APPLICATION OF BREATH ANALYZER USING MQ-3 SENSOR IN CARS

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Microprocessors and Interfacing

CSE2006

Slot: A1

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ABSTRACT

Vehicle accidents have always become a primary concern. Nowadays, people are organizing late night parties, getting alcoholic and after that they tend to drive the vehicle but due to their lack of consciousness they may cause serious fatalities on the road. So we present a technology that will help to diminish the consequences caused due to this effect. The objective of our work is to create an application of MQ-3 sensor. In this application we attach the sensor to a car along with a microcontroller which will tell if the driver is drunk (alcohol level in the driver's breath is too high).

Arduino Robot Cars which can be controlled using an Android App is developed using various components such as Arduino UNO, Bluetooth module HC-06, Motor Driver L298 N and Android device. The Arduino based will be controlled using an Android App wherein the communication between the car and Android device will take place by the Bluetooth module.Various data bytes are sent for moving the car in forward, reverse, forward left, forward right, reverse left and reverse right. For the developing and interfacing the components we studied various literatures and discussed on it. We studied the data sheets for the components such as Arduino UNO, Motor driver L298 N and Bluetooth Module HC-06. Then we interfaced the Arduino UNO with the Motor driver and Bluetooth module. We code which was developed using the Arduino IDE is uploaded into the Arduino UNO. We added some new attributes later which enhanced the working of Arduino controlled car. Also we applied various methods to reduce data redundancy and data inconsistency. And finally we did the testing of our Arduino based RC Car.

Finally, we would say that the Arduino based RC car which is designed works using a very simple logic that whenever a data byte is sent from the Android App over the Bluetooth, the Arduino would react appropriately. Unlike other Cars, it uses very less amount of data which is transferred over Bluetooth which makes it faster and quicker to react. Also the time required to show the results is very less which makes it very feasible to use. We can think of extending this project on a large scale.If the breath contaians alcohol above a certain content the automobile will not start as it is not safe for the drunk driver to ride the vehicle. If the driver is not drunk (no noticeable alcohol level in the driver's breath) the automobile will work as usual. To tackle this problem, the ignition mechanism of the vehicle is altered.

INTRODUCTION

A Breathalyzer or breath analyser (a portmanteau of breath and analyser) is a device for estimating blood alcohol content (BAC) from a breath sample. Breathalyzer is the brand name for the instrument that tests the alcohol level developed by inventor Robert Frank Borkenstein.

Alcohol that a person drinks shows up in the breath because it gets absorbed from the mouth, throat, stomach and intestines into the bloodstream.

Alcohol is not digested upon absorption, nor chemically changed in the bloodstream. As the blood goes through the lungs, some of the alcohol moves across the membranes of the lung's air sacs (alveoli) into the air, because alcohol will evaporate from a solution -- that is, it is volatile. The concentration of the alcohol in the alveolar air is related to the concentration of the alcohol in the blood. As the alcohol in the alveolar air is exhaled, the breath alcohol-testing device can detect it. Instead of having to draw a driver's blood to test his alcohol level, the device can test the driver's breath on the spot and instantly know if vehicle should be halted. It is this principle that we use in this project and use the breath of individuals to check if they have consumed high level of alcohol which makes them unfit for driving a vehicle. We aim at making a vehicle which will not start in such a situation.

PROBLEM DEFINITION

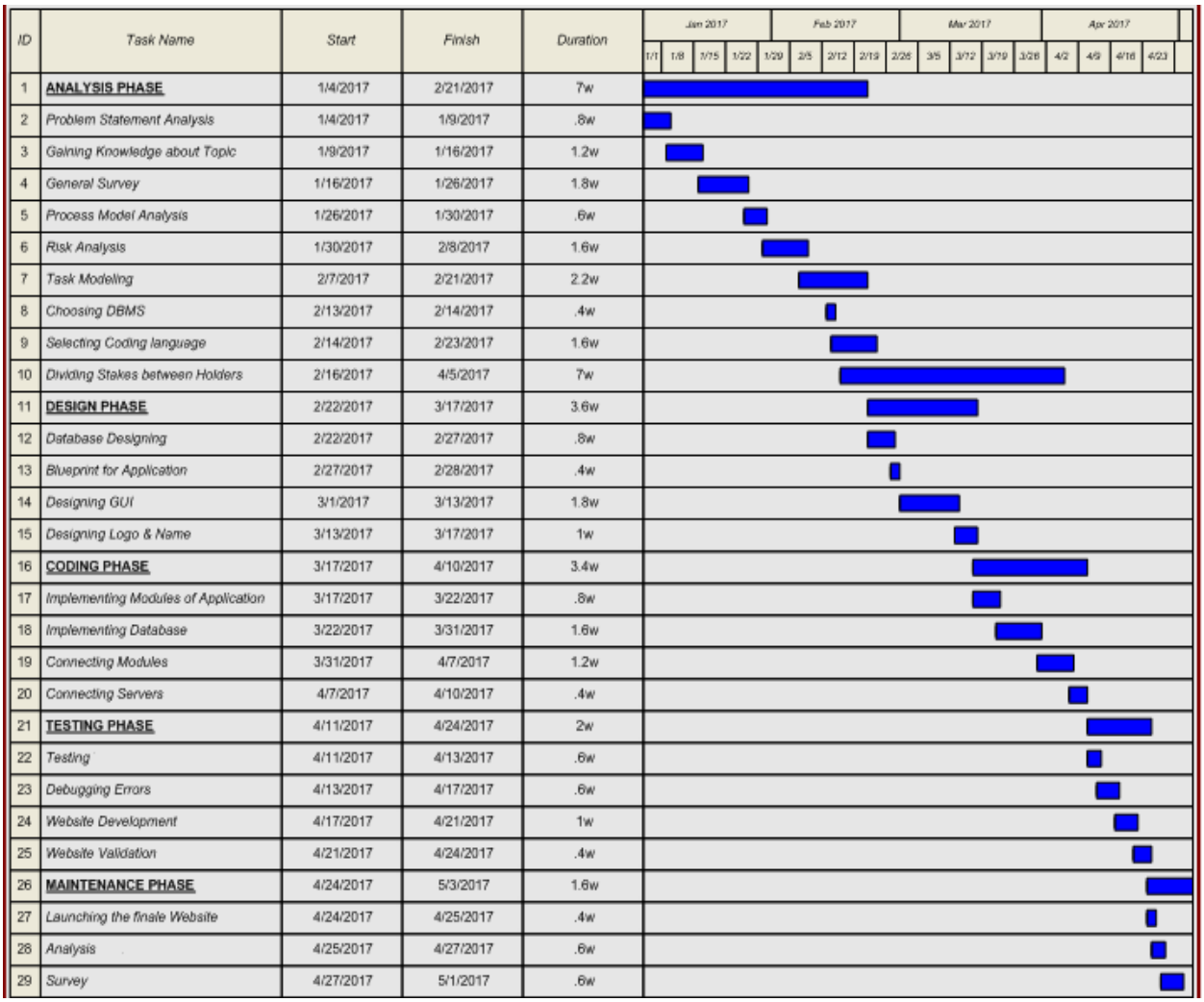
There are many luxurious features added in cars. These mainly focus on making the experience of the users friendlier. With more added features in car, usually safety is also taken into account. It includes carbon fibre frames in the car, disc braking system etc. But what if the person driving the vehicle is not eligible or fit for driving the car. In this project we focus on this aspect of security. There arises a need to do so in a systematic manner which we have tried to implement with our system. The system we have proposed is an extended approach to some of previous tries on this path.

With the advancement and breakthroughs in technology over the years, the lives of people have become more dependent solely on the technology. With the adoption of our system, we can gain control over the main security aspect of driving. The application of our system comes in handy when people are drunk and try to use a car which may cause accidents.

LITERATURE SURVEY

Alcohol detection in cars has been a problem since a long time and there were many attempts to take care of this issue. An attempt like this has been made in [4], the purpose of this project is to develop vehicle accident prevention by method of alcohol detector in an effort to reduce traffic accident cases based on driving under the influence of alcohol. This project is developed by integrating the alcohol sensor with the microcontroller 16F877A. The alcohol sensor used in this project is MQ-3 which is used to detect the alcohol content in human breath. [1] gives an idea about the usage of L-298 Motor Driver sensor. [2] is a brief elaboration on the working of MQ-3 sensor. It shows sample programs in Arduino IDE about the different operating modes of MQ-3 sensor. [3] is another project which gives a broader idea about application of our project. There are many real life situations that require control of different devices remotely and to provide security. There will be instances where a wired connection between a remote appliance/device and the control unit might not be feasible due to structural problems. In such cases a wireless connection is a better option. Basic Idea of our project is to provide security even if the owner is away from any help.

GANTT CHART

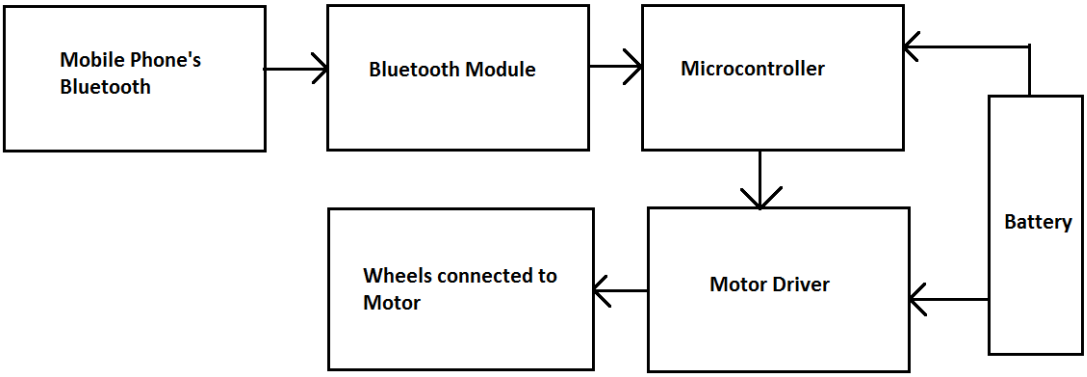


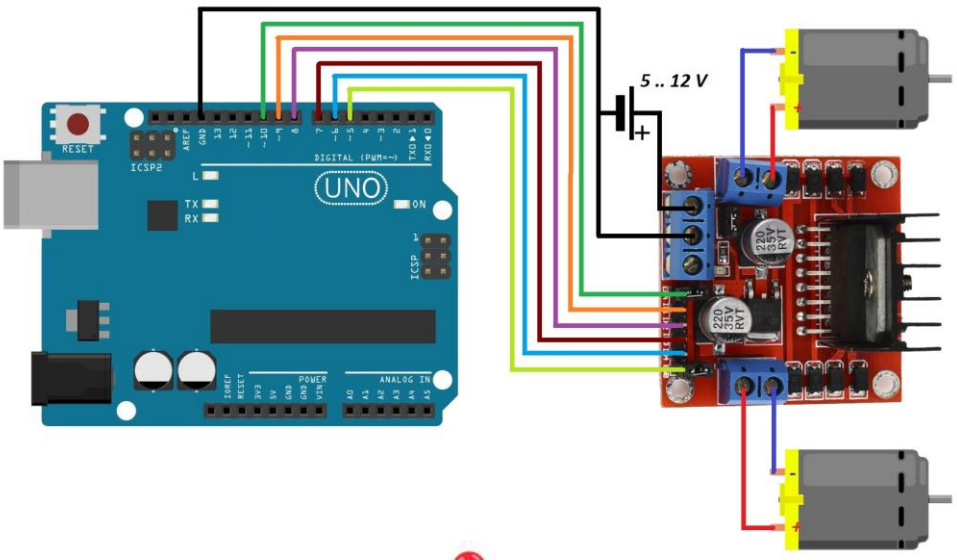
ID	Task Name	Start	Finish	Duration
1	**ANALYSIS PHASE**	1/4/2017	2/21/2017	7w
2	Problem Statement Analysis	1/4/2017	1/9/2017	.8w
3	Gaining Knowledge about Topic	1/9/2017	1/16/2017	1.2w
4	General Survey	1/16/2017	1/26/2017	1.8w
5	Process Model Analysis	1/26/2017	1/30/2017	.6w
6	Risk Analysis	1/30/2017	2/8/2017	1.6w
7	Task Modeling	2/7/2017	2/21/2017	2.2w
8	Choosing DBMS	2/13/2017	2/14/2017	.4w
9	Selecting Coding language	2/14/2017	2/23/2017	1.6w
10	Dividing Stakes between Holders	2/16/2017	4/5/2017	7w
11	**DESIGN PHASE**	2/22/2017	3/17/2017	3.6w
12	Database Designing	2/22/2017	2/27/2017	.8w
13	Blueprint for Application	2/27/2017	2/28/2017	.4w
14	Designing GUI	3/1/2017	3/13/2017	1.8w
15	Designing Logo & Name	3/13/2017	3/17/2017	1w
16	**CODING PHASE**	3/17/2017	4/10/2017	3.4w
17	Implementing Modules of Application	3/17/2017	3/22/2017	.8w
18	Implementing Database	3/22/2017	3/31/2017	1.6w
19	Connecting Modules	3/31/2017	4/7/2017	1.2w
20	Connecting Servers	4/7/2017	4/10/2017	.4w
21	**TESTING PHASE**	4/11/2017	4/24/2017	2w
22	Testing	4/11/2017	4/13/2017	.6w
23	Debugging Errors	4/13/2017	4/17/2017	.6w
24	Website Development	4/17/2017	4/21/2017	1w
25	Website Validation	4/21/2017	4/24/2017	.4w
26	**MAINTENANCE PHASE**	4/24/2017	5/3/2017	1.6w
27	Launching the finale Website	4/24/2017	4/25/2017	.4w
28	Analysis	4/25/2017	4/27/2017	.6w
29	Survey	4/27/2017	5/1/2017	.6w

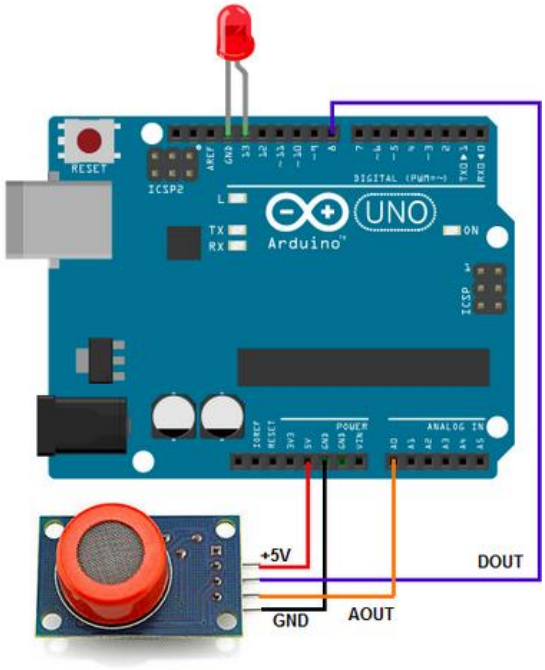
PROPOSED MODEL

The mechanism of our project includes some basic ideas. Firstly, an MQ-3 sensor is used which detects the alcohol content in the breath of the person. This data is then transmitted to Arduino using wires. The Arduino is then attached to L-298 Motor Driver sensor. If the alcohol content is below certain level the Arduino switches the motor driver on and the motors which are attached to it start.

BLOCK DIAGRAM







REQUIREMENTS

SOFTWARE REQUIREMENTS:

Arduino Software for Windows - This will be used to design the code for the Arduino UNO

Android's Phone Bluetooth – This will connect with the Bluetooth Module HC 06

Android App – The App will be designed for controlling the car

Android Studio – This will be used to design the Android App

HARDWARE REQUIREMENTS:

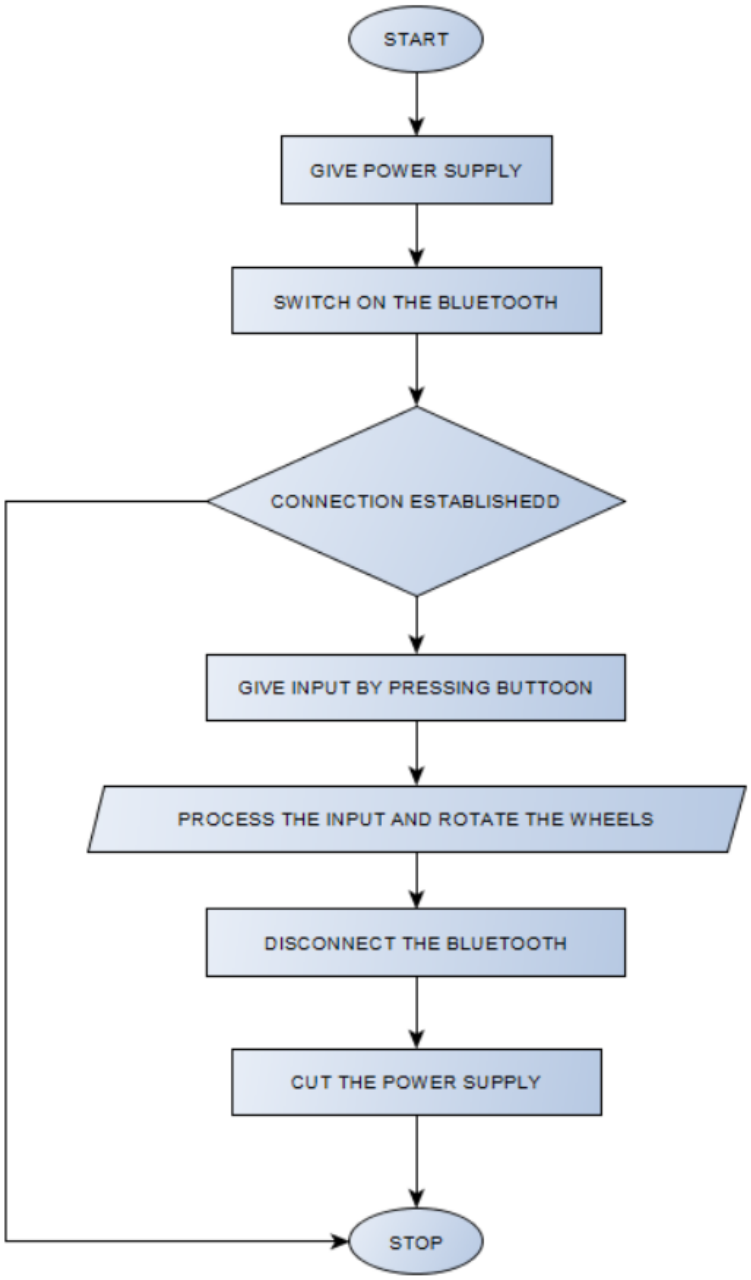
Arduino UNO- Arduino/Genuino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button.

L-298 Motor Driver Module-This dual bidirectional motor driver is based on the very popular L298 Dual H-Bridge Motor Driver IC. This module will allow you to easily and independently control two motors of up to 2A each in both directions.

MQ-3 Sensor- This alcohol sensor is suitable for detecting alcohol concentration on your breath, just like your common breathalyzer. It has a high sensitivity and fast response time. Sensor provides an analog resistive output based on alcohol concentration. The drive circuit is very simple, all it needs is one resistor. A simple interface could be a 0-3.3V ADC.

Others:

- Bread Board
- Two 9 V batteries
- Jumper cables etc


START
GIVE POWER SUPPLY
SWITCH ON THE BLUETOOTH
CONNECTION ESTABLISHEDD
GIVE INPUT BY PRESSING BUTTOON
PROCESS THE INPUT AND ROTATE THE WHEELS
DISCONNECT THE BLUETOOTH
CUT THE POWER SUPPLY
STOP

ARDUINO CODE

```
int Motor_A_Enable = 9;
int Motor_A_Reverse = 3;
int Motor_A_Forward = 4;
const int ledPin5=5;
const int ledPin12 = 12;
int Motor_B_Enable = 10;
int Motor_B_Reverse = 12;
int Motor_B_Forward = 7;
int value;
byte data = 0;
const int AOUTpin=0;//the AOUT pin of the alcohol sensor goes into analog pin A0 of the arduino

void setup() {
  // put your setup code here, to run once:
  Serial.begin(9600);

  pinMode(Motor_A_Enable, OUTPUT);
  pinMode(Motor_A_Forward, OUTPUT);
  pinMode(Motor_A_Reverse, OUTPUT);
  pinMode(ledPin5, OUTPUT);
  pinMode(ledPin12, OUTPUT);
  pinMode(Motor_B_Enable, OUTPUT);
  pinMode(Motor_B_Forward, OUTPUT);
  pinMode(Motor_B_Reverse, OUTPUT);
```

```
}

void loop() {

  value= analogRead(AOUTpin);//reads the analaog value from the alcohol sensor's AOUT pin



   data = Serial.read();
   Serial.print("Alcohol value: ");
   Serial.println(value);//prints the alcohol value

   delay(1000);
   Serial.print("\n");
   Serial.print(data);
   Serial.print("\n");
   if(value>300&&value<450)

   {
    digitalWrite(ledPin5, HIGH);
    if(int(data) == 49) //FORWARD
    {
      analogWrite(Motor_B_Enable, 100);
      analogWrite(Motor_A_Enable, 100);
      digitalWrite(Motor_A_Reverse, LOW);
      digitalWrite(Motor_B_Reverse, LOW);
      digitalWrite(Motor_A_Forward, HIGH);
```

```
  digitalWrite(Motor_B_Forward, HIGH);

}
else if(int(data) == 50)//REVERSE
{
  analogWrite(Motor_B_Enable, 100);
  analogWrite(Motor_A_Enable, 100);
  digitalWrite(Motor_A_Forward, LOW);
  digitalWrite(Motor_B_Forward, LOW);
  digitalWrite(Motor_A_Reverse, HIGH);
  digitalWrite(Motor_B_Reverse, HIGH);

}
else if(int(data) == 51)
{
  analogWrite(Motor_A_Enable, 100);
  analogWrite(Motor_B_Enable, 0);
  digitalWrite(Motor_A_Reverse, LOW);
  digitalWrite(Motor_A_Forward, HIGH);

}
else if(int(data) == 52)
{
  analogWrite(Motor_B_Enable, 100);
  analogWrite(Motor_A_Enable, 0);
  digitalWrite(Motor_B_Reverse, LOW);
```

```
    digitalWrite(Motor_B_Forward, HIGH);


   }
  else if(int(data) == 53) //REVERSE LEFT
  {
    analogWrite(Motor_A_Enable, 100);
    analogWrite(Motor_B_Enable, 0);
    digitalWrite(Motor_A_Reverse, HIGH);
    digitalWrite(Motor_A_Forward, LOW);


   }
  else if(int(data) == 54) //REVERSE RIGHT
  {
    analogWrite(Motor_B_Enable, 100);
    analogWrite(Motor_A_Enable, 0);
    digitalWrite(Motor_B_Reverse, HIGH);
    digitalWrite(Motor_B_Forward, LOW);


   }
}
else
  {
    digitalWrite(ledPin5, LOW);
    digitalWrite(ledPin12,HIGH);
   }
```

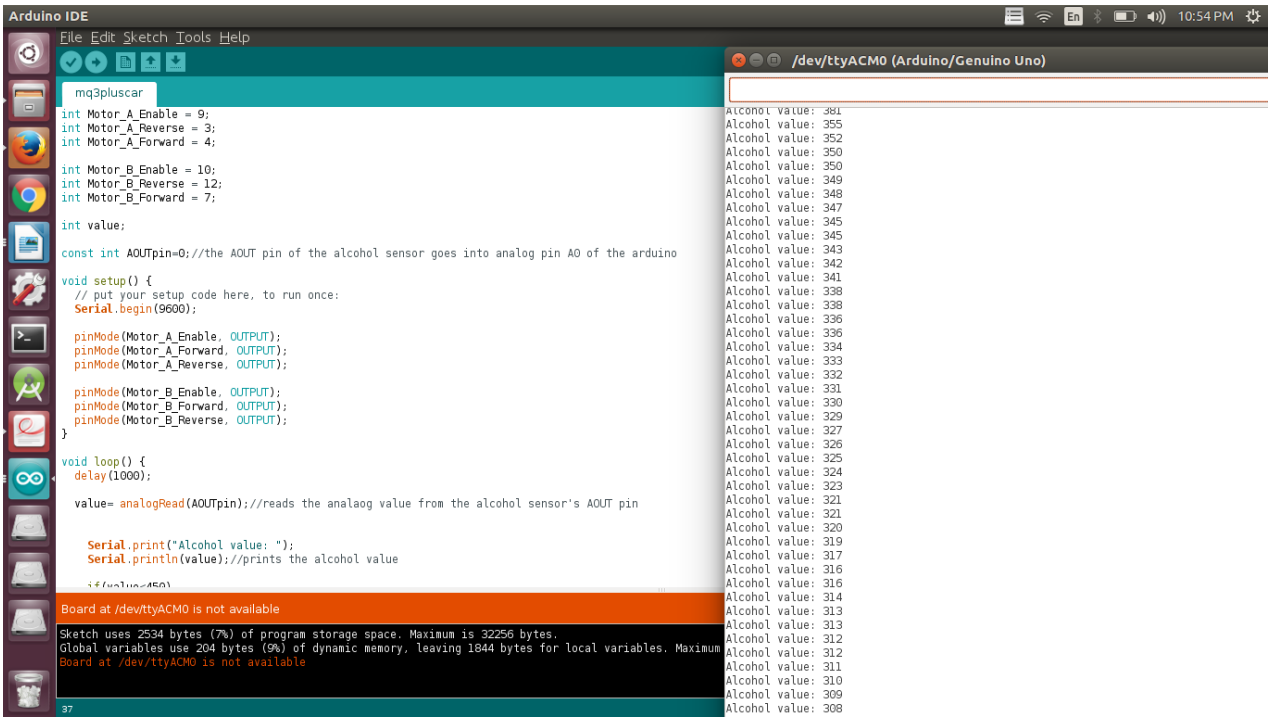
}

TESTING AND DEBUGGING

The Arduino Code was successfully compiled without any errors.

The android app was developed using the Android Studio. The Bluetooth module of the Android App is used to send the data bytes over the Bluetooth module fitted into the car. The android app was tested using the Android emulator on the Android studio. It was tested to control the car and then some changes were made in it according to the requirements. Finally, the app was debugged.

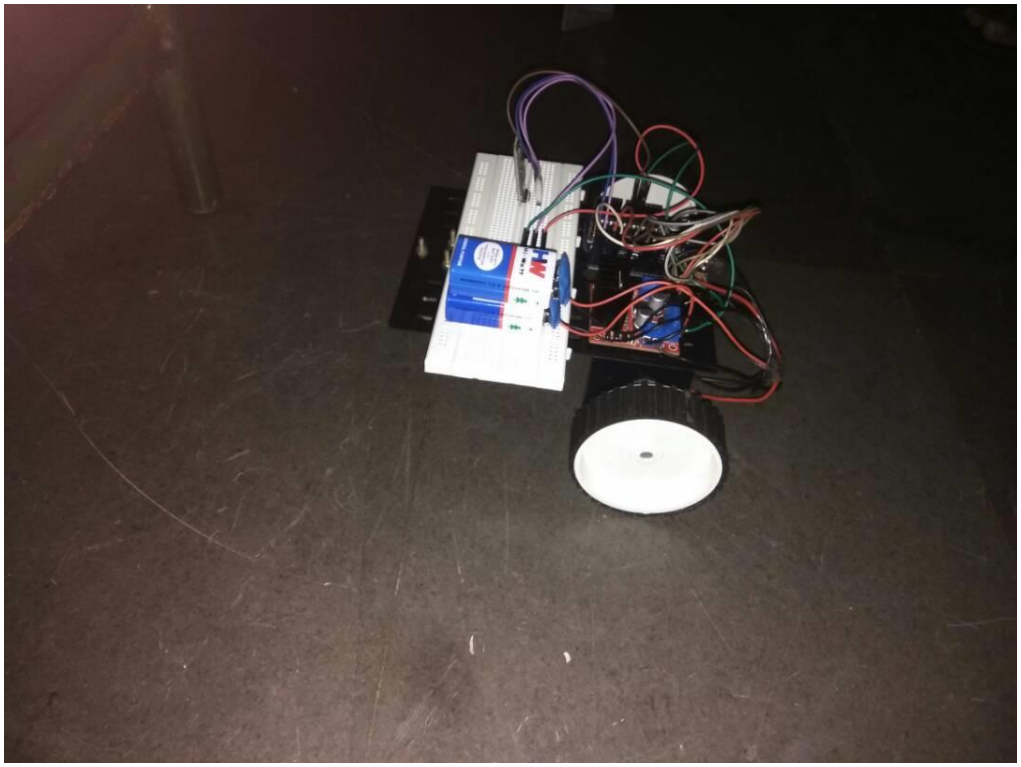
Below are the screenshots of the compiled code:



Results and Analysis

The desired results were found as the Arduino based RC controlled car project went through various phases of its development cycle.

Motor_A_enable	Motor_B_enable	IN1	IN2	IN3	IN4	Result
100	100	0	1	0	1	Forward
100	100	1	0	1	0	Reverse
100	0	0	1			Fwd-left
0	100			0	1	Fwd-Right
100	0	1	0			Rev-left
0	100			1	0	Rev-right



FUTURE ENHANCEMENT

The future implications of the project are very great considering security it provides. The project can be implemented in all cars. The location of the MQ-3 sensor can be near the steering wheel and it will keep checking the breath of the driver at all times. If there is high alcohol content in the breath of the driver the car will not start otherwise it is good to go. The project can be further used to alert the nearest police station. There are more possibilities which can be implemented.

CONCLUSION

The project we have undertaken has helped us gain a better perspective on various aspects related to our course of study as well as practical knowledge of electronic equipment and communication. We became familiar with software analysis, designing, implementation, testing and maintenance concerned with our project. The extensive capabilities of this system are what make it so interesting. By using simple sensors and some microprocessor logic great security can be obtained. Hence this application had helped us to get a vivid perspective of automobile security and the working of different sensors and microprocessors.

REFERENCES

1. http://www.instructables.com/id/How-to-use-the-L298-Motor-Driver-Module-Arduino-Tu/
2. http://www.learningaboutelectronics.com/Articles/MQ-3-alcohol-sensor-circuit-with-arduino.php
3. http://www.projectsof8051.com/alcohol-detection-with-vehicle-controlling/
4. http://www.ijser.org/researchpaper/INTELLIGENT-ALCOHOL-DETECTION-SYSTEM-FOR-CAR.pdf