PROJECT
on
Alcohol Sensing With Engine Locking
Submitted towards the partial fulfillment for the award of the degree of
BTECH
IN
Electronics and Communication Engineering
(session 2020-2024)

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ABSTRACT

BACKGROUND: This study proposed an efficient technique for eradicating the upsurge in the number of cases of roads accidents caused by excessive intake of alcohol by drivers on the Indian roads.

Material and methods: This study developed a prototype alcohol detection and engine locking system by using an Arduino Uno microcontroller interfaced with an alcohol sensor along with an LCD screen and a DC motor to demonstrate the concept. The system uses MQ-3 alcohol sensor to continuously monitor the blood alcohol content (BAC) to detect the existence of liquor in the exhalation of a driver. By placing the sensor on the steering wheel, our system has the capacity to continuously check alcohol level from the driver's breath. The ignition will fail to start if the sensors detects content of alcohol in the driver's breath. In case the driver got drunk while driving, the sensor will still detect alcohol in his breath and stop the engine so that the car would not accelerate any further and the driver can park by the roadside.

ACKNOWLEDGEMENT

Date:

In the accomplishment of completion of my project on **Alcohol Sensing Alert with Engine Locking System**
I would like to convey my special gratitude to Dr.Nisha Walde

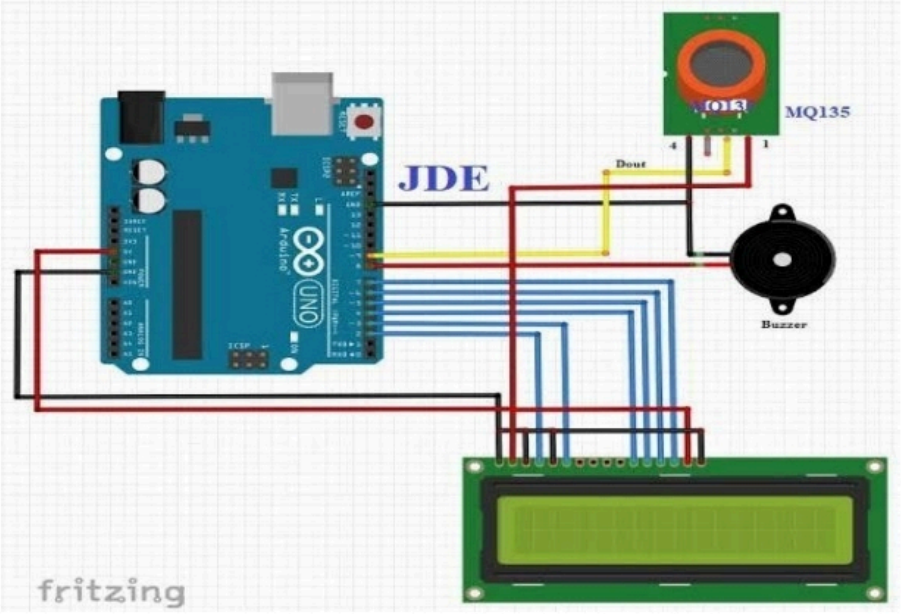
of Dept. Your valuable guidance and suggestions helped me in various phases of the completion of this project. I will always be thankful to you in this regard. I am ensuring that this project was finished by me and not copied

INTRODUCTION

These days, majority of road accidents are caused by drink-driving. Drunken drivers are in an unstable condition and so, rash decisions are made on the highway which endangers the lives of road users, the driver inclusive. The enormity of this menace transcends race or boundary. In Nigeria, the problem is being tackled by issuing laws prohibiting the act of drivers getting drunk before or while driving as well as delegating law enforcements agents to arrest and persecute culprits. However, effective monitoring of drunken drivers is a challenge to the policemen and road safety officers. The reason for this stems from the natural inability of human beings to be omnipresent as well as omniscience within the same space and time. This limited ability of law enforcement agents undermines every manual effort aimed at curbing drink-driving.

and middle-income countries having higher fatality rates per 100 000 population (24.1 and 18.4 respectively). Data collected showed that 67.2% of commercial vehicles drivers in Nigeria admitted to drinking alcohol during working days. This shows that most drivers, especially commercial and heavy duty trucks drivers engage in drink-driving, which can lead to accident. Nigeria sets a legal limit of 0.5 g/100mL blood alcohol concentration (BAC), any level above that is said to be illegal. In this paper, the illegal limit is taken as 0.4. The BAC depicts the quantity of alcohol in a certain volume of blood. It is measured as either grams of ethanol per deciliter of blood (g/fdl, commonly used in the United States), or milliliters of blood, (mg/ml, used in much of Europe). For BAC level from 0.4 to 0.6, drivers feel dazed/confused or otherwise disoriented, and it is generally not safe for a driver to drive a vehicle under such condition. Also, BAC level for 0.7 to 0.8 makes a driver's mental, physical and sensory functions to be severely impaired. At this stage, a driver is inactive and incapable of driving. BAC level of 0.2 to 0.3 is still not safe but the driver still has a little degree of self-control.

Circuit diagram

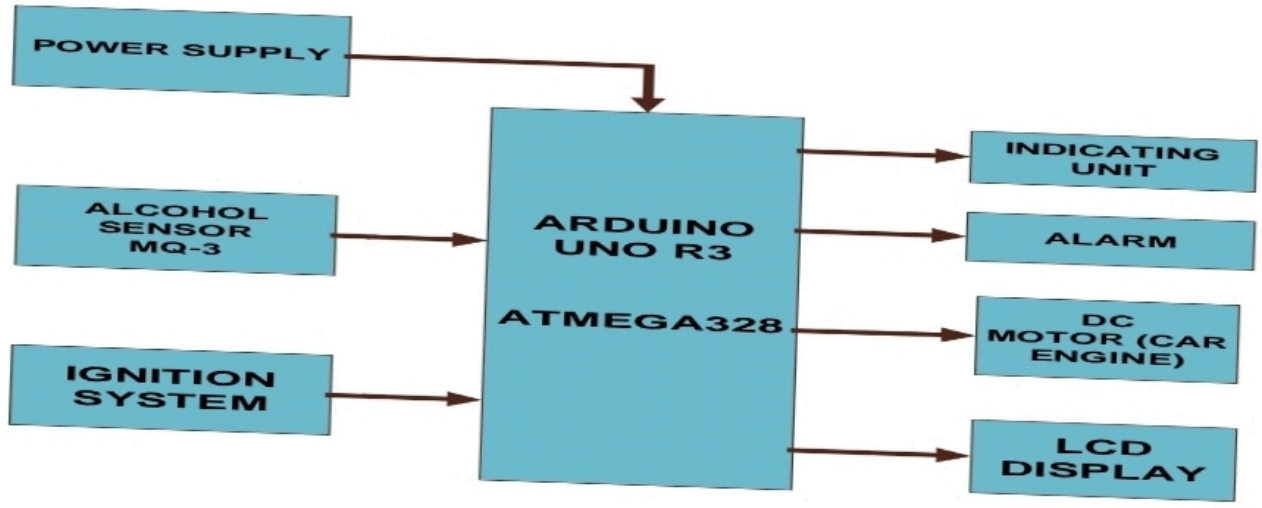


Materials and Methods

- Our proposed work consists of various units that make up the system: the power supply unit, the alcohol detection unit, the engine locking unit, ignition system unit, display unit, alarm unit and indicating unit. An LCD display will be fitted inside the car to act as an indicator to the motorist together with everyone in the vehicle. A DC motor is used as the car engine to demonstrate the concept of engine locking. The ATmega328 microcontroller under the brand name of Arduino Uno will be used to keep looking for the output from the alcohol sensor. The Arduino Uno sketch which is the environment for programming is used to write the code, compile, generate hex file and load it to the microcontroller.

The block diagram of the proposed system is shown in figure 1. It consists of power supply section, MQ-3 alcohol sensor,

DC motor, LCD, microcontroller, alarm and LEDs. The various units were designed and tested separately.

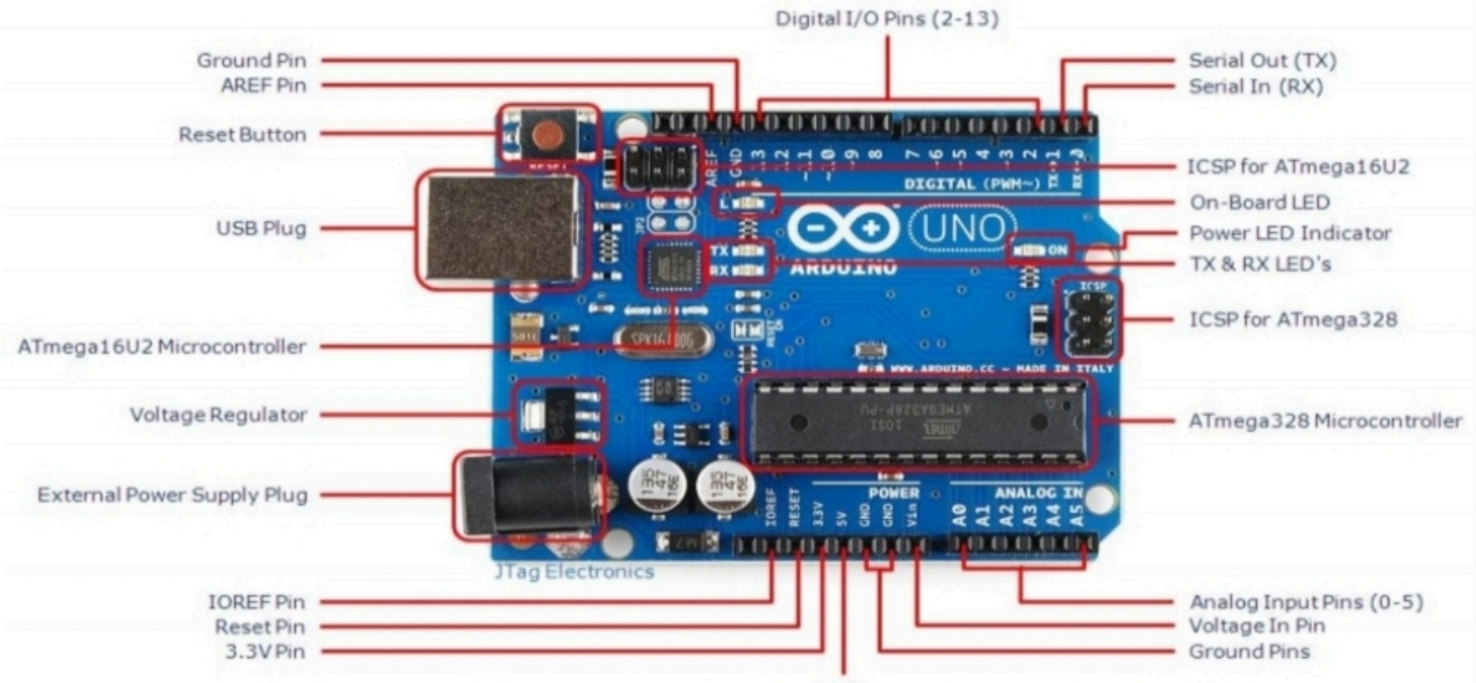


Power Supply Unit

Our system is powered with a 9V battery. A 5V DC supply as required by the microcontroller, sensor and display unit. While other components like DC motor require 1.5V and the LEDs need 2V. The Arduino Uno board has already been designed to operate without the use of transformer, the system can be powered via the USB connection from computer or with an external power supply of 7 to 12V. The External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. Any voltage that is above 12V will make the control device to burn thereby destroying the board. It is advisable to use voltage between 7 - 12V.

ATmega328 Microcontroller

The proposed system is built around ATmega328 Arduino Uno microcontroller board. The unit consists of 14 pins which allows inflow and outflow of feeding (it is possible to use 6 of those pins as Pulse Width Modulation signal outputs), 6 continuous signal with time changing quantity, 16 megahertz electronic oscillator, a Universal Serial Bus port, a power connector, an on-board voltage regulator, ICSP header, and a reset button. The Atmega328 has 32 KB flash memory, 2 KB SRAM and 1 KB EEPROM.


Digital I/O Pins (2-13)
Ground Pin
AREF Pin
Reset Button
USB Plug
ATmega16U2 Microcontroller
Voltage Regulator
External Power Supply Plug
Serial Out (TX)
Serial In (RX)
ICSP for ATmega16U2
On-Board LED
Power LED Indicator
TX & RX LED's
ICSP for ATmega328
ATmega328 Microcontroller
Analog Input Pins (0-5)
Voltage In Pin
Ground Pins
IOREF Pin
Reset Pin
3.3V Pin
JTag Electronics
DIGITAL (PWM~)
UNO
ARDUINO
POWER
ANALOG IN

MQ-3 Alcohol Sensor Unit

The sensor is made of Tin Dioxide (SnO_2) sensitive layer. The sensor is configured with a high sensitivity to

alcohol and small sensitivity to Benzene. It has a simple drive circuit with fast response, stability, and long life.

It has an analog interface type. On the sensor, port pins 1, 2 and 3 represents the output, GND and VCC

respectively. The technical specification of the sensor is portrayed in table

Table 1: Alcohol Sensor Technical Specification

Parameter Name	Sensor type	Detection gas	Concentration	Voltage	Load resistance (R_L)	Heater resistance (R_H)	Sensing resistance (**Rs**)	Slope	Temp humidity
	Semiconductor	Alcohol gas	0.04-4mg/l alcohol	±5.0V	Adjustable	31Ω ±3 Ω	2KΩ-20KΩ (in 0.4mg/l alcohol)	200–1000ppm	20±2; 65%±5%RH

The circuit diagram of the MQ-3 sensor is shown in figure 3 and 4. In the datasheet, the recommended value to
be used ranges from 100k ohm to 470k ohm. Here, 200k ohm was used.

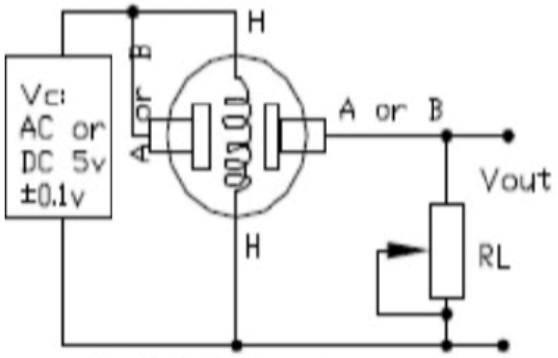
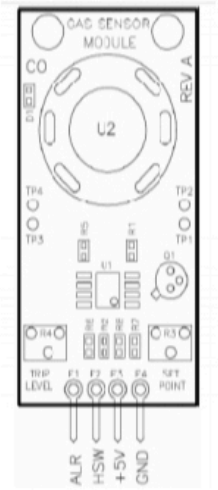


Fig. 3: MQ-3 circuit diagram



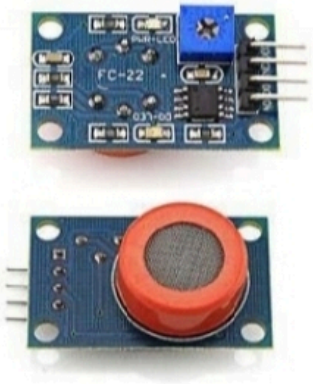
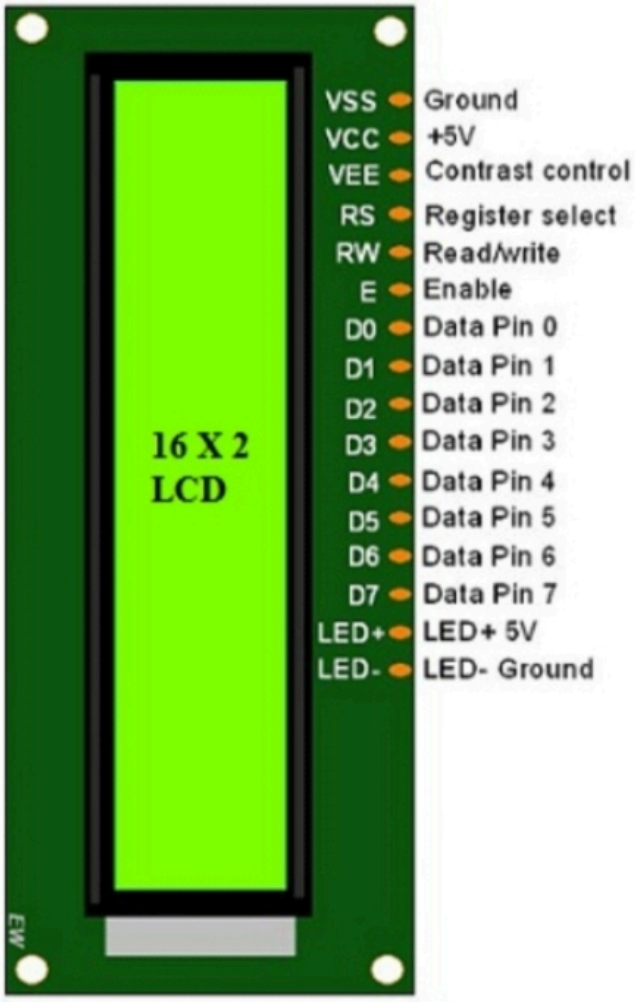


Fig. 4: Simplified circuit diagram of MQ-3 alcohol sensor

LCD Display Unit

The term LCD stands for liquid crystal display. It is one kind of electronic display module used in an extensive range of applications like various circuits & devices like mobile phones, calculators, computers, TV sets, etc. These displays are mainly preferred for multi-segment light-emitting diodes and seven segments. The main benefits of using this module are inexpensive; simply programmable, animations, and there are no limitations for displaying custom characters, special and even animations, etc.



LCD-16×2-pin-diagram

Alarm and Indicating Unit

The alarm unit used is a buzzer which indicates when alcohol is detected. The buzzer used belongs to the PS series. The

PS series are high-performance buzzers that employ Uni-morph piezoelectric elements and are designed for easy

incorporation into various circuits. They have very low power consumption in comparison to electromagnetic units.

It has a voltage requirement of 2V and is connected to pin 7of the microcontroller. The standard resistor valueof 220 Ωcommercially available is closest to the computed value of 250 Ω, so a 220 Ω resistor was used to limit the current going

through the LEDs.

DC Motor

The DC motor is an electric DC motor used to demonstrate the concept of engine locking. Here in this work, the DC

motor will be connected to pin 9 on the microcontroller, when alcohol is detected the DC motor stops in other to indicate

that alcohol is detected and continue running when there is no alcohol detected.

System Flow chart

The flow chart of the system is shown in figure 6. The system algorithm comprises of three main steps. First is to boot up the system, next is the measuring state, this stage measure the amount of alcohol level from the drivers. A prescribed set limit will be given as input to the microcontroller, once the alcohol level exceeds the limit the car will not start.

STEP 1: Power on the system

STEP 2: checks for alcohol concentration

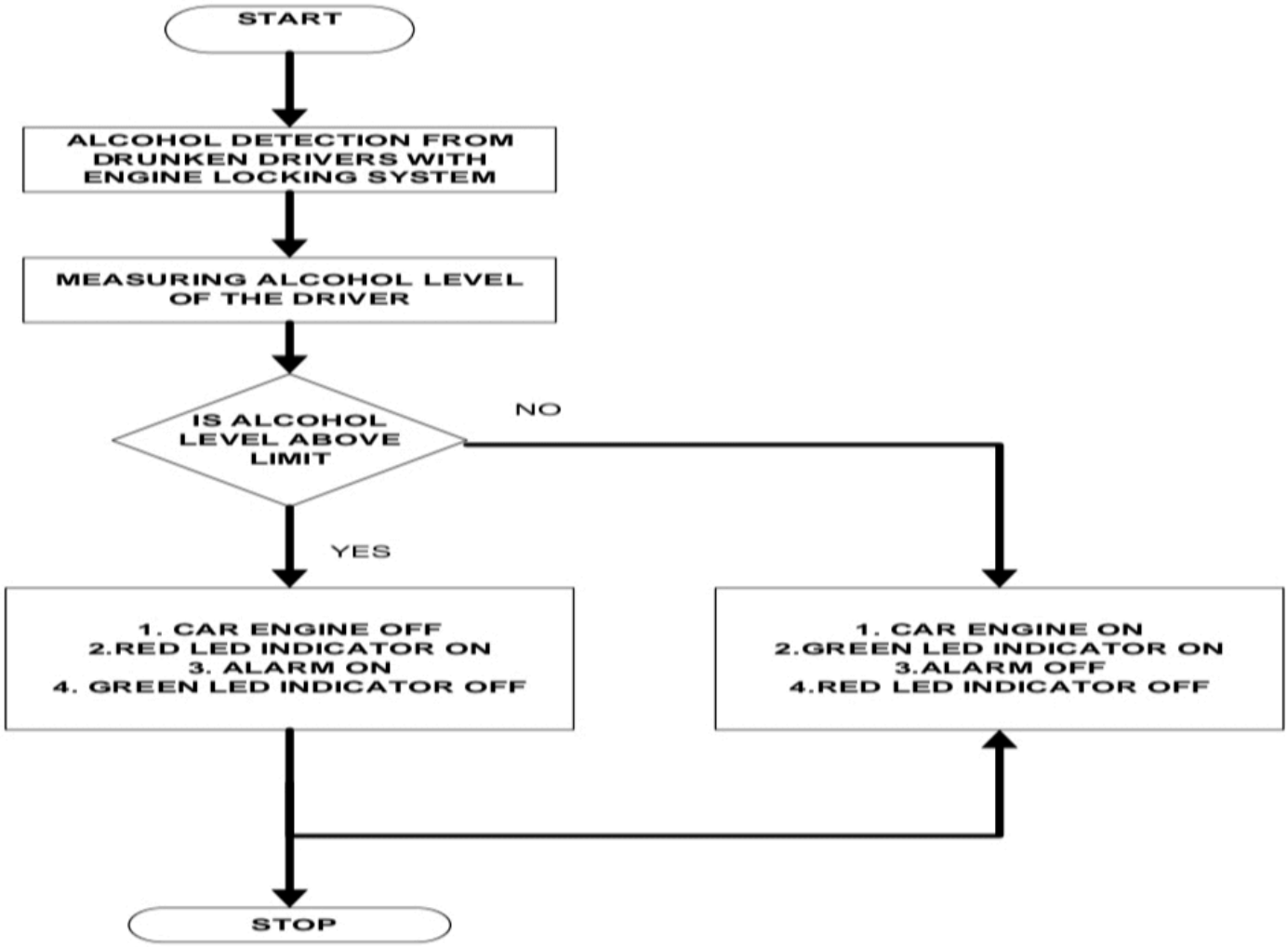
STEP 3: if alcohol is detected

STEP 3.1: turn off car engine

STEP 4: Else

STEP 5: Car engine running

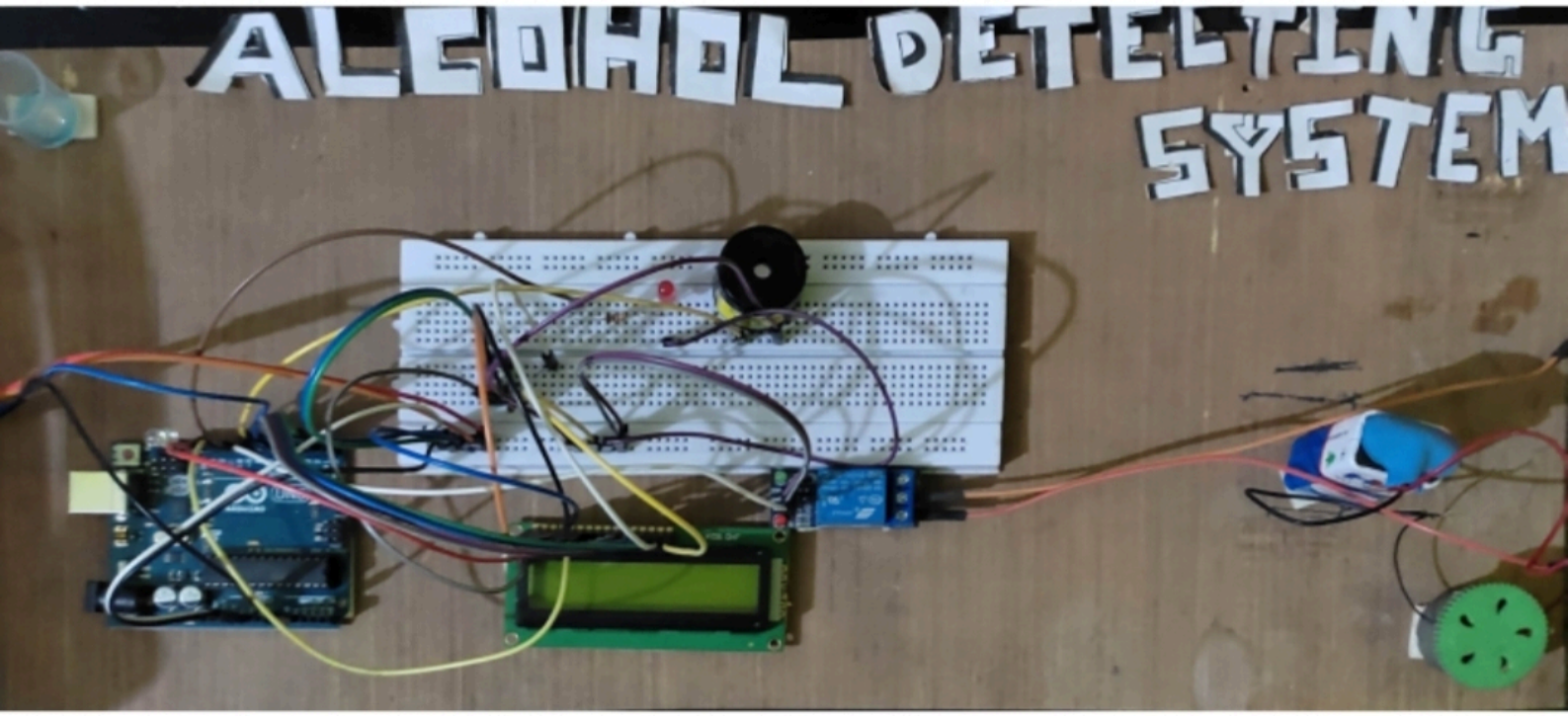
STEP 6: Goto step 1


START
ALCOHOL DETECTION FROM DRUNKEN DRIVERS WITH ENGINE LOCKING SYSTEM
MEASURING ALCOHOL LEVEL OF THE DRIVER
IS ALCOHOL LEVEL ABOVE LIMIT
NO
YES
1. CAR ENGINE OFF
2.RED LED INDICATOR ON
3. ALARM ON
4. GREEN LED INDICATOR OFF
1. CAR ENGINE ON
2.GREEN LED INDICATOR ON
3.ALARM OFF
4.RED LED INDICATOR OFF
STOP

```
#define sensorDigital 6
#include <LiquidCrystal.h>
LiquidCrystal lcd(12, 11, 5, 4, 3, 2);
#define LED2 13
#define LED1 9
#define buzzer 7
#define sensorAnalog A1
int RelayPin = 8;

void setup() {
pinMode(sensorDigital, INPUT);
pinMode(LED1, OUTPUT);
pinMode(LED2,OUTPUT);
pinMode(buzzer, OUTPUT);
pinMode(RelayPin,OUTPUT);
lcd.begin(16, 2);
Serial.begin(9600);
}
void loop() {
bool digital = digitalRead(sensorDigital);
int analog = analogRead(sensorAnalog);

Serial.print("Analog value : ");
Serial.print(analog);
Serial.print("\t");
Serial.print("Digital value :");
Serial.println(digital);
```

```
Serial.print("Digital value :");
Serial.println(digital);

if (digital == 0) {
digitalWrite(LED1, HIGH);
digitalWrite(LED2,LOW);
digitalWrite(buzzer, HIGH);
digitalWrite (RelayPin , HIGH );
lcd.setCursor(4,0);
lcd.print("WARNING..");
lcd.setCursor(0,1);
lcd.print("ALCOHOL DETECTED");

} else {
digitalWrite(LED1, LOW);
digitalWrite(LED2,HIGH);
digitalWrite(buzzer, LOW);
digitalWrite(RelayPin, LOW);
lcd.clear();
lcd.setCursor(4,0);
lcd.print("NORMAL..:)");
lcd.setCursor(0,1);
lcd.print("AlcoholNotDetect");

}

}
```

Result



Conclusions

In this paper, we proposed a method to sense the presence of alcohol from the breath of drivers and curtail the

catastrophic effects it can have on peoples' lives. The system was designed and implemented successfully via

the use of Arduino Uno ATMEGA328 microcontroller and MQ-3 sensor. Experimental evaluation of the

system showed that the alcohol sensor was able to deliver fast response when alcohol is detected. Also, the

ability of the alcohol sensor to operate over a long time is a feature of the proposed system.

Reference

1.Youtube
2.Google