technology like digital electronic system that transfer data in no second, making the design simpler is a huge contribution.

Driver operation can be best studied from changes in physiological signals like heartbeat, eye blink etc. Accidents due to driver drowsiness can be prevented using eye blink sensors. The driver is supposed to wear the eye blink sensor frame throughout the course of driving and blink has to be for a couple of seconds to detect drowsiness. Any random changes in steering movement leads to reduction in wheel speed. The threshold of the vibration sensor can be varied and accordingly action can be taken. The outcome is that the vibrator attached to eye blink sensor‘s frame vibrates if the driver falls asleep and also the LCD displays the warning messages.

Ideally, each individual needs between seven and eight hours of good quality sleep each night. Those with less buildup sleep debt, or sleep deficit. At worst cases, drivers with sleep debt risk nodding off, yet fatigue can impair reaction time and decision making when behind the wheel which increases the risk of being involved in an accident. If a driver falls asleep for just four seconds while travelling at a speed of 100 km/hr the car will have gone 111 meters without a driver in control. Those groups of drivers considered at greatest risk of being involved in a fatigue – related accident are:

- Young drivers
- Heavy vehicle drivers
- Drivers with sleep disorders.

1.1 MOTIVATION:

Accidents due to decline in driver‘s inadvertence have been a common phenomenon these days. The ever increasing numbers of traffic accidents all over the world are due to diminished driver‘s vigilance level. Drivers with a diminished vigilance level suffer from a marked decline in their perception; recognition and vehicle control abilities & therefore pose a serious danger to their own lives and the lives of other people.

This project presents an automatic drowsy driver monitoring and accident prevention system that is based on monitoring the changes in the eye blink duration and also by taking distance as a factor, Ultrasonic sensor detects the vehicles/objects from front and back side of the vehicle. Our proposed method detects visual changes in eye.

1.2 PROBLEM STATEMENT:

Driver drowsiness resulting in reduced vehicle control is one of the major causes of road accidents. Driving performance deteriorates with increased drowsiness with resulting crashes constituting 20%-23% of all vehicle accidents. The National Highway Traffic Safety Administration (NHTSA) conservatively estimates that 100 000 reported crashes are caused by drowsy drivers each year. These crashes result in more than 1500 fatalities, 71 000 injuries, and an estimated $12.5 billion in diminished productivity and property loss. Many efforts have been made recently to develop on-board detection of driver drowsiness. Drowsy or fatigue driving is a condition where drivers are exhausted and tired but still continue driving their vehicles. Driving in a fatigue condition can affect the attention span of drivers. A device is needed to detect a significant feature of the driver to indicate the level of fatigue and further wake the driver. An IOT -based system is designed to avoid countless mishaps due to drowsy drivers‘ behavioral and psychological changes by focusing on driver‘s eye movements. In addition to monitoring the intensity of the collisions impacts during road accidents.

Fatigue statistics ideally, each individual needs between seven and eight hours of good quality sleep each night. Those with less build up sleep debt, or sleep deficit. At worst, drivers with sleep debt risk nodding off, yet fatigue can impair reaction time and decision making when behind the wheel which increases the risk of being involved in an accident.

If a driver falls asleep for just four seconds while traveling at a speed of 100 km/h the vehicle will have gone 111 meters without a driver in control. Those groups of drivers considered at greatest risk of being involved in a fatigue related accident are:

1. Heavy vehicle drivers.
2. Drivers with sleep disorders.
3. Young Drivers.

1.3 OBJECTIVES AND SCOPE:

The objectives and scope of study will set the aim and target of this research from the beginning. These objectives will help to guide the author in the process of completion of the project. A successful project is one which achieved all the desired goals which have been decided at the beginning of the project. We can‘t take care of ours while in running by less conscious. If we done all the vehicles with automated security system that provides high security to driver, also gives alarm. All vehicles should be equipped with eye blink sensor and alcohol detector in future avoids these types of accidents.

CHAPTER-2 LITERATURE SURVEY

Waladur Rahman Et al. [1] proposed a solution i.e., Vehicle Speed Control and Accident Avoidance System Based on Arm M4 Microprocessor. In this project to avoid road accidents and to control speed of vehicles. Front Ultra-sonic sensors of the vehicles detect obstacles, then Cortex ARM M4 process the information and passes signals to the wiper motor to brake the vehicle with the help of Arduino Uno. Furthermore, if any obstacle from the backside comes closer to vehicles, immediately a buzzer will alert the driver. They build an embedded system using CAN protocol and Cortex ARM M4 microprocessor to avoid collusion in car.

Dr.Sujatha Jamuna Et al. [2] in many cases, drivers who are drowsy make no effort to apply brake or avoid an accident. So, a system is designed which senses the condition of the driver (his/her health) and stops the vehicle immediately if an abnormal condition of the driver is sensed to avoid accidents. Truck drivers, company car drivers and shift workers are the most at risk of falling asleep while driving. Majority of the accidents occur due to the drunkenness of the driver. The burden of which lies on the company owner as they are made liable. It can lead to economic loss. In this presentation they presented an adaptive driver and company owner alert system and an application that provides driving behavior to the company owner.

Dishita Mashru Et al. [3] This paper demonstrate a wearable device that measures the drowsiness of the person on road by various methodologies like measuring the physiological measurements of the person like heart rate, pulse rate, etc., by changes in facial features like the frequency of eye blinks, frequency of eye brows movement, etc., by measuring the vehicular behavior like deviations from a particular lane, frequency of steering wheel drifting, etc. when the person is drowsy, etc.

Kusuma Kumari B.M Et al. [4] designed Detection of driver drowsiness using Eye Blink Sensor. This 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. The driver is supposed to wear the eye blink sensor frame throughout the course of driving and blink has to be for a couple of seconds to detect drowsiness. Any random changes in steering movement leads to reduction in wheel speed. The threshold of the vibration sensor can be varied and accordingly action can be taken. The outcome is that the vibrator attached to eye blink sensor‘s frame vibrates if the driver falls asleep and also the LCD displays the warning messages. The wheel is slowed or stopped depending on the condition. This is accompanied by the owner being notified through the GSM module, so the owner can retrieve the driver‘s location, photograph and police station list near to driver‘s location. This is how the driver can be alerted during drowsiness and the owner can be notified simultaneously.

Madhumanti Maiti Et al. [5] designed an Innovative Prototype to Prevent Accidents Using Eye Blink Sensors and Accelerometer ADXL330. This paper describes a prototype of a driver fatigue monitor. A low cost charge coupled-device camera equipped with active infrared illuminators which acquires video images of the driver. Image is divided into blocks by image processing technique to detect blinks and according to the condition prevailing the alarm buzz is generated and vehicle is halted by the auto-brake system. Similarly, head movement of the driver is monitored with an accelerometer headgear to detect drowsiness in the driver.

Pragyaditya Das Et al. [6] implemented a Drowsiness Detection and Vehicle Distance Detection in Parallel. It consists of IR transmitter and an IR receiver. The transmitter transmits IR rays into the eye. If the eye is shut, then the output is high. If the eye is open, then the output is low. This output is interfaced with an alarm inside and outside the vehicle. This module can be connected to the braking system of the vehicle and can be used to reduce the speed of the vehicle. The alarm inside the vehicle will go on for a period of time until the driver is back to his senses. If the driver is unable to take control of the vehicle after that stipulated amount of time, then the alarm outside the vehicle will go on to warn and tell others to help the driver.

Arun Sahayadhas Et al.[7] The researchers have attempted to determine driver drowsiness using the following measures: (1) vehicle-based measures; (2) behavioral measures and (3) physiological measures. A detailed review on these measures will provide insight on the present systems, issues associated with them and the enhancements that need to be done to make a robust system. In this paper, we review these three measures as to the sensors used and discuss the advantages and limitations of each. The various ways through which drowsiness has been experimentally manipulated is also discussed. We conclude that by designing a hybrid drowsiness detection system that combines non-intrusive physiological measures with other measures one would accurately determine the drowsiness level of a driver. A number of road accidents might then be avoided if an alert is sent to a driver that is deemed drowsy.

Artem A Et al [8] has studied that drowsiness is the main cause for major accidents which leads to the injuries, deaths and damages. To overcome this problem, they proposed a system which uses various sensors i.e., "Driver's Eye Blinking Detection Using Novel Color and Texture Segmentation Algorithms". These sensors are used to detect the driver drowsy. The buzzer is used to alert the driver whenever the driver feels drowsy.

Nawshin mannan Proma Et al[10] developed a breaking system. A high risk of becoming drowsy of drivers who usually drive for long distances without any break in Bangladesh. It is well known that around one quarter of all serious roadway accidents is caused by sleepy drivers. It indicates that drowsiness is the main reason behind more road accident than drink driving. For avoiding accident the improvement of technologies for drowsiness detection is a major challenge. The main aim of this paper is to detect drowsiness of driver by analyzing eye and mouth for reducing road accident. The detection procedure involves the viewing of eye movements, flutter patterns and mouth opening for yawning..

Hoang Le Et al. [10] introduced a method i.e., Eye Blink Detection for Smart Glasses .This method first employs an eigen-eye approach to detect closing-eye in individual video frames. This method then learns eye blink patterns based on the closingeye detection results and detects eye blinks using a Gradient Boosting method.

(6)

This method further uses a non-maximum suppression algorithm to remove repeated detection of the same eye-blink action among consecutive video frames. Experiments with our prototyped smart glasses equipped with a low-power camera and an embedded processor show an accurate detection result (with more than 96% accuracy) on video frames of a small size of 16 × 12 at 96 fps, which enables a number of applications in health care, driving safety, and human computer interaction.

Taner Danisman Et al. [11] This paper presents an automatic drowsy driver monitoring and accident prevention system that is based on monitoring the changes in the eye blink duration. Our proposed method detects visual changes in eye locations using the proposed horizontal symmetry feature of the eyes. Our new method detects eye blinks via a standard webcam in real-time at 110fps for a 320×240 resolution. Experimental results in the JZU eye-blink database showed that the proposed system detects eye blinks with a 94% accuracy with a 1% false positive rate.

Taner Danisman Et al. [12] this paper presents an automatic drowsy driver monitoring and accident prevention system that is based on monitoring the changes in the eye blink duration. Our proposed method detects visual changes in eye locations using the proposed horizontal symmetry feature of the eyes.

Muhammad Awais et al. [13] The present study proposes a method to detect drowsiness in drivers which integrates features of electrocardiography (ECG) and electroencephalography (EEG) to improve detection performance. Driver drowsiness is a major cause of fatal accidents, injury, and property damage, and has become an area of substantial research attention in recent years. The study measures differences between the alert and drowsy states from physiological data collected from 22 healthy subjects in a driving simulator-based study. A monotonous driving environment is used to induce drowsiness in the participants. Various time and frequency domain feature were extracted from EEG including time domain statistical descriptors, complexity measures and power spectral measures. Features extracted from the ECG signal included heart rate (HR) and heart rate variability (HRV), including low frequency (LF), high frequency (HF) and LF/HF ratio.

SL NO		Performance Metrics Used	Performance Attained	Limitations Identified	Future Scope of Work
1	Evaluation of a Machine Learning-based Accident Avoidance System (2022)	Machine learning algorithms based on deep neural networks	High levels of detection accuracy and other performance metrics.	Performance highly dependent on quality and diversity of training data.	we can implement our propsed method year by adding eye blink sensor and alcohol sensor
2	Detection and Collision Avoidance Systems (2021)	Various algorithms (radar, lidar, camerabased systems)	Detection accuracy, false positive/negative rates, response time, etc.	Limited detection range, susceptibility to interference, difficulty in detecting pedestrians in complex traffic situations.	By including an alcohol sensor and an eye blink sensor, we can use our proposed solution next year.
3	"An enhanced adaptive cruise control algorithm for highway safety using fuzzy logic"(2020)	Distance Headway Time (DHT)	Reduced accidents by 30%	Limited applicability in urban environments	Evaluate performance in urban driving scenarios, integrate with other safety systems like eye blink and alcohol sensor

4	A Comparative Study of Machine Learning Algorithms for Accident Prediction(2020)	Accuracy, Precision, Recall	Random Forest achieved the highest accuracy of 89%, SVM had the highest precision of 91%, KNN had the highest recall of 88%	Random Forest achieved the highest accuracy of 89%, SVM had the highest precision of 91%, KNN had the highest recall of 88%	our proposed system can extra safty features to this method by adding detection sensors and eyeblinksensors

TABLE: 2.1

CHAPTER-3 IMPLEMENTATION

In this chapter we have done the implementation part of our project. We will see how we have implemented speed controlling system using ultrosonic sensor and Accident avoidance using Eye blink sensor. The various sensors form the hardware part of the project and power supply is DC 5V. We have used different hardware modules to implement the project. We can discuss how we have implemented step by step. The concept of driver alerting 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.

3.1 HARDWARE IMPLEMENTATION:

Basic model of the system:

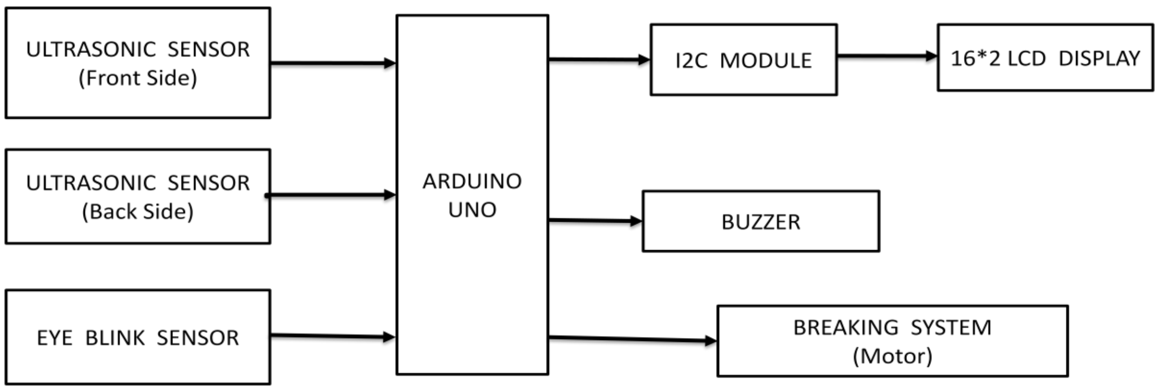

FIG 3.1: BLOCK DIAGRAM OF PROJECT

The block diagram of the system consists of:

1) Eye blink sensor (IR): To sense the duration and frequency of eye blinks.

2) Aurduino UNO.

3) Buzzer (Piezo).

4) I2C Module.

5) Ultrasonic sensor.

3.2 EYE BLINK SENSOR:

All the blocks of the Eye-Blink Detection System are put together and the design is tested. We interfaced the Eye Blink Sensor along with Buzzer. The basic block diagram of the entire set-up for detecting the eye blink rate and alerting the driver when the blink rate is more than a pre-defined threshold value, indicating that the driver is sleepy or drowsy. Here is the block diagram of our setup:

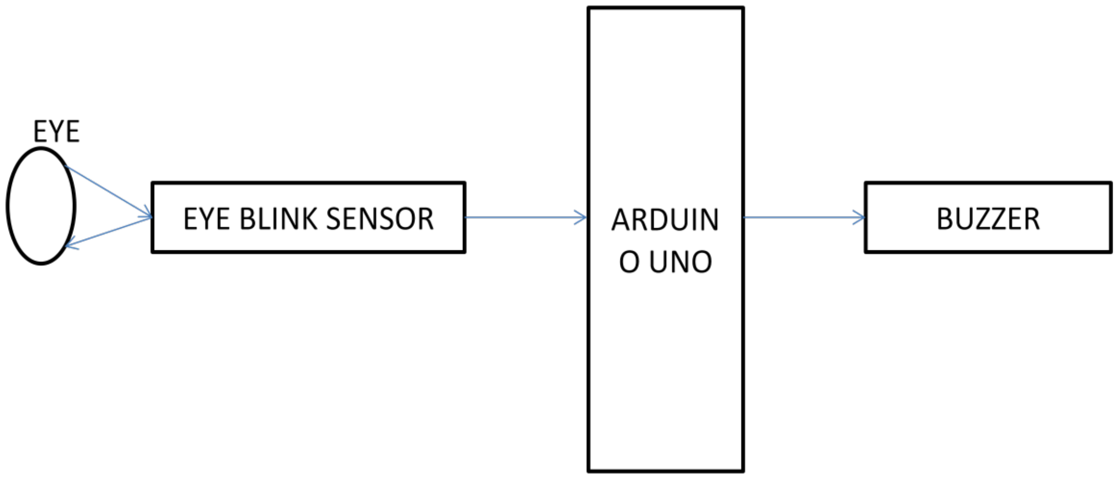

FIG 3.2: EYE BLINK SENSOR BASIC BLOCK DIAGRAM

Here we use the CNY 70 IR transmitter. It is a reflective sensor that includes infrared emitter and phototransistor in a lead package which blocks visible light. One main condition is that the IR transmitter and receiver should be in a straight line for optimum performance. The transmitter transmits IR rays into the eye of the driver. Depending on whether the eye is closed or open, there will be high output for closed eye and low output for open eye. The transmitted signal is captured by the IR receiver. This receiver is connected to the comparator. The comparator is an op amp where the reference voltage is given to inverting input terminal and the output of receiver is given to non-inverting terminal. When the IR transmitter passes the rays to the receiver, the receiver is conducting due to the fact that non inverting input voltage is less than inverting input voltage. Now the output of comparator is GND, so output is given to microcontroller.

3.2.1 INTERFACING ARDUINO WITH EYE BLINK SENSOR:

The connection for Interfacing of IR Sensor with Arduino is very easy, connect VCC of a module with Arduino 5v pin, connect the ground of module with Arduino's Ground and connect OUT pin of a module with a A0 of Analog pin of Arduino.

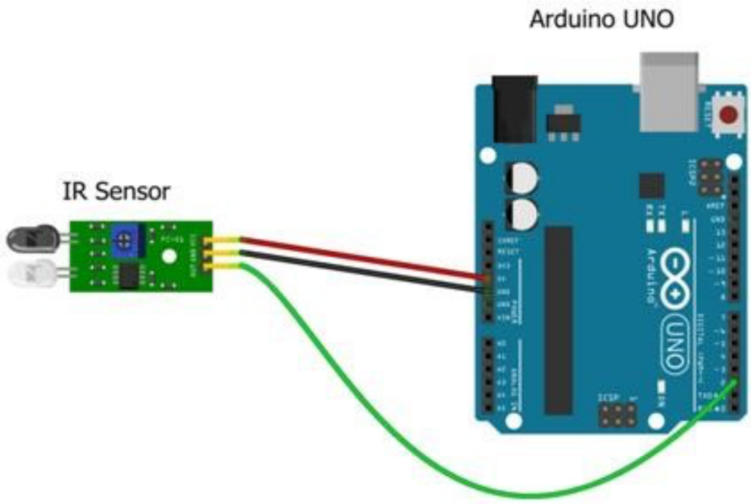

FIG 3.3: INTERFACING IR SENSOR WITH ARDUINO UNO

3.3 ULTRASONIC SENSOR:

We will be interfacing the Ultrasonic Sensor with Arduino UNO and buzzer. The Distance Sensor Array will give a high when the vehicle is closer to another vehicle more than a threshold value. The Basic Block Diagram is as follows:

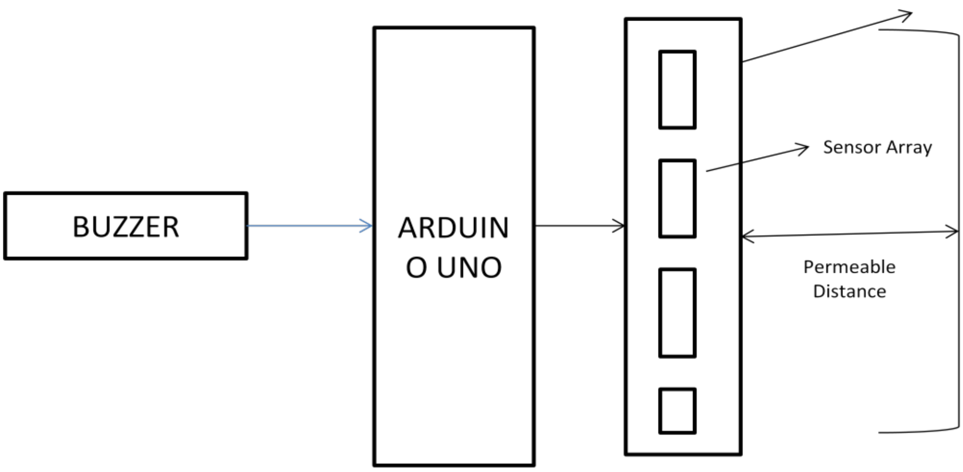

Fig 3.4: DISTANCE SENSING SYSTEM

3.3.1 INTERFACING ULTRASONIC SENSOR WITH ARDUINO:

Before starting we need to know about the working of Ultrasonic Sensor HCSR 05. Actually it consists of an ultrasonic transmitter and an ultrasonic receiver. First ultrasonic transmitter sends an ultrasonic wave. This signal will collide with the object and reflect the signal. The receiver will receive the reflected signal. The distance calculated by the time taken to receive the reflected. And the speed of sound in air. The speed of sound in air at room temperature is 340 Meter/Second or 0.034 centimeter/microsecond.

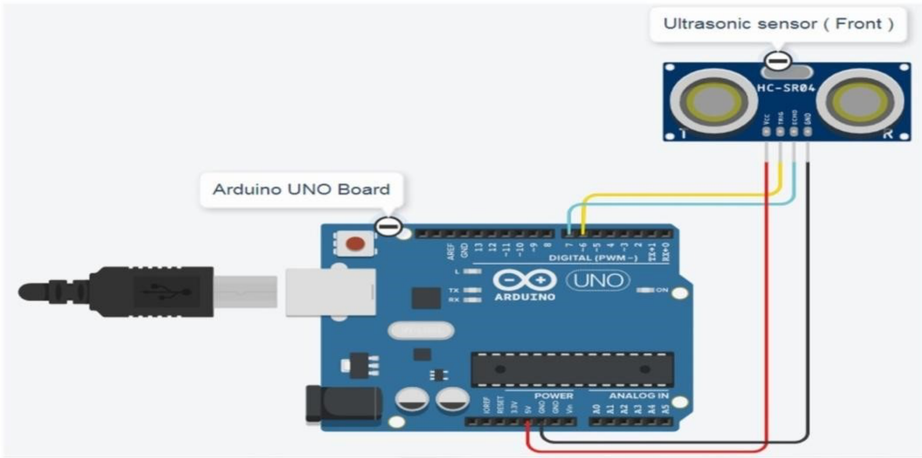

FIG 3.5: INTERFACING ULTRASONIC SENSOR WITH ARDUINO

Ultrasonic sensor is one of the main parts of numerous projects. Here we are going to interface an Ultrasonic sensor HC-SR 05 with Arduino Uno. In this project we discuss,

- Connect an Ultrasonic Sensor HC-SR 05 to Arduino.
- Read the sensor and convert it to length.
- Print the length to the Serial Monitor.

3.4 BUZZER:

The "Piezoelectric sound components" introduced herein operate on an innovative principle utilizing natural oscillation of piezoelectric ceramics. These buzzers are offered in lightweight compact sizes from the smallest diameter of 12mm to large Peizo electric sounders. We will be using two buzzers in our system.

Buzzer 1 will be interfaced with the Eye-Blink Sensor to alert the driver when he starts feeling sleepy and the Buzzer 2 will be interfaced with the Distance Detector that will alert the driver if the vehicle is closer than the permissible distance from another vehicle.

3.4.1 INTERFACING BUZZER WITH ARDUINO:

The connection for Interfacing of Buzzer with Arduino is very easy, connect Positive (+) terminal to Arduino 8th digital pin, connect the ground of module with Arduino‘s Ground.

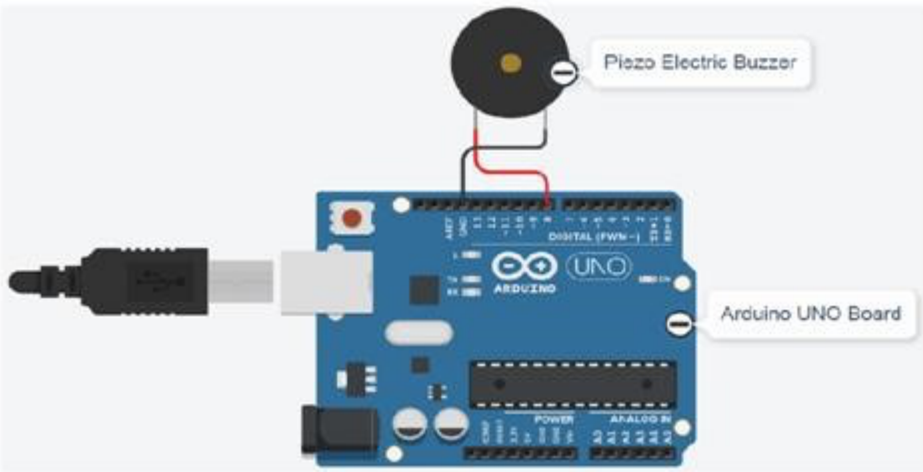

FIG 3.6: INTERFACING BUZZER WITH ARDUINO

3.5 16*2 LCD DISPLAY AND I2C MODULE:

3.5.1 16*2 LCD DISPLAY:

- LCD 16*2 is a 16 pin device that has 2 rows that can accommodate 16 characters each, it can be used in 4-bit mode or 8-bit mode.
- It has 8 data lines and 3 control lines that can be used for control purposes. Pin 4 is register select has 2 registers data and command register.
- Pin 5 is used for selecting between read and write modes, Pin 6 is used for Enabling & 7 to 14 are data pins.

4.5.2 I2C (INTER INTRGRATED CIRCUIT):

I2C Module has an inbuilt PCF8574 I2C chip that converts I2C serial data to parallel data for the LCD display. These modules are currently supplied with a default I2C address of either 0x27 or 0x3F. To determine which version you have check the black I2C adaptor board on the underside of the module. If there 3 sets of pads labeled A0, A1, & A2 then the default address will be 0x3F. If there are no pads the default address will be 0x27. The module has a contrast adjustment pot on the underside of the display. This may require adjusting for the screen to display text correctly.

4.5.3

INTERFACING OF 16*2 LCD DISPLAY AND I2C MODULE WITH ARDUINO:

Interfacing of I2C module and LCD Display with Arduino Uno is simply connect I2C module with LCD parallel & connect I2C modules 4 pins to Arduino. I2C module has 4 output pins which contains VCC, GND, SDA, SCL where 5V supply gives to I2C module through VCC & GND to GND of Arduino. SDA is a data pin & SCL is clock pin of I2C module.

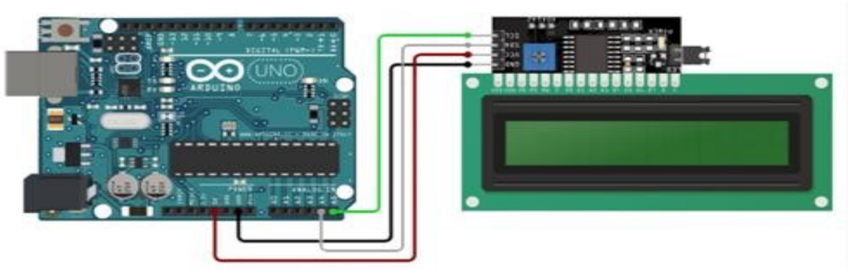

FIG 3.7: INTERFACING 16*2 LCD DISPLAY AND I2C MODULE WITH ARDUINO.

3.6 INTERFACING RELAY AND DC MOTOR WITH ARDUINO:

Interfacing is start by connecting VCC pin on the module to 5V on the Arduino and GND pin to ground. Connect the digital pin #8 to the IN input pin for controlling the relay. And the output side of the Relay, 9v DC Battery Positive terminal is connected to common pin of Relay and Dc motor is positive terminal is connected to NO(Normally Open) Pin of Relay and Negative terminal of battery is connected to Negative pin of Motor.

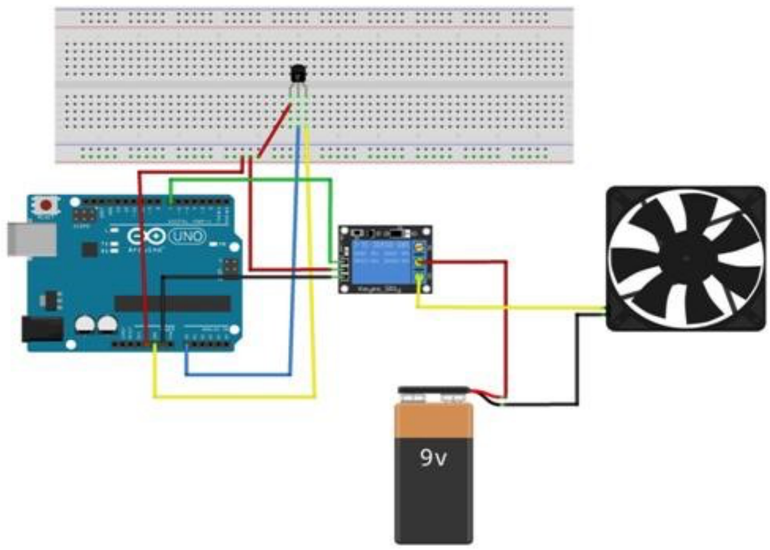

FIG 3.8: INTERFACING RELAY AND DC MOTOR WITH ARDUINO **4.7**

OVERALL COMPONENT CONNECTIONS:

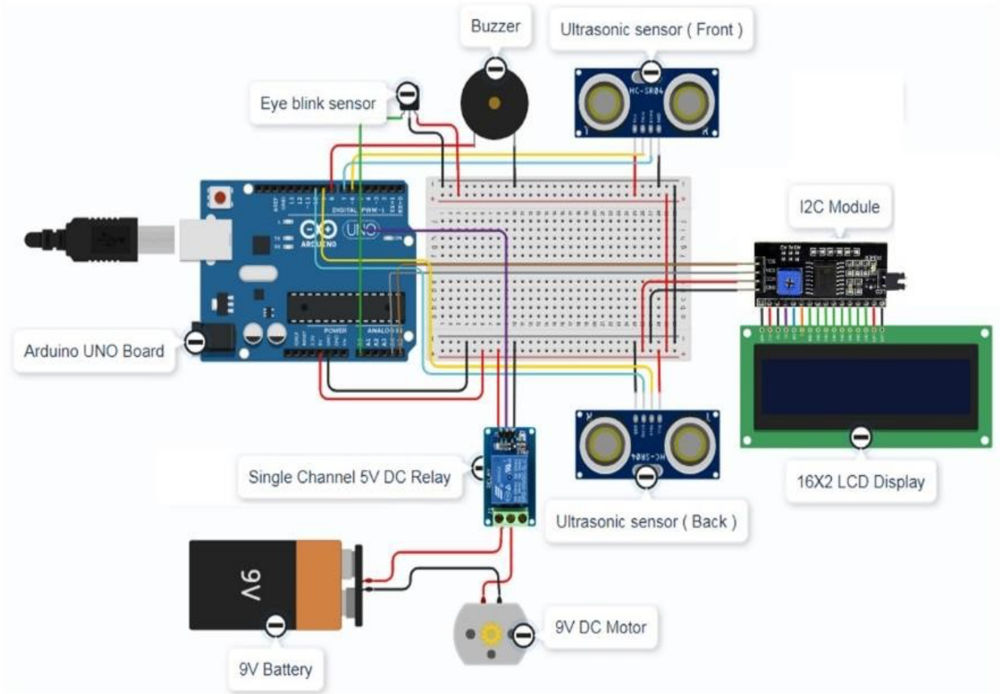

FIG 3.9: OVERALL COMPONENT CONNECTIONS.

The project involves preventing accidents due to drowsiness in vehicles by using eye blink sensor. The IR transmitter transmits infrared rays into the eyes. The ray reflected from the eye is picked up by the receiver which is in a straight line to the transmitter. Depending on the output of receiver, we get to know whether the eye is in an open or closed position. Another extra feature is the alarm system. There are two alarms. One inside the vehicle to alert the driver and another outside to alert the people in the vicinity of the vehicle. If the eye is in a closed position, then the output is high. This output activates the corresponding pin in the microcontroller and sets off an alarm. The alarm continues to ring until the driver takes necessary steps to take control of the vehicle. If after a stipulated amount of time, the driver is unable to take control of the vehicle, then the microcontroller which is linked to the braking system, slows down the vehicle. An external alarm goes off indicating people to help the driver in the vehicle.

FIG 3.9: ALARM IS GENERATED WHEN THE DRIVER IS NOT SAFE STATE TO DRIVE THE VEHICLE.

The above flow chart describes the flow of operation of the eye blink sensor and how the alarm buzz is generated when the driver is not in a conscious state .The speed of the vehicle is automatically reduced by the auto-brake system if the alarm is not turned off by the driver.

The development methods decide a large section of how the final system functions, and thus care is taken to ensure that the best practices, tools and equipments are used. The system will be developed using Kiel IDE. The programming language embedded C will also be used. The main modules would be microcontroller, IR sensor, LM358 comparator, accelerometer, LCD and android phone.

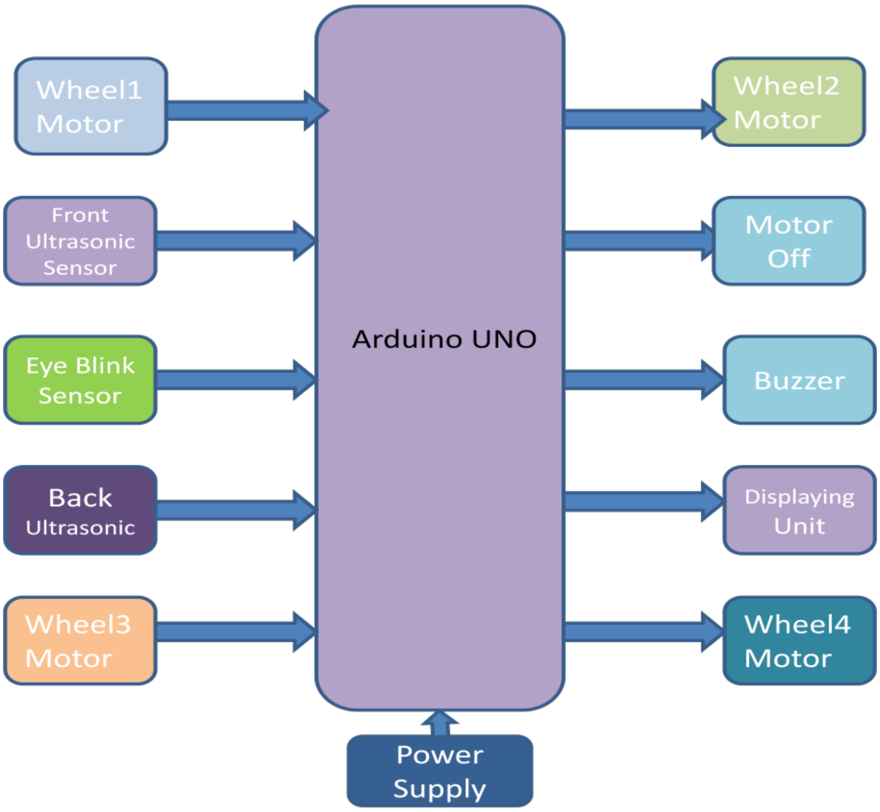

FIG 3.10: IMPLEMENTATION OF THE PROPOSED PROTOTYPE IN A CAR

3.8 SOFTWARE IMPLEMENTATION FOR SIMULATION:

We will use Embedded C with Arduino IDE Compiler to implement this concept using the. The algorithm for the program to work is as follows:

- Define a region of interest. We define it using the cheek bones and the eye-brows

- See for a sharp contrast and sense it. Our eye is white (Sharp Contrast) with respect to the skin color.
- Sense each blink.
- Set a maximum time for each blink. Exceeding which will generate an alarm.

3.8.1 FLOWCHART OF THE CODE:

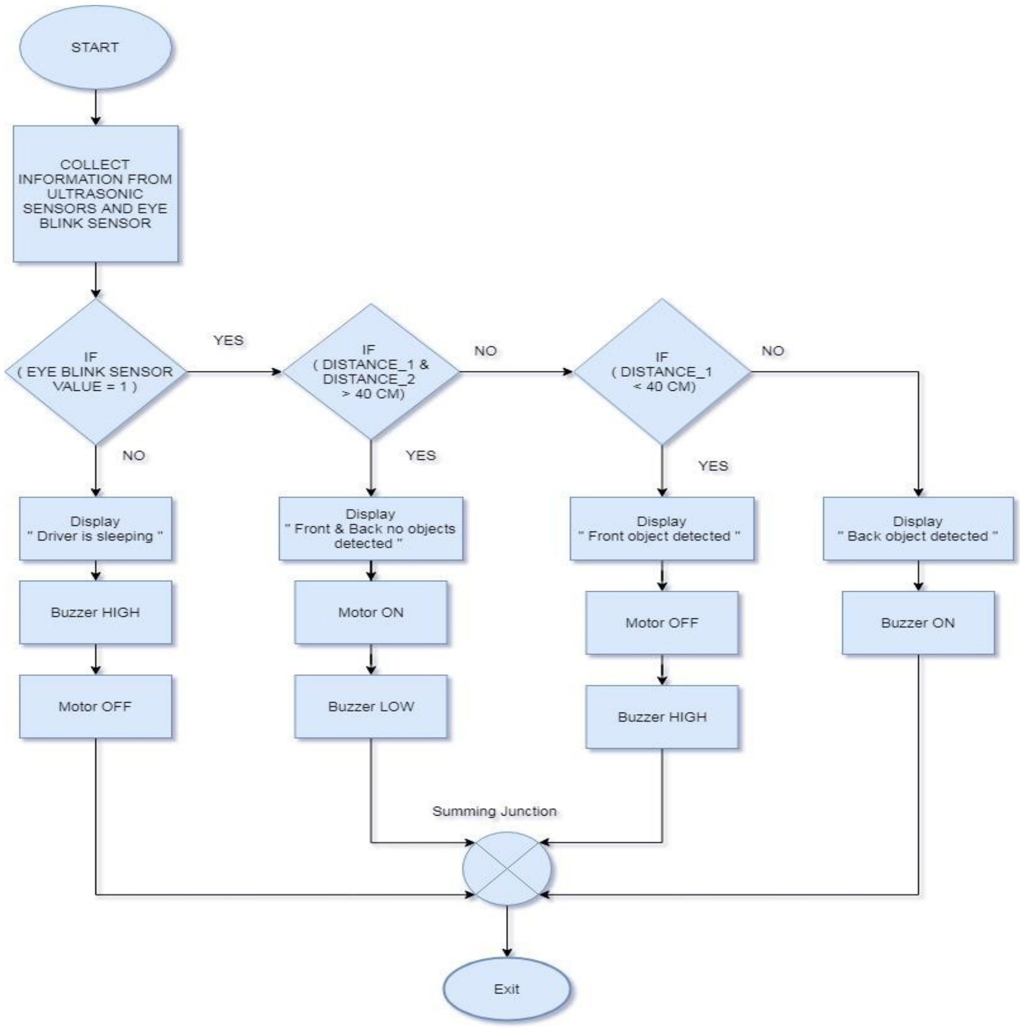

FIG 3.11: FLOWCHART OF THE CODE

The above flowchart is implemented by taking the conditions of the project by the code. From the above flowchart we can check for which conditions a particular function is done. Arduino Uno collects the information from the Ultrasonic sensor and Eye blink sensor. Arduino Uno checks the information which is given as inputs it gives the response based on the conditions given. If the Eye blink sensor is high then the motor will be in off condition. Based on the inputs of ultrasonic sensor the motor will work.

3.9 EXECUTION OF THE CODE:

There are 4 steps while executing the Code. They are:

STEP-1: SAVING THE CODE

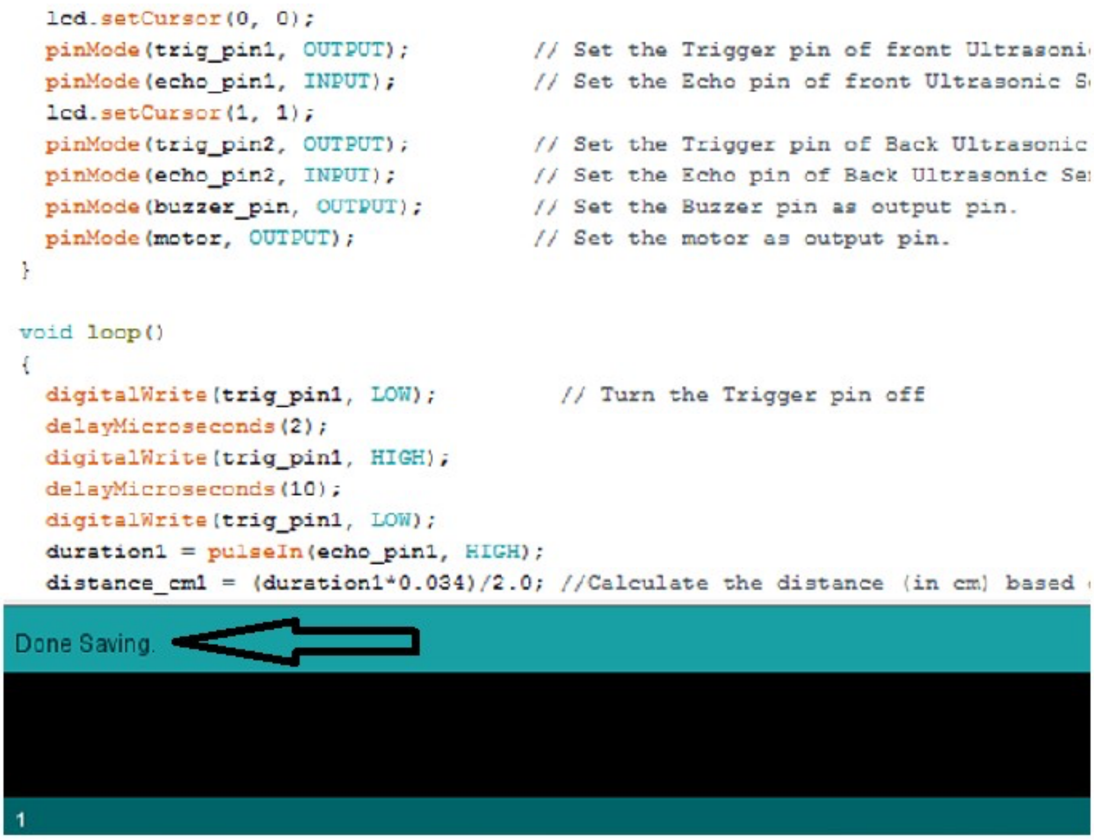

FIG 3.12: SAVING THE CODE

After writing all the code simply click on save button to save the entire code. After saving the code we have to check the status bar for confirmation whether the code is saved or not. The above image shows that the code is saved successfully.

STEP-2: COMPILING THE CODE

FIG 3.13: COMPILING THE CODE

When we want to run the code simply click on Verify button. After clicking on verify button then the status bar will shows that compiling sketch like the above image.

STEP-3: UPLOADING THE CODE

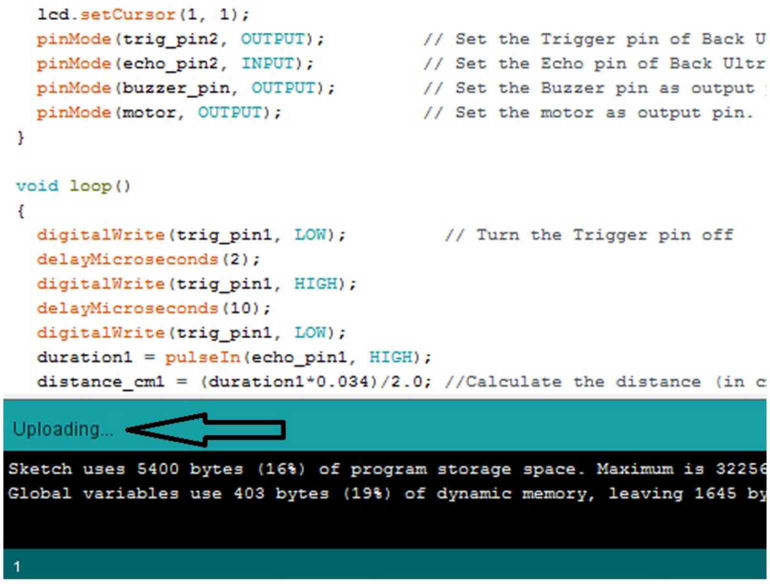

FIG 3.14: UPLOADING THE CODE TO ARDUINO BOARD

After compilation is done then select the board type and port on Arduino IDEfor uploading the code to Arduino Board. After selecting board type and port then simply click on Upload button the the code will be uploading to Arduino Board. And the status bar will shows the status like above image.

STEP-4: DONE UPLOADING THE CODE

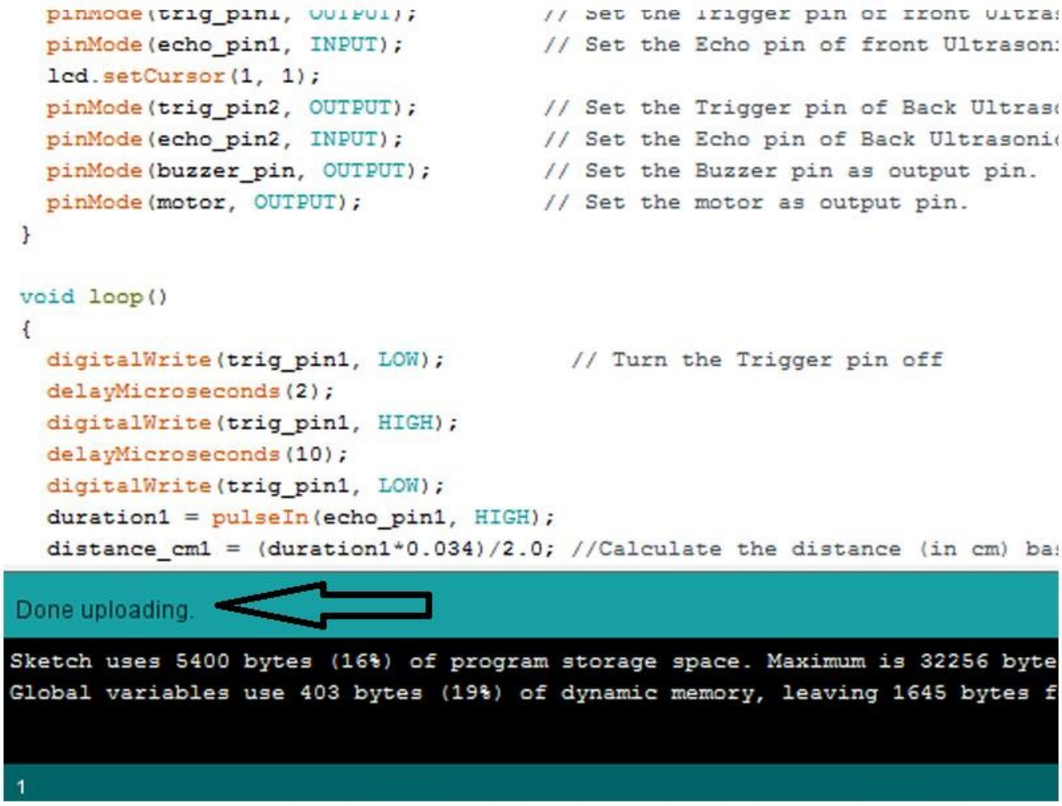

FIG 3.15: DONE UPLOADING

Done uploading means the code is successfully uploaded to Arduino Board. And the status bar will shows ―Done uploading‖ like above image.

CHAPTER-4 RESULTS AND VALIDATIONS

4.1 EYE BLINK SENSOR RESULTS:

- The most significant step in the eye blink detection is the acquisition of image by charge coupled device cameras. The image is then divided into frames. In natural condition normal person blinks 20 times a minute. Depending upon the number of frames the image has been divided the blink rate can be detected.
- So according to per minute or per second of blinking we can count the total image frames and then we can take decision that driver is in safe condition or not. [4]Counting occurs in three levels.
    - Lower
    - Medium
    - Higher
- These three stages can be subdivided into further two stages.
    - Below.
    - Above

The conditions prevailing in the sublevels and levels have been summarized in tabular form below:

4.1.1 WHEN DRIVER IS IN SLEEPING MODE:

The IR transmitter transmits infrared rays into the eyes. The ray reflected from the eye is picked up by the receiver which is in a straight line to the transmitter. If driver sleeps then the sensor detects and slows the speed of the vehicle and stops the motor. It also makes alarm sounds to make the driver alert. It also displays ‗Driver is in sleeping mode' in LCD Module 16X2.

FIG 4.1: OUTPUT OF EYE BLINK SENSOR

- **Output**: Slows down the speed of the vehicle and motor turns off.
- **LCD display**: Driver is in Sleeping Mode
- Alarm alerts the driver whenever the driver is in Sleeping mode/Drowsy Condition.

4.2 ULTRASONIC SENSOR RESULTS:

4.2.1 WHEN THE OBJECT IS DETECTED:

CASE - 1:

The ultrasonic sensor which is present at the front of the vehicle will emitting ultrasonic sound waves and when it hits the object and comes back, and converts the reflected sound into an electrical signal. The time duration that the signal takes to reach the receiver, finds the distance between the vehicles. The ultrasonic sensor finds the distance in range of 4m. If the vehicle is detected in that range the speed of the motor reduces and stops the motor. Also the distance is indicated in LCD Module 16X2. The distance measured in centimeters by using the formula (duration x 0.034)/2.

FIG 4.2 OUTPUT WHEN FRONT OBJECT IS DETECTED

- **Output:** Slows down the speed of the vehicle and motor turns off.
- **LCD display**: Front Object Detect
- Displays the object distance from the Vehicle

CASE - 2:

The ultrasonic sensor which is present at the back of the vehicle will emitting ultrasonic sound waves and when it hits the object and comes back, and converts the reflected sound into an electrical signal. The time duration that the signal takes to reach the receiver, finds the distance between the vehicles. The ultrasonic sensor finds the distance in range of 4m. If the vehicle is detected in that range then alarm sounds on to make the driver alert. Also the distance is indicated in LCD Module 16X2. The distance measured in centimeters by using the formula (duration x 0.034)/2.

FIG 4.3: OUTPUT WHEN BACK OBJECT IS DETECTED

- **Output:** Buzzer alerts the driver
- **LCD display:** Back Object Detect
- Displays the object distance from the vehicle

CASE - 3:

The ultrasonic sensor which is present at the front and back of the vehicle will emits ultrasonic sound waves and get reflected back and find that object at both ultrasonic sensors then it indicates that 'front and back object detected'.

FIG 4.4: WHEN FRONT AND BACK OBJECTS ARE DETECTED

- **Output:** Motor Off
- **LCD Display:** Front and back objects detected Buzzer alerts the driver.

4.2.2 WHEN NO OBJECT DETECTED:

The ultrasonic sensor which is present at the front and back of the vehicle will emits ultrasonic sound waves and are not get reflected back then it indicates that 'front and back no object detected'.

FIG 4.5: OUTPUT WHEN NO OBJECT IS DETECTED

- **Output:** Motor ON
- **LCD Display:** Front and back no objects Detected.

CHAPTER-5 CONCLUSIONS AND FUTURE SCOPE

5.1 CONCLUSION:

In this project we have designed a low cost, low powered design for detecting the drowsiness of the driver and alerting the driver to prevent an accident. So, we as an engineer need to take some action against this and provide the desired solution. For the safety of the human being some automation is made. The purpose of such a model is to advance a system to detect fatigue symptoms in drivers and control the speed of vehicle to avoid accidents. Advanced technology offers some hope avoid these up to some extent. This project involves measure and controls eye blink using IR sensor. We can automatically park the vehicle by first using Automatic braking system, which will slow down the vehicle and simultaneously will turn on the parking lights of the vehicle and will detect the parking space and will automatically park the vehicle preventing from accident.

The project ―Automatic Speed Control of Vehicle Using Ultrasonic Sensors, Eye Blink Sensor.‖Has been successfully designed and tested. If driver sleeps then the sensor detects and slows the speed of the vehicle and stops the motor. Even by using ultrasonic sensor we can avoid the accidents. It detects the objects that is present in front and back of the vehicle and makes the driver alert. If the first ultrasonic Sensor finds object in the given range then slows the speed of the vehicle and stops the motor. When second ultrasonic finds object the then the alarm is on and makes the driver alert. Integrating features of all the hardware components used have developed it. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly, using highly advanced IC‘s and with the help of growing technology the project has been successfully implemented.

Working video :

https://drive.google.com/file/d/1Pg1vefJyZhm1bVBD1UC-8IFWcGFQXcbk/view?usp=sharing

5.2 FUTURE SCOPE:

- Using 3D images is another possibility in finding the eyes, the deepest part of a 3D image.
- We can implement GSM technology to inform the relatives or owners of the vehicle about the alcohol consumption
- We can implement GPS technology to find out the location of the vehicle
- In worst case, nearby cars can alerted
- This is extended with alcoholic detection also.
- This project can be extended by using gesture controlled accelerometer, which when fixed on the inner roof of the car, can monitor the head movement of the driver without use of headgear.

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APPENDIX-CODE:

```
#include <Wire.h>
#include <LiquidCrystal_I2C.h>
#define EYE_BLINK A0
const int buzzer_pin = 8;            // pin where the Buzzer is connected to const int
trig_pin1 = 9;              // digital pin for HC-SR04 echo connector ( Front side ) const int
echo_pin1 = 10;             // digital pin for HC-SR04 Trigger connector ( Front side ) const
int trig_pin2 = 6;              // digital pin for HC-SR04 echo connector ( Back side ) const
int echo_pin2 = 7;              // digital pin for HC-SR04 Trigger connector ( Back side )
const int motor= 5;                 // pin where the Motor is connected to int
distance_cm1,distance_cm2;   // distance read from ultrasonic sensors long
duration1,duration2;
LiquidCrystal_I2C lcd(0x27, 16, 2);

void setup()
{   pinMode(EYE_BLINK, INPUT);          // Set the Ir Sensor pin as input
pin.
  lcd.begin();   lcd.backlight();   lcd.setCursor(0, 0);   pinMode(trig_pin1, OUTPUT);
// Set the Trigger pin of front Ultrasonic Sensor pin as output pin.
  pinMode(echo_pin1, INPUT);          // Set the Echo pin of front Ultrasonic Sensor pin as
input pin.
  lcd.setCursor(1, 1);   pinMode(trig_pin2, OUTPUT);        // Set the Trigger pin of
Back Ultrasonic Sensor pin as output pin.
  pinMode(echo_pin2, INPUT);          // Set the Echo pin of Back Ultrasonic Sensor pin as
input pin.    pinMode(buzzer_pin, OUTPUT);          // Set the Buzzer pin as output pin.
pinMode(motor, OUTPUT);            // Set the motor as output pin.
}
```

```
void loop() {   digitalWrite(trig_pin1, LOW);        // Turn the
Trigger pin off   delayMicroseconds(2);
digitalWrite(trig_pin1, HIGH);   delayMicroseconds(10);
digitalWrite(trig_pin1, LOW);   duration1 =
pulseIn(echo_pin1, HIGH);   distance_cm1 =
(duration1*0.034)/2.0;    digitalWrite(trig_pin2, LOW);
delayMicroseconds(2);   digitalWrite(trig_pin2, HIGH);
delayMicroseconds(10);   digitalWrite(trig_pin2, LOW);
duration2 = pulseIn(echo_pin2, HIGH);   distance_cm2 =
(duration2*0.034)/2.0;

  if(digitalRead(EYE_BLINK))
  {
   if((distance_cm1 <= 40)&&(distance_cm2 <= 40))
   {
     digitalWrite(buzzer_pin, HIGH);
digitalWrite(motor, HIGH);
lcd.setCursor(0, 0);      lcd.print("FRONT
& BACK ");      lcd.setCursor(0, 1);
lcd.print("OBJECTS DETECTED ");
delay(1000);                  //Delay 1000
milliseconds for displaying the text.
     lcd.clear();
     }
```

```
 else if (distance_cm1 <= 40)
      {
        digitalWrite(buzzer_pin, HIGH);
digitalWrite(motor, HIGH);
lcd.setCursor(0, 0);
lcd.print("FRONT OBJ DETECT!");
lcd.setCursor(0, 1);
lcd.print("Distance: ");
lcd.print(distance_cm1);
lcd.print("cm");        delay(1000);
lcd.clear();
        }
      else if (distance_cm2 <= 40)
      {
        digitalWrite(buzzer_pin, HIGH);
digitalWrite(motor, LOW);
lcd.setCursor(0, 0);
lcd.print("BACK OBJ DETECT!");
lcd.setCursor(0, 1);
lcd.print("Distance: ");
lcd.print(distance_cm2);
lcd.print("cm");        delay(1000);
lcd.clear();
        }
```

```
else     {
       digitalWrite(buzzer_pin, LOW);
digitalWrite(motor, LOW);
lcd.setCursor(0, 0);
lcd.print("FRONT & BACK NO");
lcd.setCursor(0, 1);
       lcd.print("OBJECTS DETECTED");
       delay(1000);
lcd.clear();
       }
}   else
  {
   if (!digitalRead(EYE_BLINK))
   {
delay(1000);
     if (!digitalRead(EYE_BLINK))
     {
delay(1000);
       if (!digitalRead(EYE_BLINK))
       {
        if (!digitalRead(EYE_BLINK)&&(distance_cm2 <= 40))
        {
         digitalWrite(buzzer_pin, HIGH);
digitalWrite(motor, LOW);
lcd.setCursor(0, 0);
lcd.print("DRIVER IS IN ");
lcd.setCursor(0, 1);
lcd.print("SLEEPING MODE");
         delay(2000);
        }
```

```
  else
        {
          digitalWrite(buzzer_pin, HIGH);
digitalWrite(motor, HIGH);
lcd.setCursor(0, 0);
lcd.print("DRIVER IS IN ");
lcd.setCursor(0, 1);
lcd.print("SLEEPING MODE");
          delay(2000);
        }
}       else
{
exit;
}
     }
}    else
{
exit;
}
  }
}
```