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Design And Development Of Microcontroller Based Automatic Vehicle Lock Control System For Drunken Driver

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DESIGN AND DEVELOPMENT OF MICROCONTROLLER BASED AUTOMATIC VEHICLE LOCK CONTROL SYSTEM FOR DRUNKEN DRIVER

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Declaration

We, the undersigned, declare that this project, Design and Development of Microcontroller Based Automatic Vehicle Lock Control System for Drunken Driver , is our own work, and has not been presented for in any other place, and all sources of materials used for the project have been fully acknowledged.

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Abstract

Road accidents are very common in todays busy life. Drunk driving is also major reason for many accidents in major countries all over the world. Most of the people use private vehicles and sometimes being careless, people may drive in a drunken state. This may lead to hazardous accidents. To avoid such conditions, microcontroller based automatic vehicle lock control system is proposed as a smart solution to prevent the phenomenon that enhances safety on roads. The purpose of this project is to implement an alcohol detection system to reduce traffic accidents while driving and also starting of vehicle under the influence of alcohol. The hardware modules include the Arduino, alcohol sensors, LCD panel and GSM modem. The software component includes the C programming language and source code which is implemented Arduino. Upon assembly, the system is able to detect the alcohol concentration in a persons breath sample and displays the detected amount in terms of PPM(parts per million) percentage on the LCD panel. Based on the concentration level According to the amount, the system decides whether to enable or disable the ignition switch circuitry. It sends message to traffic police through a GSM modem whenever a person is found to be driving in a drunken state.

Keywords: Arduino, Alcohol Sensor, Blood Alcohol content, LED, LCD, buzzer and GSM module

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List of Abbreviations

AC	Alternating Current
ADCs	Analog to Digital Convertors
BAC	Blood Alcohol Concentration
CMOS	Complementary Metal Oxide Semi-Conductor
DC	Direct Current
GND	Ground
GSM	Global System for Mobile communication
I/O	Input Output
IC	Integrated Circuit
IDE	Integrated Development Environment
LCD	Liquid Crystal Display
LED	Light Emitting Diode
MC	Micro Controller
MHz	Mega Hertz
PCB	Printed Circuit Board
PPM	Parts Per Million
PWM	Pulse Width Modulation
SMS	Short Message Service
TTL	Transistor Transistor Logic
USB	Universal Serial Bus
VCC	Voltage Collector Collector
VIN	Input Voltage
WHO	World Health Organization

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Chapter 1

Introduction

1.1 Background of the Study

Now-a-days different types of vehicle accidents are occurred in daily life with variety of causes. Car accidents may be caused due to many reasons; it may be due to a break failures, drunken driver person or due to over speed. Accidents that are caused due to drunken drivers and speed driving can be eliminated by applying control mechanism accordingly.

Drunken drivers will not be in stable condition and so the rash driving is the inconvenience for other road users and also question of life and death for the drunken drivers, also for others. So there is a need for an effective system to check drunken drivers. In order to reduce the accident rate, we have designed a Microcontroller Based Automatic Vehicle Lock Control System of Drunken Driver by detecting the amount of alcohol.

In our alcohol detection system, the ignition of the fuel is regulated by a sensor circuit. The sensor circuit is used to detect whether alcohol was consumed by the driver recently which is used to check whether alcohol is consumed while driving. If the breath sample contains no alcohol, the driver is given full control to the speed of the vehicle.

1.2 Problem Statement

Traffic accident is increased from time to time in alarming rate and it is a serious problem throughout the globe, particularly, in developing countries like Ethiopia. Although there are rules and regulations of traffic for the drivers to respect, they fail to do so and traffic police have the difficulty to keep every driver respect the rules especially for rules related to drunk driving. In developing countries like Ethiopia, the existing vehicles have no automatic system to check drivers state of blood alcohol level. This makes road traffic accident even worst.Therefore, the vehicle accidents have its own negative impact in once country on the enhancement of developmental activities. From the assets of one country which are engulfed by the vehicle accidents are:

1. Children who are hand on the responsibility, productive age who is back bone and aged people who are pride of once country.

2. Tangible and intangible assets of government and other private sectors.

3. This also left for the word societies because going on backward of one country is moving backward the societies of glob.

It is known that, car accidents caused by drunken drivers are creating a serious problem in materials and life in Ethiopia. According to WHO report published in April, 2014 traffic accident in Ethiopia accounts for the deaths of 37.28 persons per 100,000 [1]. From this accidents, drunken drivers have the large scale. So there is a need to design Automatic vehicle lock control for drunken driver.

1.3 Significance of the project

After implementation of this system in vehicle, a safe journey is possible which would decrease the injuries during accidents and also reduce the accident rate due to drunken driving. This system has also accident prevention technology which would reduce the accident of the vehicle in crowd areas. This system has benefits on the following bodies

1. Road travelling services.

2. Regional transport office.

3. Toll way accident management.

1.4 Objective of the project

1.4.1 General Objective

To design and develop automatic vehicle lock control for drunken driver using microcontroller.

1.4.2 Specific Objectives

- To interface alcoholic sensor, LCD, GSM and Buzzer with Arduino.

- To simulate and develop automatic vehicle lock for drunken driver in Proteus software and Arduino.

- To develop the possible prototype using the help of Arduino.

1.5 Goal of the project

We wish at the ending of this project to reduce drowsy related traffic accidents, safe life and material caused by drunken driver.

1.6 Project Methodology

This methodology explains the methods used to implement this project. The first one is to identify and understand the flow of operation system. The procedure of the project that we follow to complete this project is as follows

- Selecting the title
- Problem identification
- Objective and scope
- Literature review
- Overall study of the system and design requirement
- Data collection
- Data analysis
- Simulation testing
- Conclusion and recommendation

All data and information which are required for this project are gathered from different sources

Primary data:-

- From our direct experience
- Experience and Knowledge share from skilled person

Secondary data:-

- Referring some related books of electrical engineering and lecture handouts.
- Referring different journals and websites.
- Video Tutorial

1.7 Scope of the Project

This project covers the interfacing of microcontroller with alcoholic sensor, buzzer for alarming system, GSM for sending SMS message to traffic police, LCD to display message depending on the alcohol concentration in the air. The scope of this project is:

- Designing and simulation of automatic vehicle lock for drunken driver using microcontroller
- Interfacing different components with microcontroller.
- Implementation of the system.

1.8 Outline of the project

In this project a clear out line has been provided with descriptions of each chapter are given below: This report consists of 6 chapters. Chapter 1 gives background of the entire project including statement of the problem, project objective, methodology, significance of the project, goal of the project and project scope. Chapter 2 reviews and related works with compression with system has been discussed. Chapter 3 discusses on conceptual frame work of the study Chapter 4 discuss with the design and development of the system selected to automatic vehicle lock control system for drunken driver. In Chapter 5, the result will be test and explained in detail. And the last Chapter summarizes Conclusion and recommendations.

Chapter 2

Literature Review

A number of research projects headed by different research institutes and automobile manufacturers around the world have been focusing on accident prevention and detection systems. The following are related works to our system design.

Sharukh khan and Shahabaz Khan 'sproject is to develop a system that can detect the alcohol content in the air exhaled by the driver and automatically turn off the car if Alcohol percentage exceeds the limit. In this project, they were using 8051 family micro controllers. They were going to embed the program to receive data from alcohol sensor, convert it into digital form and then control the ignition system. Alcohol sensor gives out analog data that cant be analyzed by 8051 so they use analog to digital converter to convert it in to digital format. After that the data is stored and then compared to threshold values if the value is beyond its limits then controller takes appropriate action. Here in this project they were going to turn OFF the ignition system, by doing so they can stop the car and prevent accidents that occur due to drink and drive. Here they use Triacs or electro mechanical relays to control the ignition system. [2] The above system uses old version of microcontroller which has low performance and platform than the development board Arduino. Here there is no alarm system used for informing the driver has an excess alcohol in his blood.

M.H Mohamad, Mohd Amin Bin Hasanuddin, and Mohd Hafizzie Bin Ramli:-The vehicle accident prevention system can be one of the solutions to avoid drunken driver to drive as it could detected the BAC through human breaths using alcohol sensor. The construction of this system consists of two parts which is hardware development and software development. Hardware development involved the designing circuit of the project and printed circuit board (PCB) works. The system includes several parts as follow: PIC 16F876A, alcohol sensor circuit, alarm system, LCD display and ignition system. The alcohol sensor circuit will detect the alcohol depends on human breath and the signal will send data to PIC 16F876A as a controller to other circuits. The result of human breath contains alcohol that has detected from alcohol sensor circuit will display on the LCD 16x2 display. [3]

Shaik Shafi, Tanmay.N.T. S, Tarunya.D, Vinay.G, and Reena.K:-In order to reduce the accident rate, we have designed a Breath Analyzer using Lab VIEW. This application permits detection of alcohol content, if the person has taken alcohol then, engine of the vehicle is switched off, storing of the data detected and the details of the alcoholic person are sent through an email to the nearest police station person using IOT. The objective of this project is to design and implement an Alcohol Breath Analyzer Using Lab VIEW. We are using Arduino in our system, due to its low cost and high performance; it suits the best for this project. We are using Lab VIEW software. The MQ-3 sensor is used to detect the blood alcohol content. The Blood Alcohol Content (BAC) is considered as 100ppm is equal to 1 unit. The LED and LCD are the output devices. Then the buzzer rings. When the alcohol content is above 6 units, the motor is off and an e-mail is sent to the concerned person using IOT. In this we are using VISA (virtual instrumentation software architecture) tool box for serial communication with zigbee transreciever. [4]

Vaishnavi.M, Umadevi.V, Vinothini.M, Bhaskar Rao. Y, Pavithra.S:- This project is developed by integrating the alcohol sensor with the microcontroller 16F877A. The alcohol Sensor used in this project is MQ-2 which is used to detect the alcohol content in human breath. This paper presents the progress in using alcohol Detector, a device that senses a change in the alcoholic gas content of the surrounding air. The sensor will then analyze the amount of alcoholic vapors and offer the user some indication of the amount of alcohol present. This device is more commonly referred to as a breath analyzer; as it analyzes the alcohol content from a persons breath. The device is mostly used by law enforcement to determine whether an individual has been driving under the influence of alcohol. Police breathalyzers measures the Blood Alcohol Content, or BAC, of an individual. The unit designed for this project is a simpler version of the breathalyzer used by police. It will not accurately determine the BAC level of a Person. [5]

Abhishek Gupta, Shriram Ojha, Vikash Kumar, Vikrant Singh, and Vipin Malav:- They have proposed the detection of alcohol using alcohol detector connected to Printed circuit board (PCB) such that when the level of alcohol crosses a permissible limit, the vehicle ignition system will turn off. The system implemented by us aims at reducing the road accidents in the near future due to drunken driving. The system detects the presence of alcohol in the vehicle and immediately locks the engine of the vehicle. The entire system adopted the PCB Microcontroller unit (based on AT89S52). The core function modules are

Alcohol Sensor module (MQ-3), Comparator, Microcontroller (AT89S52), 16x2 LCD Display, DC Motor, transistor, voltage regulator and relay. [6]

Prashanth K P, Kishen Padiyar, Naveen Kumar P H, and K Santhosh Kumar:-They developed a mechatronic system which consists of MQ-2 gas sensor (alcohol sensor) which is suitable for detecting alcohol content from the breath. So, it can be placed in the proximity of the driver. The surface of the sensor is sensitive to various alcoholic concentrations. It detects the alcohol from the drivers breath; the resistance value drops lead to change in voltage (Temperature variation occurs). Generally, the illegal consumption of alcohol during driving is 0.08mg/L as per the government act. But for demonstration purpose, they programmed the threshold limit of BAC as 500 PPM. The decoded radio frequency (RF) signal is sent to the controller in the vehicle unit to start /stop the vehicle. If there is no control signal of BAC (below the threshold limit) from alcohol sensor then the vehicle will start, otherwise if it detects the BAC (above the threshold limit) the vehicle will not start. The alcohol sensor will detect the alcohol content depending on human breath and the signal will send data to PIC16F877C as a controller to other circuits. The result of alcohol content in human breath that has been detected from alcohol sensor will be displayed on the LCD 16 x 2 displays. The alcohol sensor MQ-2 has been selected in this system due to its sensitivity in detection of small value of BAC. [7]

S.P. Bunker, V.V. Deotare, R.V. Babar:-Investigated in, Intelligent Car System for Accident Prevention Using ARM-7 that is about making cars more intelligent and interactive which may notify or resist user under unacceptable conditions, they may provide critical information of real time situations to rescue or police or owner himself. Driver fatigue resulting from sleep deprivation or sleep disorders is an important factor in the increasing number of accidents on todays roads. This paper describes a real-time online safety prototype that controls the vehicle speed under driver fatigue. [8]

Nimmy James, Aparna C, Teena P John:-This system provides a unique method to curb drunken people. The system has an alcohol sensor embedded on the steering of the car. Whenever the driver starts ignition, the sensor measures the content of the alcohol in his breath and automatically switches off the car if he is drunken. In this system, the sensor delivers a current with a linear relationship to the alcohol molecules from zero to very high concentration. The output of the sensor is fed to the pic microcontroller for comparison. If the measured value reaches the threshold, relay cut off automatically and the buzzer pro-

duces sound. [9]

A.A. Marathe, F.H. Mansuri, Y.W. Shaikh D.R. Mahajan, and G.D. Wag:-Introduce all about making safe driving system of vehicle for drunk drivers. This system aims to minimize road accidents due to drunk driving and making vehicle driving safer than before. This is implemented using alcohol detection sensor, motors and mechanical linkages. It is unique method to curb drunken drivers by means of alcohol detection system. The system uses MQ-3 sensor, stepper motor, linkages and buzzer etc. In this project, the alcohol detecting sensor in vehicle senses and sends input signals to operational amplifier magnifies it and automatically stops the fuel supply or spark plug with the help of mechanical linkages. It prevents the vehicle from starting. This system is aimed at making vehicle driving safer than before. This is implemented using alcohol detection sensor and MECHANICAL LINKAGES to stop the vehicle. The main limitation of this project is it doesnt consist outputs that informs for the driver or authority traffic police only have motor stop mechanism. [10]

Phani Sridhar. A, Samuel Susan.V, G. Kalyan Chakravathi, Ravi Teja.G:-This project develops an Auto Lock System. The input for the system is from Detection Sensors either from Alcohol Breath or any other mechanism. The controller keeps looking for the output from these sensors. If there are any traces of Alcohol above the set limit, then the system will lock the Engine. Here a simulating process is activated using a DC motor through the relay and the complete process is under the supervision of an intelligent AT89c51 microcontroller. [11]

Generally, the above-mentioned projects don't state about the GSM technology, for sending information about status of driver to the authorized person. But our project presents a new approach towards automobile safety and security to decrease the number of accidents caused due to the drunken drivers. It has a smart electronic system which continuously monitors the alcohol content in the air surrounding. This application permits detection of alcohol content, if the person has taken alcohol above the stated limit, then the ignition of the vehicle is switched off, GSM sends information to the traffic police and alarm system will be on.

Chapter 3

Conceptual Framework of the study

3.1 Frame work

Vehicle lock control system includes several parts to design as follow: Arduino, alcohol sensor circuit, alarm System, LCD display and ignition system. The block diagram of this system is shown in Figure 3.1. Arduino is the heart of the system which connects both input and output of the system. Arduino requires input voltage of 5V voltage supply to the other circuit.

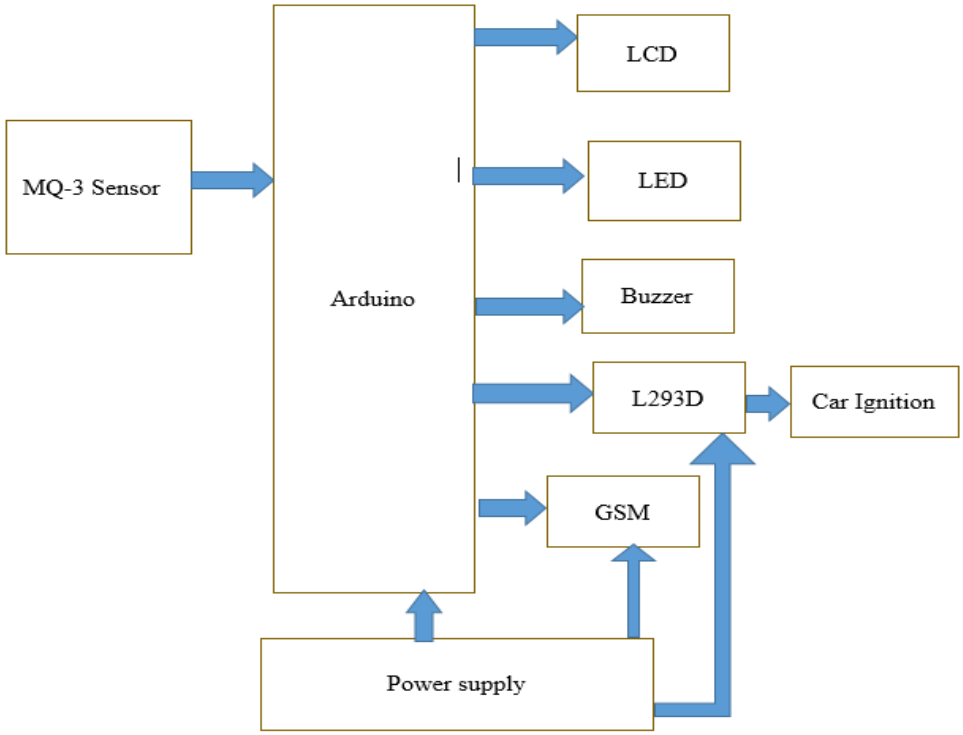

Figure 3.1: Block diagram of the system

3.1.1 Arduino

Arduino is an open-source physical computing platform based on a simple microcontroller board, and a development environment for writing software for the board. Arduino can be used to develop interactive objects, taking inputs from a variety of switches or sensors,

and controlling a variety of lights, motors, and other physical outputs. The boards can be assembled by hand or purchased preassembled; the open-source IDE can be downloaded for free. The Arduino programming language is an implementation of Wiring, a similar physical computing platform, which is based on the Processing multimedia programming environment. This project uses Arduino Uno to control the motor and GSM.The Arduino Board is programmed using the Arduino IDE software. The MQ-3 sensor measures the level of alcohol in the driver and sends signal to the Arduino.

Arduino/Genuine Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; We will study the Arduino UNO board because it is the most popular board in the Arduino board family. In addition, it is the best board to get started with electronics and coding. Some boards look a bit different from the one given below, but most Arduino have majority of these Components in common.

3.1.1.1 Arduino Board and PIN Description

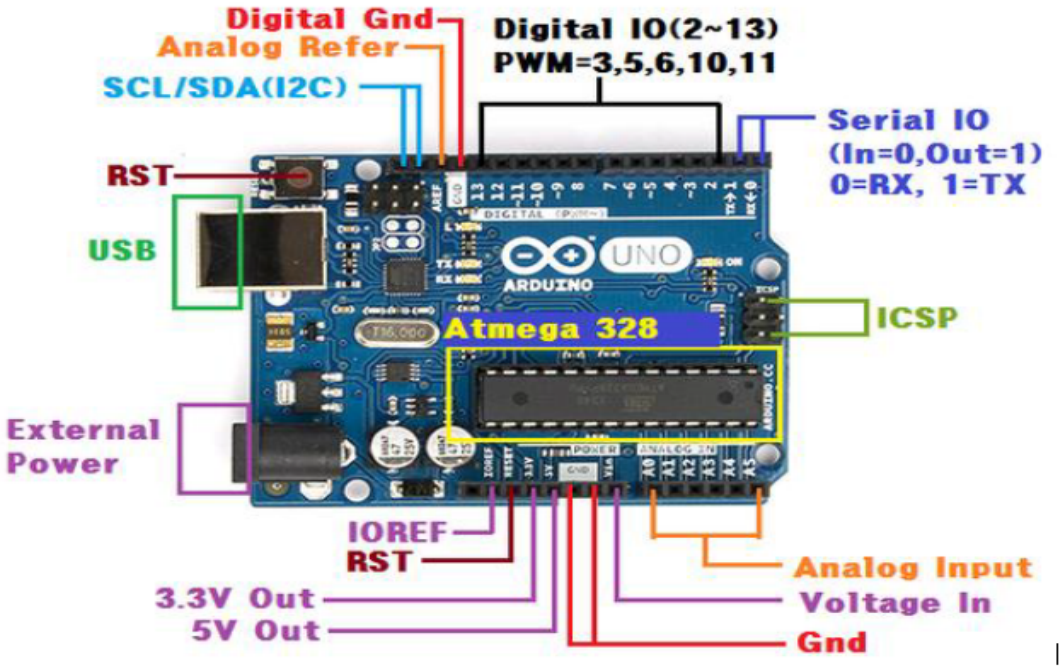

Figure 3.2: Arduino Board

3.1.1.1.1 Power:- The Arduino/Genuine Uno board can be powered via the USB connection or with an external power supply. The power source is selected automatically.

Power USB:-Arduino board can be powered by using the USB cable from your computer.

All you need to do is connect the USB cable to the USB connection.

External Power (Barrel Jack):-Arduino boards can be powered directly from the AC mains power supply by connecting it to the Barrel Jack. For external supply, the voltage range of 7V to 12V DC is recommended. The 9V battery can be used to power your Arduino Uno board.

Voltage Regulator:-The function of the voltage regulator is to control the voltage given to the Arduino board and stabilize the DC voltages used by the processor and other elements.

5V Pin:-: It is used to power external components connected to Arduino which needs 5V.

3.3V Pin:-: It is used to power external components connected to Arduino which needs 3.3V Most of the components used with Arduino board works fine with 3.3 and 5 volts.

GND (Ground)::-There are several GND pins on the Arduino, any of which can be used to ground your circuit.

Vin:-Voltage In, if you are powering your Arduino board from USB nothing is obtained from Vin pin. But, if you are powering the board with external supply then that supply is directly obtained from Vin pin. However, the supply obtained at Vin pin is usually lesser by 1V than voltage supplied to Power pin due to reverse polarity protection diode.

Power LED indicator:-This LED should light up when you plug your Arduino into a power source to indicate that your board is powered up correctly. If this light does not turn on, then there is something wrong with the connection.

AREF:-AREF stands for Analog Reference. It is sometimes, used to set an external reference voltage (between 0 and 5 Volts) as the upper limit for the analog input pins.

IORef:-Input Output Voltage Reference, it allows shields connected to Arduino board to check whether the board is running at 3.3V or 5V.

3.1.1.1.2 Input and Output Arduino have different corresponding inputs and output pins.These pins are illustrated as below

Analog pins

The Arduino UNO board has analog input pins A0 through A5 as we can see in the Figure 3.2. These pins can read the signal from an analog sensor like the humidity sensor or temperature sensor and convert it into a digital value that can be read by the microprocessor. Here the MQ-3 is connected with A5 pin to read the analog input of the sensor.

Digital I/O:-The Arduino UNO board has 14 digital I/O pins (of which 6 provide PWM (Pulse Width Modulation) output. These pins can be configured to work as input digital pins

to read logic values (0 or 1) or as digital output pins to drive different modules like LEDs, relays, etc. The pins labeled can be used to generate PWM.

TX and RX LEDs:-On your board, you will find two labels: TX (transmit) and RX (receive). They appear in two places on the Arduino UNO board. First, at the digital pins 0 and 1, to indicate the pins responsible for serial communication. Second, the TX and RX led. The TX led flashes with different speed while sending the serial data. The speed of flashing depends on the baud rate used by the board. RX flashes during the receiving process.

3.1.1.1.3 Other components of the Arduino :Arduino also have the foolowing componets in its board

Crystal Oscillator:-The crystal oscillator helps Arduino in dealing with time issues. How does Arduino calculate time? The answer is, by using the crystal oscillator. The number printed on top of the Arduino crystal is 16.000H9H. It tells us that the frequency is 16,000,000 Hertz or 16 MHz

Arduino Reset:- You can reset your Arduino board, i.e., starts your program from the beginning. You can reset the UNO board in two ways. First, by using the reset button on the board. Second, you can connect an external reset button to the Arduino pin labelled RESET.

ICSP pin: - Abbreviated as In Circuit Serial Programming which consists of MOSI, MISO, SCK, RESET, VCC, and GND. It is either used to program USB or Microcontroller (For UNO, AT mega 328P-PU). ICSP allows the user to program the microcontroller when it is in circuits, In Arduino UNO it allows to program ATmega328P-PU directly with AVR instructions without using Arduino IDE.

SDA:-Serial Data, it is the bidirectional data line that is used by I2C.

SCL:-Serial Clock, it is used to indicate that data is ready on bidirectional data line that is used by I2C.

AREF:-Analog Read Reference, it is mainly used for analog Reference () function calls, as default it is not required but to use it you have to add some voltage source between 0V to 5V in AREF Pin which will be considered as accurate reference voltage.

SCK:-Serial Clock, which is used by SPI (Serial Peripheral Interface). It is clock generated by Master which is used to clock the data to the Slave.

MOSI:-Master Out Slave In, the data is transmitted from Master to Slave. (Master- Slave)

MISO:-Master in Slave Out, the data is transmitted to Master from Slave. (Slave - Master)

SS:-Slave Select, it is used to select the Slave. Make high to SS pin to deactivate and make low to activate it.

INT1 and INT0:-These are hardware interrupts, it calls the ISR (Interrupt Service Routine) when the pin change occurs.

TX:-Transmit, it is used to transmit TTL serial data. It is also referred as outwards since it transmits data from Arduino to other connected peripheral device.

RX:-Receive, it is used to receive TTL serial data. It is also referred as inwards since it receives data from external hardware to Arduino.

3.1.1.1.4 microcontroller :-each Arduino board has its own microcontroller. You can assume it as the brain of your board. The main IC (integrated circuit) on the Arduino is slightly different from board to board. The microcontrollers are usually of the ATMEL Company. The ATmega328P is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega328P achieves throughputs approaching 1 MIPS per MHz allowing the system designed to optimize power consumption versus processing speed. The ATmega328P provides the following features:

- 4K/8K bytes of In-System Programmable Flash with Read-While-Write Capabilities
- 23 general purpose I/O lines
- 32 general purpose working registers
- three flexible Timer/Counters with compare modes
- internal and external interrupts
- a serial programmable USART
- a byte-oriented 2-wire Serial Interface
- an SPI serial port
- a 6-channel 10-bit ADC

- five software selectable power saving modes. The Idle mode stops the CPU while allowing the SRAM, Timer/Counters, USART, 2-wire Serial Interface, SPI port, and interrupt system to continue functioning.

Basic Principles of Pulse Width Modulation:-Pulse width modulation is basically, a square wave with a varying high and low time. A basic PWM signal is shown in the following Figure 3.3

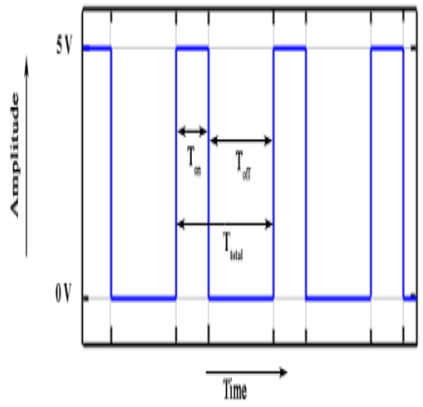

Figure 3.3: Pulse Width Modulation

There are various terms associated with PWM

- **On-Time**:-Duration of time signal is high.
- **Off-Time**:-Duration of time signal is low.
- **Period**:-It is represented as the sum of on-time and off-time of PWM signal.
- **Duty Cycle** :-It is represented as the percentage of time signal that remains on during the period of the PWM signal.

Period

As shown in the Figure 3.3, Ton denotes the on-time and Toff denotes the off-time of signal. Period is the sum of both on and off times and is calculated as shown in the following equation

$$T_{total} = T_{on} + T_{off} \tag{3.1}$$

Duty Cycle

Duty cycle is calculated as the on-time of the period of time. Using the period calculated

above, duty cycle is calculated as

$$D = \frac{T_{on}}{T_{on} + T_{off}} = \frac{T_{on}}{T_{total}} \tag{3.2}$$

Pulse Width Modulation or PWM is a common technique used to vary the width of the pulses in a pulse-train. PWM has many applications such as controlling servos and speed controllers, limiting the effective power of motors and LEDs.In addition, some pins have specialized functions:

3.1.1.2 Feature and Specification

The feature and specification for arduino is shown in Table 3.1

Table 3.1: Specifications of Arduino

Feature	Specification
Microcontroller	ATmega328p
Operating voltage	5v
Input voltage	7-12
Digital I/O pins	14(of 6 provide PWM output)
Analog Input pins	6
DC current per I/O pin	40 mA
DC current for 3.3v pin	50mA
Flash Memory	32KB(ATmega328) of which 0.5KB
Clock Speed	16MHz

3.1.1.3 Selection of Arduino

- **Inexpensive**- Arduino boards are relatively inexpensive compared to other microcontroller platforms. The least expensive version of the Arduino module can be assembled by hand, and even the pre-assembled Arduino modules cost less than 50 dollar
- **Cross-platform**- The Arduino Software (IDE) runs on Windows, Macintosh OSX, and Linux operating systems. Most microcontroller systems are limited to Windows.
- **Simple, clear programming environment**- The Arduino Software (IDE) is easy-to-use for beginners, yet flexible enough for advanced users to take advantage of as well. For teachers, it's conveniently based on the Processing programming environment, so students learning to program in that environment will be familiar with how the Arduino IDE works.

- **Open source and extensible software**- The Arduino software is published as open source tools, available for extension by experienced programmers. The language can be expanded through C++ libraries, and people wanting to understand the technical details can make the leap from Arduino to the AVR C programming language on which it's based. Similarly, you can add AVR-C code directly into your Arduino programs if you want to.

- **Open source and extensible hardware** - The plans of the Arduino boards are published under a Creative Commons license, so experienced circuit designers can make their own version of the module, extending it and improving it. Even relatively inexperienced users can build the bread board version of the module in order to understand how it works and save money.

3.1.2 Alcoholic detector (MQ-3)

It is impossible for police to check each and every vehicle for drunken drivers, so an effective system which automatically prevents drunken driving is needed. This system can be integrated with the ignition system thus allowing only sober people to handle the car. In our system, we use MQ-3-Alcohol-Ethanol-Sensor (Figure 3.4) which is a semiconductor alcohol sensor which detects alcohol in air. This gives an output depending on the amount of alcohol concentration in a puff of air given as input to it.

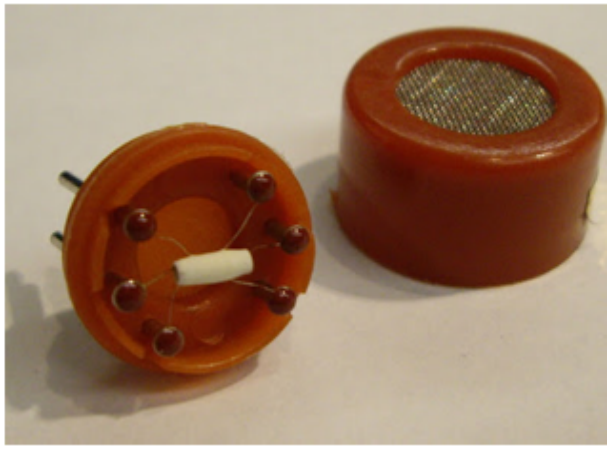

Figure 3.4: Alcohol Sensor

This semiconductor gas sensor detects the presence of alcohol gas at concentrations from 0.04 mg/L to 4 mg/L, a range suitable for making a breathalyzer. The sensors simple analog

voltage interface requires only one analog input pin from your microcontroller. This alcohol gas sensor detects the concentration of alcohol gas in the air and outputs its reading as an analog voltage. Connecting five volts across the heating (H) pins keeps the sensor hot enough to function correctly. Connecting five volts at either the A or B pins causes the sensor to emit an analog voltage on the other pins. A resistive load between the output pins and ground sets the sensitivity of the detector as shown in Figure 3.5. The resistive load should be calibrated for your particular application using the equations in the datasheet, but a good starting value for the resistor is 200 k.

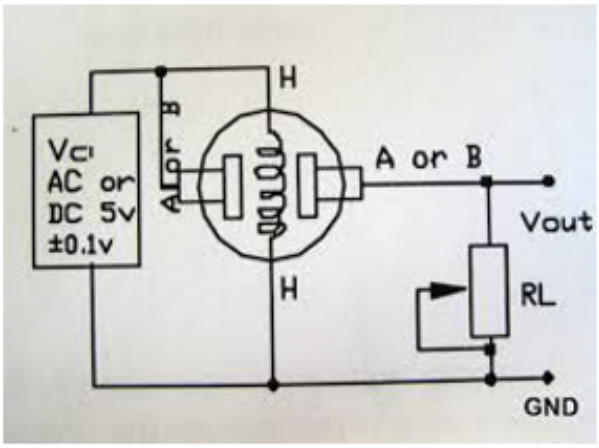

Figure 3.5: Alcohol Sensor circuit

3.1.2.1 Working Principles of Alcoholic Sensor

Basically, it has 6pins, the cover and the body.Even though it has 6 pins, we use only 4 of them. Two of them are for the heating system, which is represented by H and the other 2

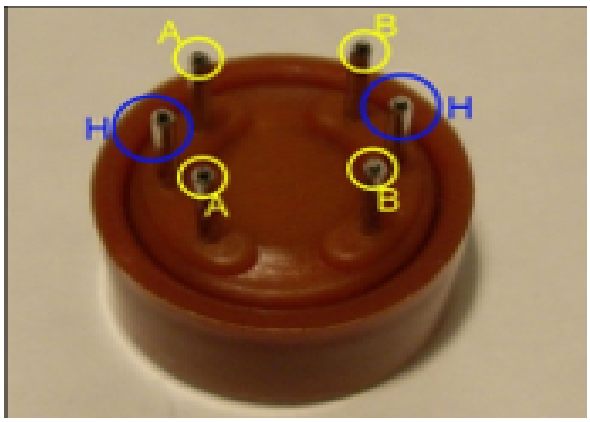

Figure 3.6: Alcohol Sensor pins

are for connecting power and ground, represented by A and B.The pins are as shown in the

Figure 3.6. Inside of the sensor, you will find the little tube. Basically, this tube is a heating system that is made of aluminum oxide and tin dioxide and inside of it there are heater coils, which practically produce the heat. And you can also find 6 pins. 2 pins that I called Pin H are connected to the heater coils and the other ones are connected to the tube. The core

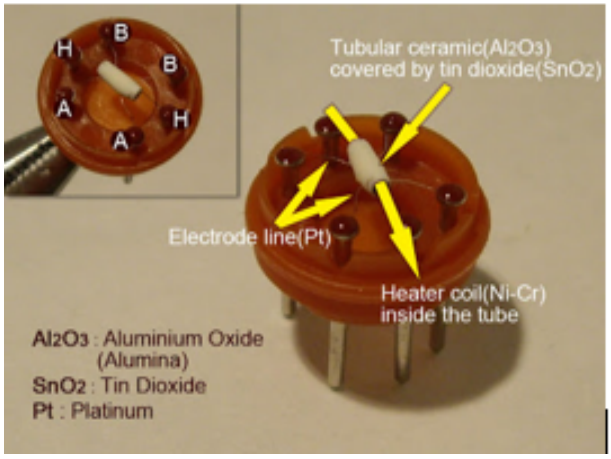

Figure 3.7: Internal part of MQ-3

system is the cube. As you can see in this cross-sectional view, basically, it is an Alumina tube cover by SnO2, which is tin dioxide. And between them there is an Aurum electrode, the black one. And also, you can see how the wires are connected. So, why do we need them? Basically, the alumina tube and the coils are the heating system, the yellow, brown parts and the coils in the Figure 3.7.

Then, when the alcohol molecules in the air meet the electrode that is between alumina and tin dioxide, ethanol burns into acetic acid then more current is produced. So, the more alcohol molecules there are, the more current we will get. Because of this current change, we get the different values from the sensor.

Circuit Specification

Table 3.2: Alcohol circuit specification

Feature	specification
Detecting concentration scope	0.05mg/L–10mg/L Alcohol
Supply Voltage	5 V
Maximum Current	200mA
Digital Output	5V
Analog Output	0 V to 5 V Variations
Operating temperature	-10°C up to 50°C

MQ-3 Feature

- Simple to use
- Output sensitivity adjustable
- Low Cost
- Fast Response
- Stable and Long Life
- Good Sensitivity to Alcohol Gas
- Both Digital and Analog Outputs
- Simple drive circuit

Applications

- Automotive Domain
- Security and Surveillance
- Smart Home System
- Industrial Control System

Sensitivity Adjustment:-Resistance value of MQ-3 is different to various kinds and various concentration gases. So, when we use these components, sensitivity adjustment is very necessary. It is recommended to calibrate the detector for 0.4mg/L (approximately 200ppm) of alcohol concentration in air and use value of load resistance that (RL) about 200 K (100K to 470 K). [12]

3.1.3 GSM Modem

GSM is a mobile communication modem; it stands for global system for mobile communication. It is widely used mobile communication system in the world. GSM is an open and digital cellular technology used for transmitting mobile voice and data services that operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands.GSM 900MHz is sown in the Figure 3.8

A GSM modem is a device which can be either a mobile phone or a modem device which can be used to make a computer or any other processor communicate over a network. A

GSM modem requires a SIM card to be operated and operates over a network range subscribed by the network operator. It can be connected to a computer through serial, USB or Bluetooth connection.

A GSM modem can also be a standard GSM mobile phone with the appropriate cable and software driver to connect to a serial port or USB port on your computer. GSM modem is usually preferable to a GSM mobile phone. The GSM modem has wide range of applications in transaction terminals, supply chain management, security applications, weather stations and GPRS mode remote data logging.

Figure 3.8: GSM board

Features of GSM Module

- Improved spectrum efficiency
- International roaming
- Compatibility with integrated services digital network (ISDN)
- Support for new services.
- SIM phonebook management
- Fixed dialing number (FDN)
- Real time clock with alarm management

- High-quality speech
- Uses encryption to make phone calls more secure
- Short message service (SMS)

3.1.3.1 Working principle of GSM Modem

GSM modem duly interfaced to the MC through the level shifter IC Max232. The SIM card mounted GSM modem upon receiving digit command by SMS from any mobile phone send that data to the MC through serial communication.While the program is executed, the GSM modem receives command STOP to develop an output at the MC, the contact point of which are used to disable the ignition switch. The command so sent by the user is based on an intimation received by him through the GSM modem ALERT a programmed message only if the input is driven low. The complete operation is displayed over 16x2 LCD display.

AT-Command set overview:-

The AT-Commands of GSM are given below in table 3.3.

Table 3.3: Commands for GSM

Command	Description
AT	Check if serial interface and GSM modem is working.
ATE0	Turn echo off, less traffic on serial Line.
AT+CNMI	Display of new incoming SMS.
AT+CPMS	Selection of SMS memory
AT+CMGF	SMS string format, how they are Compressed.
AT+CMGR	Read new message from a given memory location
AT+CMGS	Send message to a given recipient
AT+CMGD	Delete message

3.1.4 Liquid crystal display (LCD)

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. In this project, we use the 16x2 LCD display; its a very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. LCDs are economical; easily programmable; have no limitation of displaying special and even custom characters (unlike in seven segments),animations and so on. A 16x2 LCD means it can display 16 characters per

line and there are 2 such lines. In this LCD, each character is displayed in 5x7 pixel matrix.The LCD pins is clarified in Figure 3.9. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc.

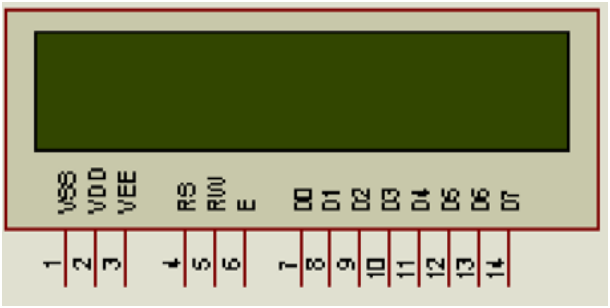

Figure 3.9: LCD

3.1.4.1 LCD Commands and Instruction set

Only the instruction registers (IR) and the data register (DR) of the LCD can be controlled by the MCU. Before starting the internal operation of the LCD, control information is temporarily stored into these registers to allow interfacing with various MCUs, which operate at different speeds, or various peripheral control devices. The internal operation of the LCD is determined by signals sent from the MCU

3.1.4.2 LCD Pin description

The LCD pin description are illustrated as below Table 3.4 **Features of LCD include:**

- Display memory
- Automatic signal generation
- Configurable frame frequency
- Blinking capability
- Regulated charge pump
- Contrast control by software

Table 3.4: LCD Pin description

Pin No	Name	Function
1	GROUND	Ground (0V)
2	VCC	Supply Voltage(5V)
3	VEE	Contrast adjustment through variable register
4	Register Select(RS)	(Register Select) Used to tell LCD controller weather data on Data Bus Is a Command or Text Data. High Signal for Data and Low signal for command
5	Read/Write(R/W)	(Read Write) Used to tell LCD controller, if we wish to Read or Write To the LCD. High for Read, Low for Write.
6	Enable(EN)	Send data to data pins when high to low pulse is given
7	DB0	8-bit data pins
8	DB1	8-bit data pins
9	DB2	8-bit data pins
10	DB3	8-bit data pins
11	DB4	8-bit data pins
12	DB5	8-bit data pins
13	DB6	8-bit data pins
14	DB7	8-bit data pins

3.1.5 Buzzer

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric.It is used in an enormous range of products and is available in various levels of sophistication. It is also available at various price levels, from device that cost very little too expensive, purpose-specific devices that is designed to emit sound over a wide area or to provide more specialized functions. The buzzer is shown in Figure 3.10

Figure 3.10: Buzzer

Features of Electronics buzzer:

- High reliability.
- Compact.
- Pin type terminal construction enables direct mounting onto printed circuit boards.

3.1.6 Alarm circuit

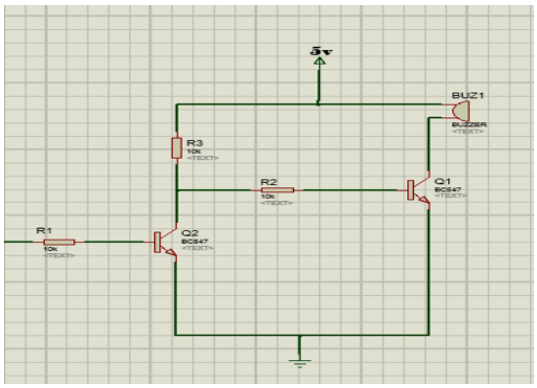

Figure 3.11: Buzzer Circuit

The circuit shown in Figure 3.11 above is designed to control the buzzer. The buzzer ON and OFF is controlled by the pair of switching transistors (BC 547). The buzzer is connected in the Q2 transistor collector terminal. When high pulse signal is given to base of the Q1 transistors, the transistor is conducting and closes the collector and emitter terminal. So, zero signals are given to base of the Q2 transistor. Hence Q2 transistor and buzzer is turned OFF state. When low pulse is given to base of transistor Q1 transistor, the transistor is turned OFF. Now 5v is given to base of Q2 transistor so the transistor is conducting and buzzer is energized and produces the sound signals. The state of the buzzer is shown in the Table 3.5

Alarm in this system is function to alert the driver and other people in vicinity about the

Table 3.5: Buzzer ON and OFF state

Voltage from arduino	Transistor Q1	Transistor Q2	Buzzer o/p
1	ON	OFF	OFF
0	OFF	ON	ON

condition of the BAC level detected by alcohol sensor. When the alcohol sensor detects alcoholic level of the driver is above the threshold value, then alarm system will be activated and corresponding the LCD will display Drunkenness message for the driver.

3.1.7 Light emitting diode (LED)

A light Emitting Diode (LED) is an optical semiconductor device that emits light when voltage is applied.In other words, LED is an optical semiconductor device that converts electrical energy into light energy. When Light Emitting Diode (LED) is forward biased, free electrons in the conduction band recombines with the holes in the valence band and releases energy in the form of light. Internal parts for LED is explained in Figure 3.12

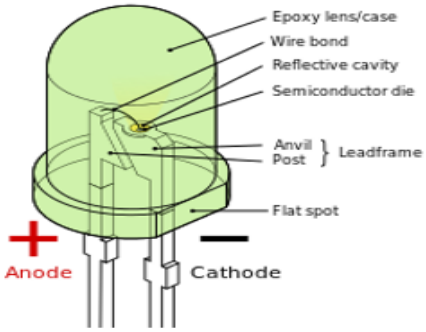

Figure 3.12: Light Emitting Diode

3.1.8 Ignition system

Ignition is the electrical system in an engine that causes the fuel to burn so that the engine begins working. A car's ignition has the job of taking the 12V of battery within the car, and using it to generate a high voltage that can then be sent to spark plugs, which start the vehicle. The ignition system of various vehicles possesses various stage but they have some steps in common: the accessories, ignition, starting off and lock positions. The purpose of the ignition system is to create a spark that will ignite the fuel-air mixture in the cylinder of an engine to produce a spark at spark plugs so, it can enable or disable vehicles engine. Basically, ignition system requires a supply, ignition switch and ignition coil. The starting system has five main components: the ignition switches or start button, a neutral safety Switch, starter relay, solenoid and motor.which is shown as Figure 3.13

Starting system:- Allows to activate the alcohol detection circuitry, to play the radio, work the power windows,etc. While the engine is not running. Most ignition switches are mounted on the steering column. Some switches are actually two separate parts; the lock into which you insert the key. Once the engine starts, the key-operated switch is turned; a spring in the solenoid assembly pulls the pinion gear away from the mesh, and the starter

motor stops.

Motor starter:-A starter is an electric motor that turns over to start the engine. A starter consists of the very powerful DC electric motor and the starter solenoid that is usually attached to the motor. Inside, a typical starter motor has the electric windings (coils) attached to the starter motor housing and the armature (the rotating part) that is connected through the carbon brushes in series with the windings. On the front end of the armature, there is a small gear that is attached to the armature through an over running clutch.

Neutral safety Switch:-For safety reasons, the starter motor can only be operated when the automatic transmission is in Park or Neutral position; or if the car has a manual transmission, when the clutch pedal is depressed. To accomplish this, there is a Neutral Safety Switch installed at the automatic transmission shifter mechanism or at the clutch pedal in case of a manual transmission. Often a transmission range sensor - the part that tells the powertrain computer which position (P R N D) the transmission is in, is used as a neutral safety switch (in the photo). When the automatic transmission is not in Park or Neutral (or when the clutch pedal is not depressed), the neutral safety switch is open and the starter control circuit is disconnected.

Solenoid Valve:-Solenoids act as electric to mechanical energy converters, taking an electrical signal and converting it to work. The operation is based upon the reaction of a moving element, the armature or plunger, in response to a magnetic field developed by an electrical conductor, usually a winding. Solenoids can be configured to operate in either Direct Current (DC), or Alternating Current (AC). Solenoids are electromechanical actuating devices found in many types of applications. The solenoid switches is the part of automobile which relays a large electric current to the starter motor. The system converts electrical energy from the batteries into mechanical energy to turn the engine over. It is mounted on the starting motor and forms the major component of the starting system. The coils inside the solenoid are energized by electricity, they create a magnetic field which attracts and pulls a plunger. Attached to one end of this plunger is a shift lever. The lever is connected to the drive pinion and clutch assembly of the starter motor. The solenoid receives a large electric current from the car battery and a small electric current from the ignition switch. As the ignition switch is turned, a small electric current is sent to the starter solenoid. The pair of heavy contacts closes, relaying the large electric current to the starter motor, which in turn sets the engine in motion. Once the engine starts, the key-operated switch is turned; a spring

in the solenoid assembly pulls the pinion gear away from the mesh, and the starter motor stops. The starter's pinion is clutched to its driveshaft through an overrunning sprig clutch which allows the pinion to transmit drive in only single direction. In this manner, drive is transmitted through the pinion to the flywheel ring gear.

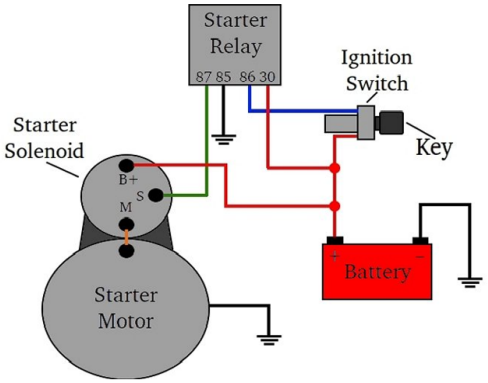

Figure 3.13: starting system

3.1.9 Power supply

Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply Unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others. Here in our application we need a 5v DC power supply. For all electronics involved in the project. This requires step down transformer, rectifier, voltage regulator, and filter circuit for generation of 5v and 12v DC power .The block diagram of power supply is shown in Figure 3.14.

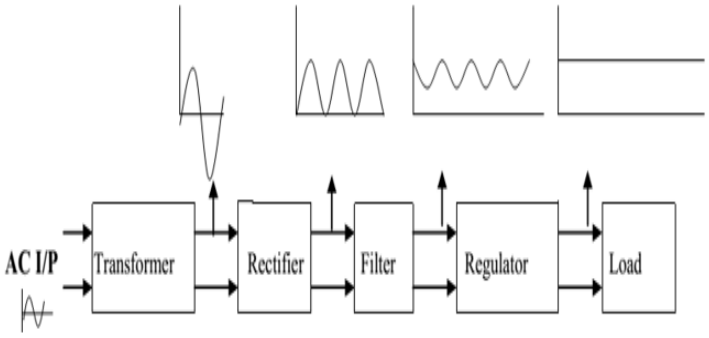

Figure 3.14: Power supply block diagram

Chapter 4

System Design

4.1 Flow chart of the system

The flow chart of the system is shown in Figure 4.1. This flow chart shows the interconnection of various components and their sequential operation when the sensor become active it senses the amount of alcohol taken by the driver and this data is processed or analyzed by the controller then after the controller initiates a command signal and the other components are activated based on the present data they received from the microcontroller. The value of the output voltage is changed based on the concentration of the alcohol detected. Arduino control the output of the system based on the changing voltage from the alcohol sensor. The voltage output is equivalent to the Alcohol level detected in ppm. The Alcohol level is categorized into three level which are intoxication (130 ppm to 260 ppm), slightly drunk (261 ppm to 399 ppm) and drunkenness (above 400 ppm). The LCD will display three conditions based on Alcohol sensed by alcohol sensor. The conditions are intoxication, slightly drunk and drunkenness level.

4.2 Hard Ware System Design

The system design and development describe the fundamental building blocks of the system which highlights the block diagram, operational framework, components and their specification. The block diagram depicts the total blue print of the proposed project. The total essence and the functioning of the project are represented in a single block diagram. This block diagram explains roughly about the connection of the microcontroller Arduino Uno board, 2x16 LCD screen, Mq-3, GSM, Car ignition and LEDs. Based on this block diagram, we write the program code according to our circuit design

4.2.1 Alcohol Detection Principle for Breathalyzer Applications

Overall, there is sufficiently strong evidence to indicate that lowering the legal BAC limit for drivers does help reduce road traffic injuries and deaths in certain contexts. A number of

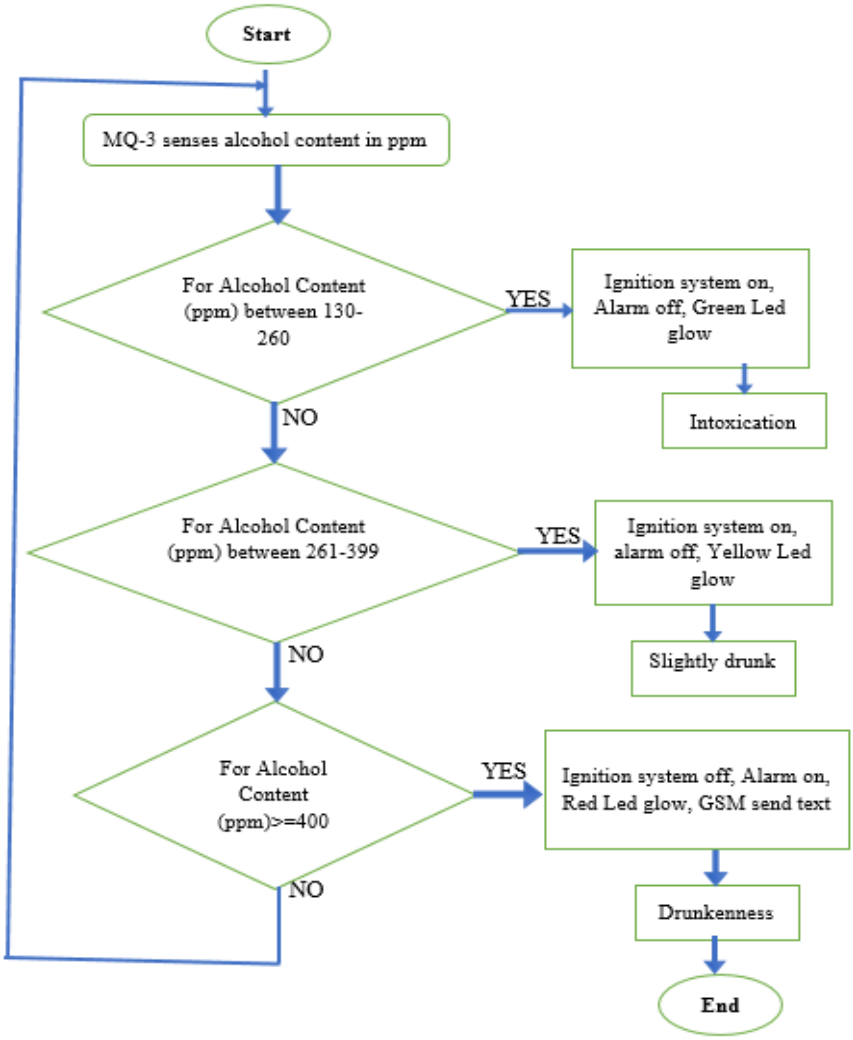

Figure 4.1: Flow chart

studies indicate that lowering the BAC limit from 0.10 to 0.08 reduces road traffic injuries and fatalities, although the scale of effect varies. [13] Various countries have various stated law that guides the alcohol consumption of their driver. Taking this in to account we have determined our specification which doesnt make a great difference but, taking the averaged value. For our designed we select the threshold value for alcohol content is 0.8mg/l which is approximately 400ppm. We use potentiometer instead of Alcohol sensor for simulation purpose to show the status of various contents for every voltage level. The corresponding value of alcoholic content in air (mg/l) with BAC will be as follow. e take samples for 130, 200, 260, 300, 350 and 400 ppm and the result is shown in Table 4.1. Notice the range for

Table 4.1: Alcohol content in different measurement

Alcohol concentration in *ppm*	Alcoholic content in mg/L	BAC(%)	Decision of Arduino
130	0.26	0.054	Green led glow (intoxi-cated)
200	0.4	0.084	Green led glow
260	0.52	0.109	Green led glow
300	0.6	0.126	Yellow led glow (slightly drunk)
350	0.7	0.147	Yellow led glow
400	0.8	0.168	Red led glow (drunk-enness)

alcohol sensor detection scope is 0.05mg/L-10mg/L and the voltage level that an arduino can read from the analog sensor is (0-1023) because of this arduino has 10-bit ADC.

If we know how much alcohol is in the driver breath, there is a straightforward formula used to calculate the blood alcohol content (BAC). Alcohol content in a volume of breath or blood is expressed as mg/L (milligrams per liter). A 1 % blood alcohol content is 10g/L or 10,000mg/L. A 0.1% BAC is 1000mg/L.It turns out that there is a standard conversion from breath alcohol content to BAC that is employed by commercial breathalyzers. Breath

& blood alcohol content differ by a factor of 2100; that is, for every mg of alcohol in the breath, there are 2100mg of alcohol in the blood. [14] So, a person with BAC of 0.1 (%) has 1000mg/L of alcohol in their blood and 1000/2100 = 0.4762mg alcohol in their breath. So, our final formula for calculating BAC from the alcohol measured in the breath is:

$$BAC(\%) = breathmg/L * 0.21 \tag{4.1}$$

4.2.2 Vehicle Ignition System for a Drunk Driver That Uses Different Drives

Regardless of the driver taken by the vehicle either it is electrical or chemical the controlling technique of the ignition system applies to both in same way by same controller the trick in choosing the appropriate position in order to control system. In case of diesel vehicle we choose to control the solenoid valve which controls the fuel supply to the main motor .we select to control the solenoid valve by controlling the relay this serves for both diesel and benzene drive vehicle. The relay was energized according the controller decision if driver consumes an alcohol more than the allowed value based on the program it doesn't energize, if not it does.The controller design is illustrated in Figure 4.2

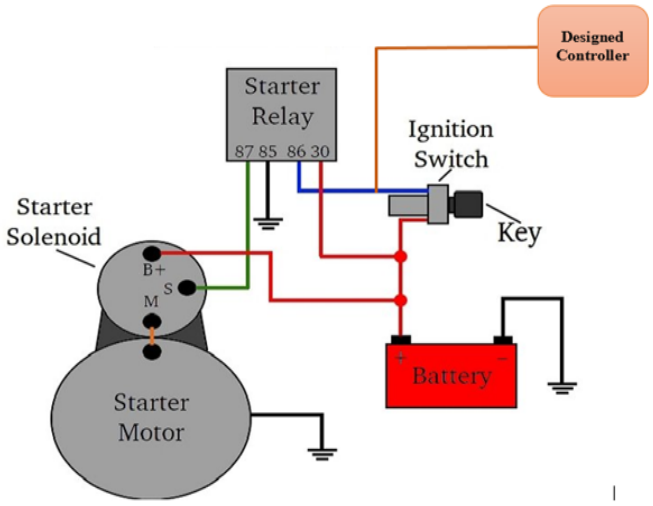

Figure 4.2: Vehicle ignition system for benzene drive

Voltage regulator

Obviously the microcontroller and the alcohol sensor uses 5volt DC supply but the battery

supplys 12 volt DC therefore this voltage reduced in to suitable amount using the 7805 regulator shown below hence, the distributer continuously feeds to the battery to maintained it always. Therefore, it should be reduced to a convenient amount of voltage using a regulator the circuit given below produces an output voltage of the desired amount

4.2.3 Power supply

A **power supply** is an electronic device that supplies electric energy to load. It provides the needed energy to the entire system. The power supply circuit is built using, rectifiers, filters and then voltage regulators. Starting with the ac voltage, a steady dc voltage is obtained by rectifying the ac voltage, then filtering to a dc level, and finally, regulating to obtain a desired fixed dc voltage. The regulation is usually obtained from an IC voltage regulator unit.

Transformers

Transformers are devices which step down a relatively higher AC input Voltage into a lower AC output voltage. Here 50HZ, 220V AC is converted into 12V AC using a step-down transformer. 12V output of step down transformer is an RMS value and its peak value is given by the product of square root of two with RMS value, which is approximately 17V.

$$V_{peak} = \sqrt{2} * Vrms = \sqrt{2} * 12 = 17V \tag{4.2}$$

Rectification

Rectification is the process of removing the negative part of the Alternate Current (AC), hence producing the partial DC. The full wave rectification can be achieved by using 4 diodes as shown in Figure 4.3. Diodes only allow current to flow in one direction. In first half cycle of AC diode D2 and D3 are forward biased and D1 and D4 are reversed biased, and in the second half cycle (negative half) Diode D1 and D4 are forward biased and D2 and D3 are reverse biased. This Combination converts the negative half cycle into positive. here, the output voltage of rectifier is not a pure DC as it consists of pulses. Hence, it is called as pulsating DC power. But voltage drop across the diodes is (2*0.7V) = 1.4V; therefore, the peak voltage at the output of this rectifier circuit is 15.6V (17-1.4) approximately, 16v.

Filtration

The output after the Rectification is not a proper DC, it is oscillation output and has a very high ripple factor. We don't need that pulsating output, for this we use Capacitor. Capacitor

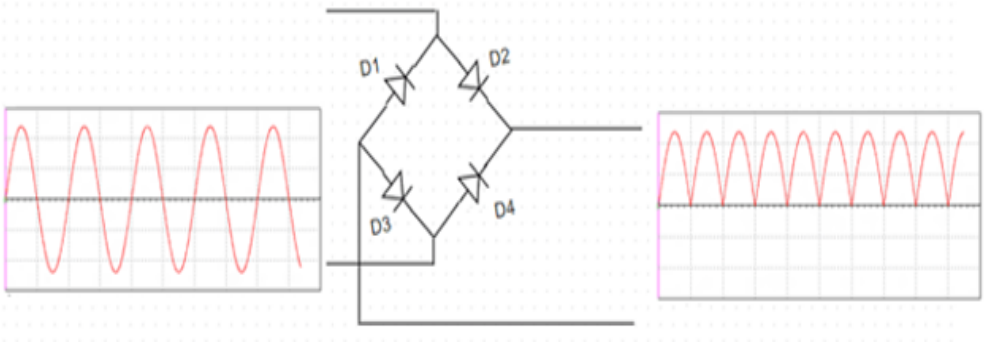

Figure 4.3: Full wave bridge rectifier

charge till the waveform goes to its peak and discharge into Load circuit when waveform goes low. So, when output is going low, capacitor maintains the proper voltage supply into the Load circuit, hence creating the DC. Now the value of this filter capacitor is calculated as follow. the formulae to calculate value of capacitor :

$$C = I * t/V \tag{4.3}$$

C= capacitance to be calculated

I= Max output current (lets say 500mA)

We will get wave of 100Hz frequency after converting 50Hz AC into DC, through full wave bridge rectifier. As the negative part of the pulse is converted into positive, one pulse will be counted two. So, the Time period will be

$$T = 1/(2 * f) = 1/(100Hz) = 0.01s \tag{4.4}$$

V = Peak voltage voltage given to voltage regulator IC (+2 more than rated, means 5+2=7) because A voltage regulator IC 7805 is used to provide a regulated 5v DC. When capacitor discharges into load circuit, it must provide 7v to 7805 IC to work. So, finally V is:

$$V = V_{max} - V_{min} = 16v - 7v = 9v \tag{4.5}$$

At the beginning of each discharge period our capacitor is charged up to V max = 15 V. In order to prevent our capacitor voltage going below V min = 7 V (which is the lowest input operating point for LM7805 voltage regulator) at the end of the discharge period, our

capacitor value should be chosen with the equation:

$$C >= (Imax * Tdischarge)/(Vbeforedischarge - Vafterdischarge) \quad (4.6)$$

$$C_{min} = I * t/V = (0.5A * 0.01s)/9v = 555.6\mu F \quad (4.7)$$

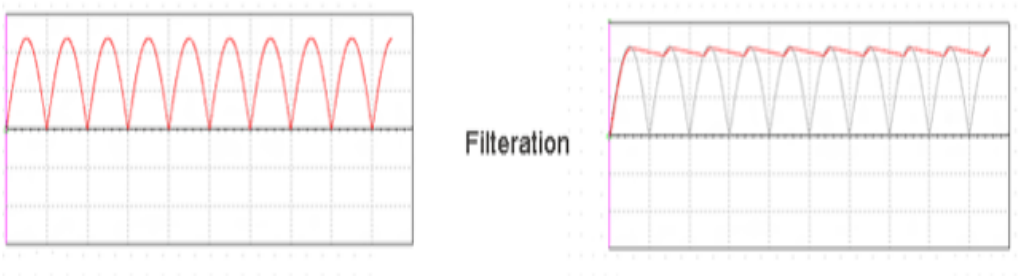

Figure 4.4: Filtering

Voltage Regulation

A voltage regulator IC 7805 is used to provide a regulated 5v DC. Input voltage should be 2volts more than the rated output voltage for proper working of IC, means at least 7v is needed, although it can operate in input voltage range of 7-20V.(and has a maximum input rating of 35V).Voltage regulators have all the circuitry inside it to provide a proper regulated DC. Capacitor of 0.01uF should be connected to the output of the 7805 to eliminate the noise, produced by transient changes in voltage. The power supply circuit to get 5v dc

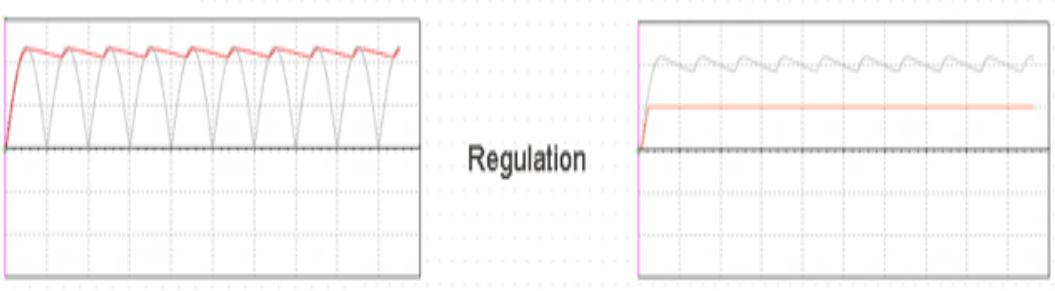

Figure 4.5: Voltage regulation

regulated output is given in the following Figure 4.6

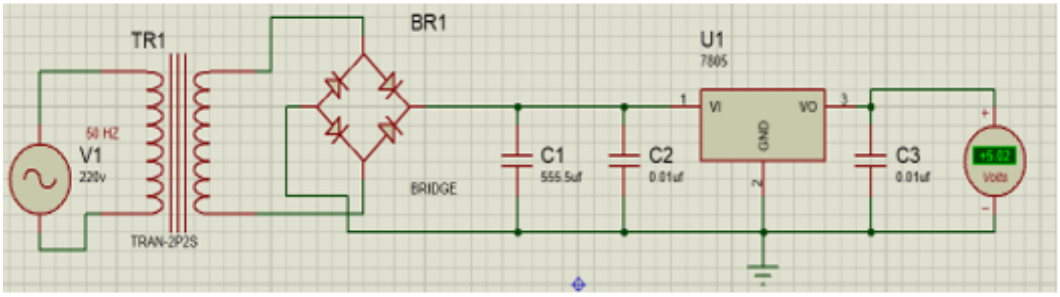

Figure 4.6: Power supply design circuit

4.3 Soft Ware Development

Software development as a general is to develop embedded software required to be integrated and controlled with the hardware development. Software development also means an activity on the computer programming required to construct a circuit as a simulation before doing a fabrication to construct a real physical hardware development. Software programs, called sketches, are created on a computer using the Arduino integrated development environment (IDE). The IDE enables you to write and edit code and convert this code into instructions that Arduino hardware understands. The IDE also transfers those instructions to the Arduino board. The code compilation flow chart is given in Figure 4.7

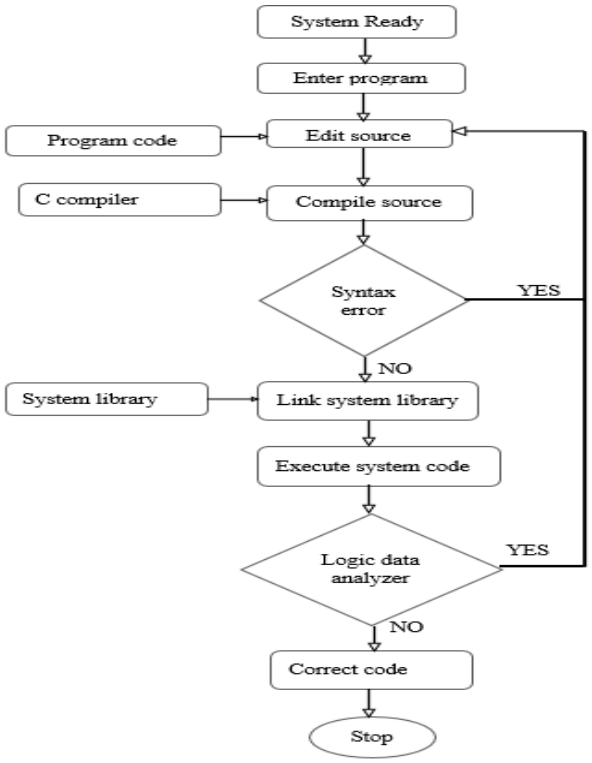

Figure 4.7: Flow chart for compilation code

4.3.1 Code development

Integrated development environments (IDEs) are powerful PC-based programs which include everything to edit, assemble, compile, link, simulate, and source-level debug a program, and then download the generated executable code to the physical microcontroller chip using a programmer device.The program code was written as text file and converted to a machine code using the integrated development environment (IDE).The IDE text editor is shown below Figure 4.8

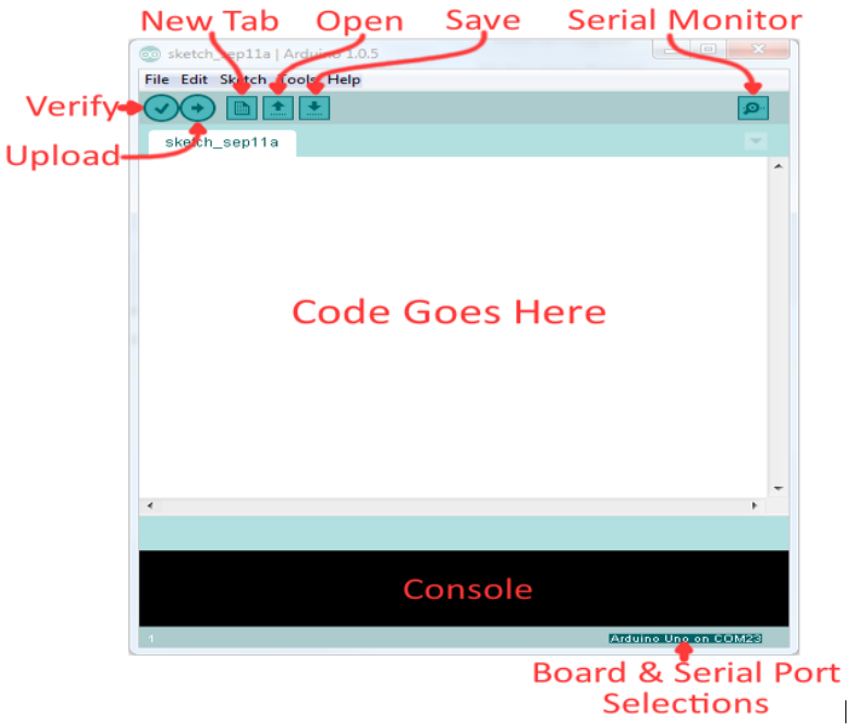

Figure 4.8: IDE text editor

1. Verify: Verifies and compiles code to make sure there are no errors.
2. Upload: Uploads the code to the microprocessor.
3. New: Creates a new sketch.
4. Open: Opens a sketch.
5. Save: Saves the current sketch
6. Sketch Name: Displays the current sketch name. The sketch can also be the file name.

7. Arduino Version: Displays the version of Arduino that is currently running.
8. Serial Monitor: Opens the serial monitor window.
9. Code Editor: Where the code is written.
10. Console: Displays feedback messages while programming / uploading.
11. Board: Displays the board that is connected.
12. Processor: Displays the processor that is currently connected.
13. Port: Displays the port of the Arduino that is currently being used.

IDE is a comprehensive editor, project manager and design desktop for application development of embedded designs using arduino Uno. Once the code is compiled, a hex file is obtained which is burned into the program memory of the microcontroller chip. The hex file from Arduino is uploaded as following Figure 4.9

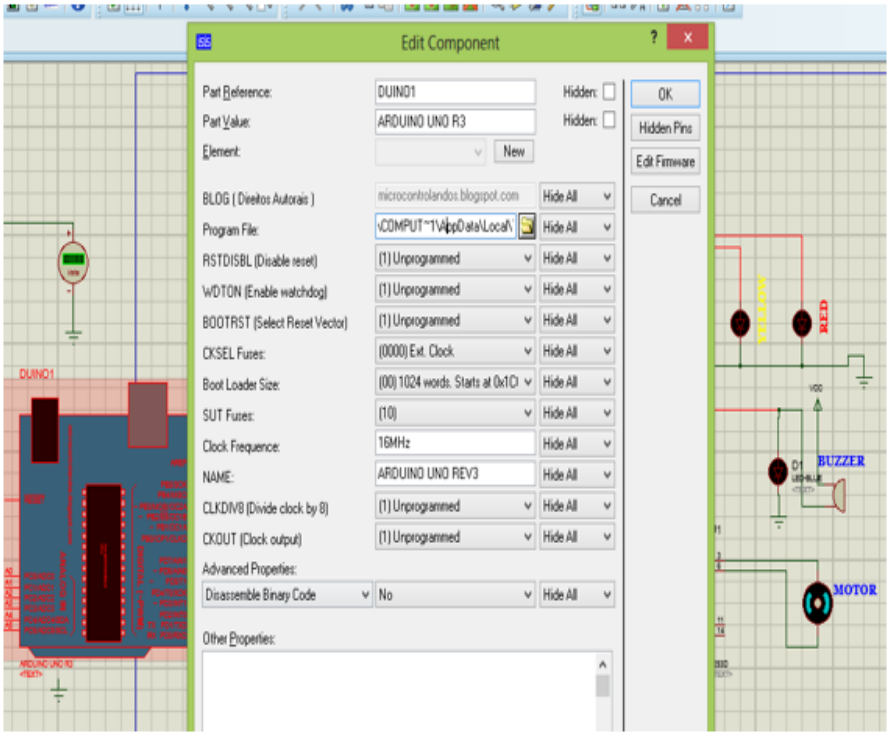

Figure 4.9: Uploading hex file to proteus

4.3.2 Arduino Functions

A function is a group of instructions, also known as a named procedure, used by programming languages to return a single result or a set of results. All functions must have a unique name, setup is one example of a unique function name (setup and loop are special functions in Arduino programming and form part of the structure of a basic sketch). The function name is followed by opening and closing parentheses () that may or may not contain something. All functions must have a return type. Both setup and loop have a void return type. The body of a function consists of an opening and closing brace (). Different functions that are used mostly in arduino are listed as follow:-

The setup () Function

Statements in the setup () function are run only once, every time that the sketch is run. The program then starts executing statements in the loop () function. The sketch will run after it has been programmed into the Arduino. Opening the serial monitor window will reset the Arduino and cause it to run the sketch again. The sketch can also be rerun by pressing the reset button on the Arduino or disconnecting and then reconnecting the power to the Arduino.

The loop () Function

Statements in the loop () function will run continuously from top to bottom and then back to the top. If the loop () function contains two statements, the first statement will be executed, then the second statement, then the first statement again and so on in a loop.

pinMode()

The pin Mode function configures the specified pin to behave either as an input or an output.

digitalWrite()

The digital Write function writes a HIGH or a LOW value to a digital pin. The digitalWrite function writes a HIGH or a LOW value to a digital.

delay()

The delay function pauses the program for the amount of time (in milliseconds).

digitalRead()

Reads the value from a specified digital pin, either HIGH or LOW. igitalRead(pin) the function that are used in our design is shown as below Figure 4.10. The corresponding steps that we use to upload the developed code to the arduino board is:-

Select a Board

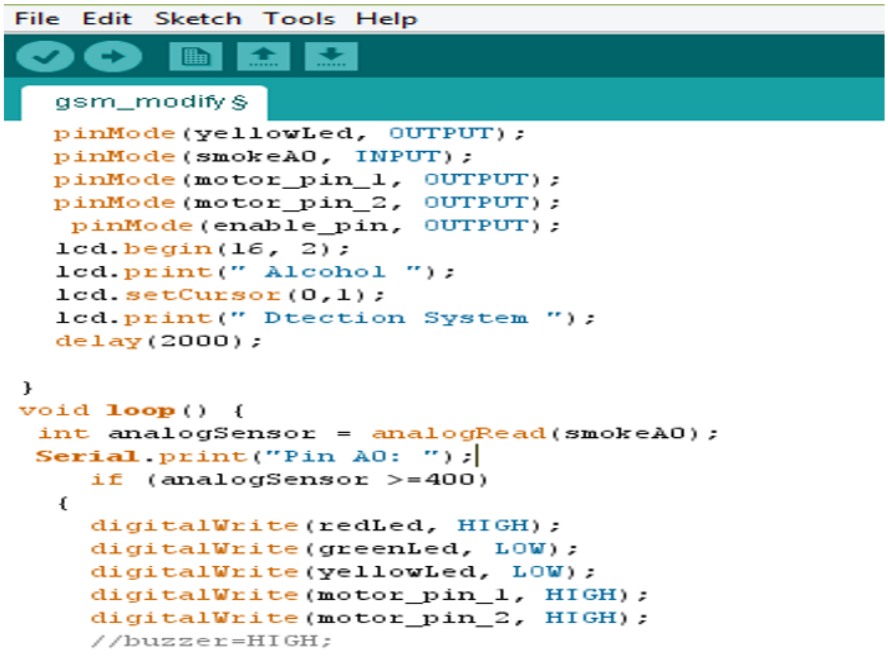

Figure 4.10: Arduino IDE functions

This step is required to tell the Arduino IDE which of the many Arduino boards we have. Go up to the Tools menu. The Board Arduino Uno is selected.

Select a Serial Port

Next up we need to tell the Arduino IDE which of our computers serial ports the Uno Board is connected to. For this, again go up to Tools, Serial Port and select your Uno Arduino Boards COM port.

Upload

With all of those settings adjusted, were finally ready to upload some code! By clicking

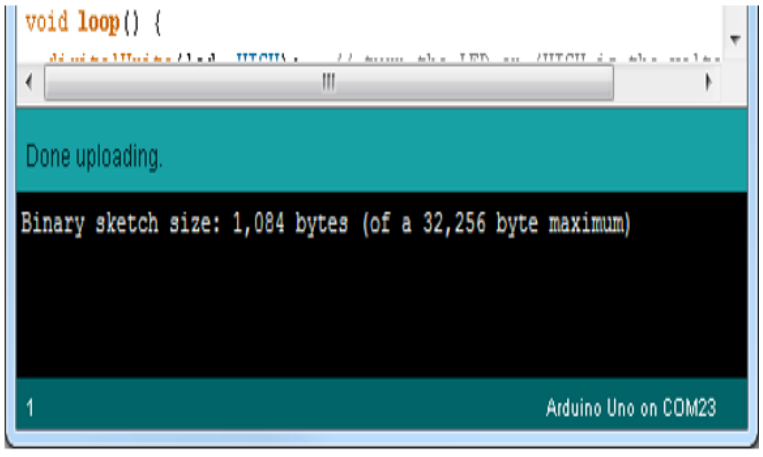

Figure 4.11: Uploading of code to Arduino board

the Upload button (the right-pointing arrow) and allow the IDE some time to compile and upload our code. It should take around 10-20 seconds for the process to complete. When the code has uploaded, you should see something like in Figure 4.11 our console window:

Chapter 5

Result and Discussion

The result of our project was demonstrated by simulation of the designed system using protues 8.1 professional software supported by the intended program written in c programing language to meet its target value. For data analysis, a variable resistor (potentiometer) was connected to the Arduino as a replacement of the alcohol sensor. This input was varied its value accordingly in range of 5 V to match the corresponding ppm value. The circuit diagram for the designed system is shown below in Figure 5.1. The analogue input received

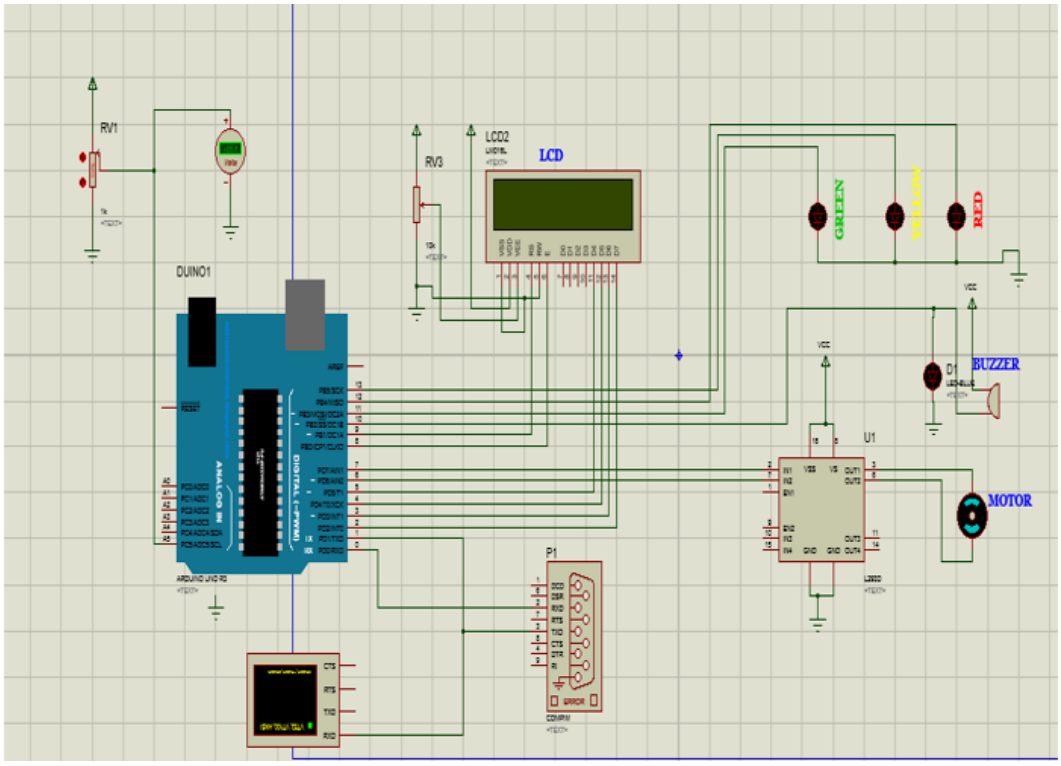

Figure 5.1: Over all schematic Diagram of the system

was quantized into digital signal in microcontroller. The signal was further processed by the controller to yield its corresponding ppm value. This value was displayed on the LCD panel. Simultaneously, the various parameters were switched ON depending on the input given. As illustrated in Table 5.1 For first condition, LCD will display

intoxication when the alcohol sensor detected ppm level from 130 ppm to 260 ppm. This

Table 5.1: Summary result

Alcohol content(PPM)	LED output			Buzzer	Ignition System	GSM modem	LCD Display(status)
	Green	Yellow	Red				
130-260	ON	OFF	OFF	OFF	Enable	OFF	Intoxicated
261-399	OFF	ON	OFF	OFF	Enable	OFF	Slightly Drunk
Above 400	OFF	OFF	ON	ON	Disable	ON	Drunkenness

condition showed that the driver is free from alcohol and there is no alarm sound from the buzzer is activated. While the ignition system is enable means the driver is conscious and can drive the vehicle on the road safely. The result for this condition in protues is as shown in Figure 5.2. The next condition is slightly drunk with 261 ppm to 399 ppm drunkenness level.

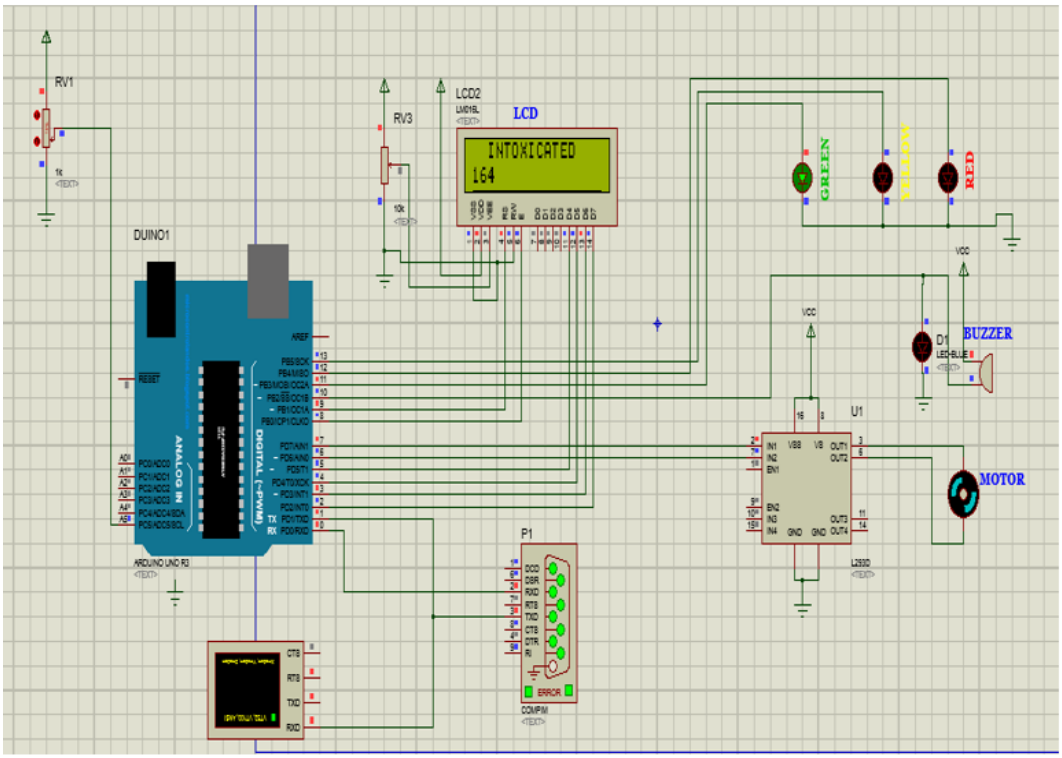

Figure 5.2: Condition 1 when driver is sober

This means the driver has drunk with a little amount of alcohol, but need to be assisted during the driving on the road. The buzzer is activated to alert the driver and the people in vicinity that the driver is slightly drunk. The result as follow in Figure 5.3. The last condition is when the ppm is above the threshold value which 400. The LCD display drunkenness status. Also an alarm from buzzer will be activated to make the driver aware his/her own condition

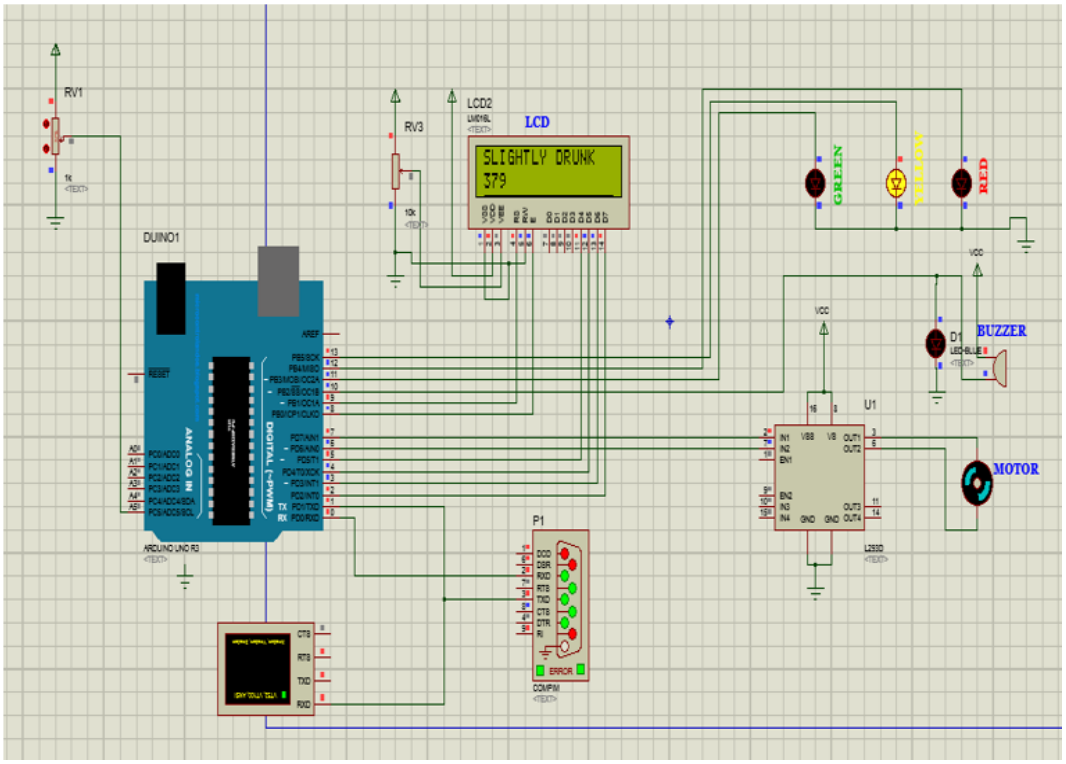

Figure 5.3: Condition 2 when driver is slightly drunk

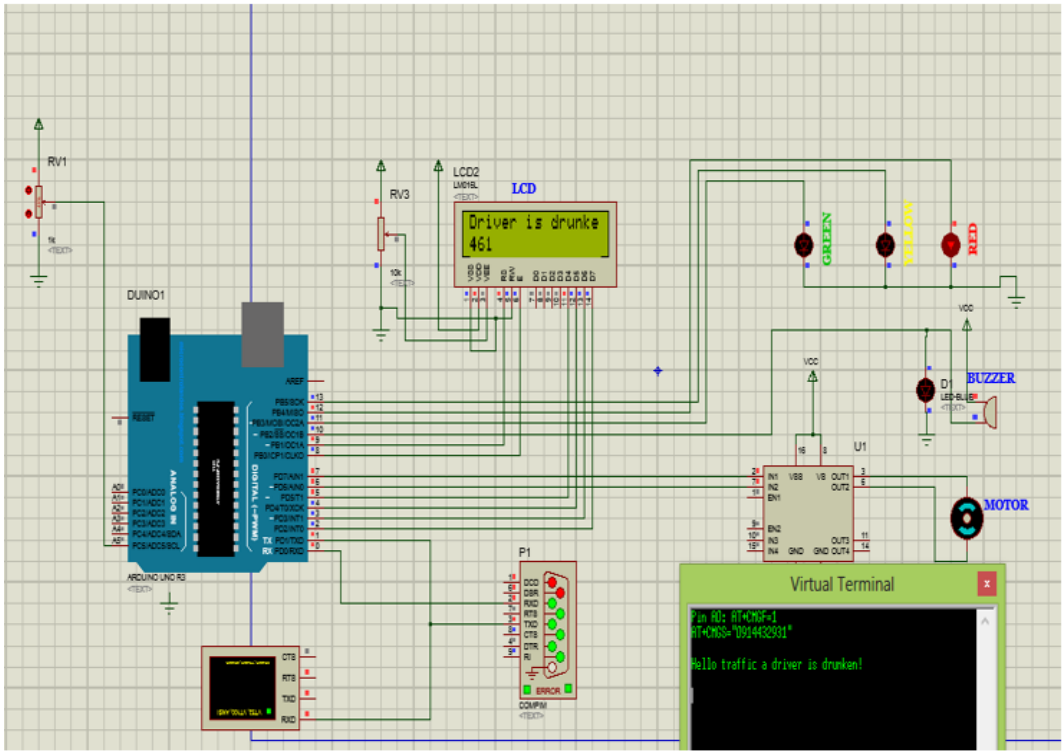

Figure 5.4: Condition 3 when driver is unconscious

and to vigilant other people in surrounding area. The most safety element provided by this system is the driver in high level of drunkenness is not allowed to drive a car as the ignition system will be deactivated.

IMPLEMENTATION AND TEST

At first MQ-3, LCD, GSM and Buzzer are connected together with Arduino. Sensor senses the alcohol level in the air. When the sensed level goes beyond 400PPM the controller will not be sent signal to the motor and the car will not start. On the other hand, if the sensed level is below 400 ppm the control will be given to the motor and the car will start. The sensed level depends upon the sensitivity of the alcohol sensor. The sensed value will decrease with time and when the value goes below the set value the car will start. LCD is

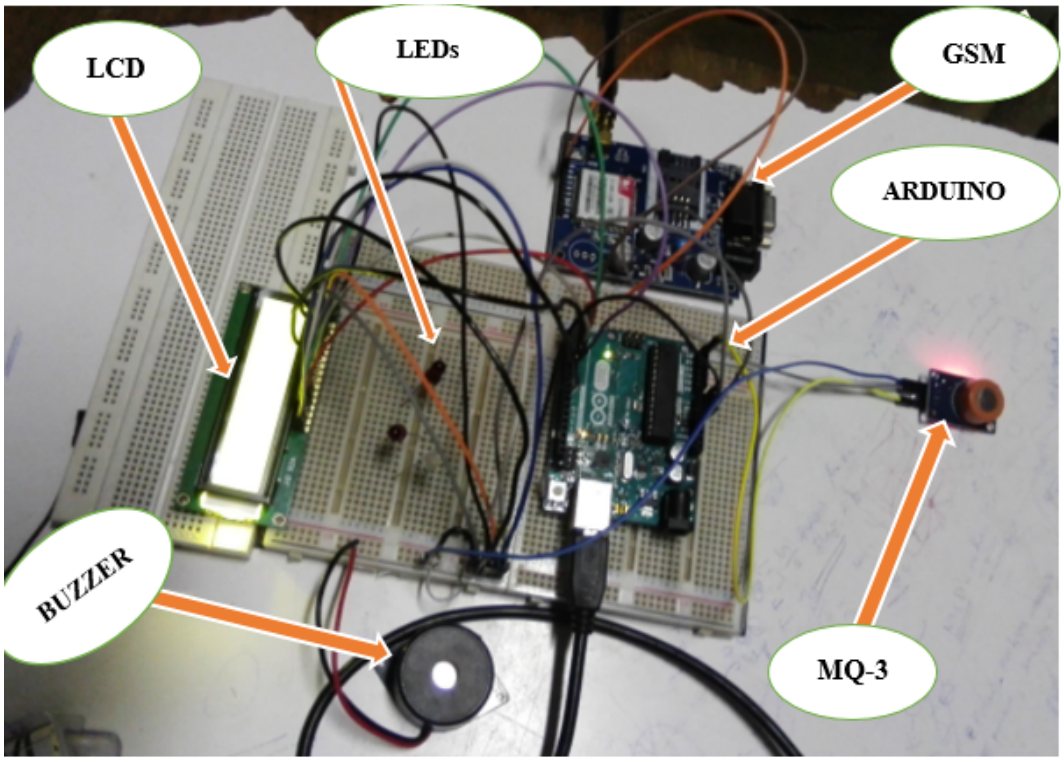

Figure 5.5: Implementation of system

also connected to the microcontroller which shows all the sensed values. The buzzer is also connected which is used to indicate when the value goes beyond the set value. In this paper we try to implement the components as follow Figure 5.5.

Chapter 6

Conclusion and Recommendation

6.1 Conclusion

We proposed an automatic vehicle lock control system for drunken driver embedded with alcohol detector. It consists of Arduino uno as the main controller, MQ-3 alcohol sensor as the input part to the system, and LEDs, LCD display, GSM and alarm system(buzzer) as the output parts to the system. This system is capable to alert the driver about the level of drunkenness by displaying the condition on LCD display. It also produces an alarm from buzzer to make the driver aware his/her own condition and to vigilant other people in surrounding area. When the driver has drunk an alcohol above the specified level, then the GSM modem sends SMS message to the responsible persons mobile phone in order to take a measurement. The most safety element provided by this system is, the driver in high level of drunkenness is not allowed to drive a car as the ignition system will be deactivated. Ultimately, this system helps to prevent the driver to drive in risky situation and will avoid accidents that occur on the road. Generally, our proposed system has a great role on minimizing the traffic accidents that are caused by drunken drivers.

6.2 Recommandation

If anyone has got the chance to do this project again, we recommend to add some advanced features:

- This could also be extended to the heavy vehicles, air bus, navigating vehicles, sense detection machines. These are also extended to bio medical fields, software development industries.
- This can be implemented with GPS modem in order to find the location of the vehicle.
- This can be also extended to minimize car accidents causes by obstacles and drowsy driver by including obstacle sensors and eye blink sensor.

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References

Appendix

Appendix A: Code in C Programming

```
#include<LiquidCrystal.h>
LiquidCrystal lcd(9, 8, 5, 4, 3, 2);
int redLed = 12;
int greenLed = 11;
int buzzer = 10;
int yellowLed=13;
int smokeA0 = A5;
int motor_pin_1=6;
int motor_pin_2=7;
int enable_pin=1;
void setup() {
  Serial.begin(9600);
  pinMode(redLed, OUTPUT);
  pinMode(greenLed, OUTPUT);
  pinMode(buzzer, OUTPUT);
  pinMode(yellowLed, OUTPUT);
  pinMode(smokeA0, INPUT);
  pinMode(motor_pin_1, OUTPUT);
  pinMode(motor_pin_2, OUTPUT);
  pinMode(enable_pin, OUTPUT);
  lcd.begin(16, 2);
  lcd.print(" Alcohol ");
  lcd.setCursor(0,1);
  lcd.print(" Dtection System ");
  delay(2000);

}
void loop() {
```

```
 int analogSensor = analogRead(smokeA0);
Serial.print("Pin A0: ");
   if (analogSensor >=400)
{
   digitalWrite(redLed, HIGH);
   digitalWrite(greenLed, LOW);
   digitalWrite(yellowLed, LOW);
   digitalWrite(motor_pin_1, HIGH);
   digitalWrite(motor_pin_2, HIGH);
   tone(buzzer, 1000, 200);
   lcd.clear();
   lcd.print("Driver is drunken ");
   lcd.setCursor(0, 1);
   lcd.print(analogSensor);
   delay(400);
   SendSMS();      //Send one SMS
   delay(10000);
    while(1);       //Wait forever

}
 if(analogSensor >=261 && analogSensor <=399)
{
   digitalWrite(redLed, LOW);
   digitalWrite(greenLed, LOW);
   digitalWrite(yellowLed, HIGH);
   noTone(buzzer);
   lcd.clear();
   lcd.print("SLIGHTLY DRUNK ");
   lcd.setCursor(0, 1);
   lcd.print(analogSensor);
   digitalWrite(motor_pin_1, LOW);
   digitalWrite(motor_pin_2, HIGH);
```

```
    delay(400);

  }
  if (analogSensor>=130 && analogSensor=<260)
  {
    digitalWrite(redLed, LOW);
    digitalWrite(greenLed, HIGH);
    digitalWrite(yellowLed, LOW);
    lcd.clear();
    lcd.print("  INTOXICATED ");
    lcd.setCursor(0, 1);
    lcd.print(analogSensor);
    delay(400);
    digitalWrite(motor_pin_1, LOW);
    digitalWrite(motor_pin_2, HIGH);
  }
}
void SendSMS()
{
  Serial.println("AT+CMGF=1");
  delay(1000);
  Serial.println("AT+CMGS=\"0914432931\"\r");
  delay(1000);
  Serial.println("Hello traffic alcohol detected by driver !");
  delay(200);
  Serial.println((char)26);
  delay(1000);
}
```