Alcohol Detector Using Arduino (Smart vehicle)

[1]Prof. Meena Sune, [2]Vijay Kumar Nirapure, [3]Rani Kachahe, [4]Sejal, [5]Sontakke Prerna Arun, [6]Kanhaiya Bamne

[1]AssistantProfessor,[2,3,4,5,6]Students
Department of Electrical and Electronics Engineering
Shri Balaji Institute of Technology and Management
Betul, Madhya Pradesh, India.

Abstract-
The main aim of this project is to design a system for implementing an efficient over speed and alcohol detection system for vehicles that will be useful to reduce car accidents.In this evolving World, people are driving very fast and accidents are occurring frequently, so we lost our valuable life by making small mistakes while driving (e.g., school zones, hills areas, highways) and collision between the vehicles. In order to avoid such kind of accidents and to alert the drivers and to control their vehicle speed in such kind of places, the highway department has placed the signboards. But sometimes it may not be possible to view that kind of signboards and there is a chance for accident. So to intimate the driver about the zones and the speed limit automatically, it is done by means of using RF technology. The main objective of this project is to design a RF based speed control system meant for vehicle's speed control and monitors the zones which can run on an embedded system. Smart Display and Control (SDC) can be custom designed to fit into a vehicle's dashboard and displays information on the vehicle. The project is composed of two separate units–zone status transmitter unit and receiver (speed display and control) unit, a alcohol sensor. Once the information is received from the zones, the vehicle's embedded unit automatically alerts the driver and reduce the speed according to the zone, it waits for few seconds and otherwise vehicle's SDC unit automatically reduces the speed and and when the vehicle driven by a drunken person then the system automatically send a message to the nearest traffic police station. Therefore, the project members will design and implement the prototype of this system.

Key Words: Arduino Uno, ATMega328 microcontroller, RF transmitter and receiver module, dc motor, gas sensor.

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1. INTRODUCTION

At this time, one of the major factors for loss of life, loss of infrastructures and Material a car accident. Even though many quality roads are built, relatively latest car exists, different rules and regulation are made statistically the car accident are increasing year after year. The reasons for these accidents are many failures to give way for pedestrians, over speed, influence of alcohol and drug are the common and major ones. Starting from this point of view we designed a system which can reduce the accidents caused by over speed and drunken driving.

2. PROBLEM STATEMENT

In our world car accident increases increase from day because of many reasons. From those reasons most car accidents occur due to drunken driving and over speed. Therefore this project will be a solution to the problem by providing an embedded system, which installed in the vehicles.

3. PROJECT OBJECTIVE

The main objective of this project is to design and implement over speed and alcohol detection system for vehicles.

Specific objective.

- To protect the great human life from car accident
- To avoid loss of materials and
- To give a better car accident prevention system to the traffic station

4. SCOPE OF THE PROJECT

The project includes designand implementation of both hardware and software.

- Microcontroller ATmega8A is used as central processor.
- MQ-2 Alcohol sensor is used to detect the alcohol concentration.
- RF Module is used to receive and transmit information
- C-language for the Microcontroller coding.
- Proteous software is used for simulation purpose.

5.LITERATURE REVIEW

To design a system that can achieve the objective of the project some studies have been carried out, which involving three main subtopics such as previous case study on related projects, studies of hardware and software.

6. WORK REVIEW

There are some existing projects related to over speed and alcohol detection system. Some of them are:-

InJiangpengDai [2] theyareproposed**"Mobile Phone Based Drunk Driving Detection",**

Early detection and alert of dangerous vehicle maneuvers typically related to drunk driving. The entire solution requires only a mobile phone placed in vehicle and with accelerometer and orientation sensor. A program installed on the mobile phone computes accelerations based on sensor readings, and compares them with typical drunk driving pattern extracted from real driving tests. Once any evidence of drunk driving is present, the mobile phone will automatically alert the driver or call the police for help well before accident actually happens. They implement the detection system on Android G1phoneandhaveittested with different kinds of driving behaviors.

But they are designed a system for drunk driving detection only, so there is no any mechanism to stop the car in this system, our project worked on this issue.

K. In Govindaraju [3] proposed **"An Embedded Based Vehicle Speed Control System Using Wireless Technology",**

The main objective of this system is to operate the vehicle in safe speed at critical zones. The base station having the transmitter which is designed for Frequency Modulation (FM), the receiver part is implemented in Vehicle. The ARM processor is implemented at receiver side, which receives the critical frequency, and then it is activated in critical mode. Speed Control Driver (SCD) can be custom designed to fit into a vehicle's dashboard ,and displays information on the vehicle. Once the information is received, it automatically alerts the driver, to reduce the speed according to the time and zone. This system only used to inform the speed limit of the road to the driver but if the driver ignores the warning there is no system to stop him, so we are designed a system by using RF communication to inform for the nearest traffic station.

In Nimmy James[4]**"Alcohol Detection System",**

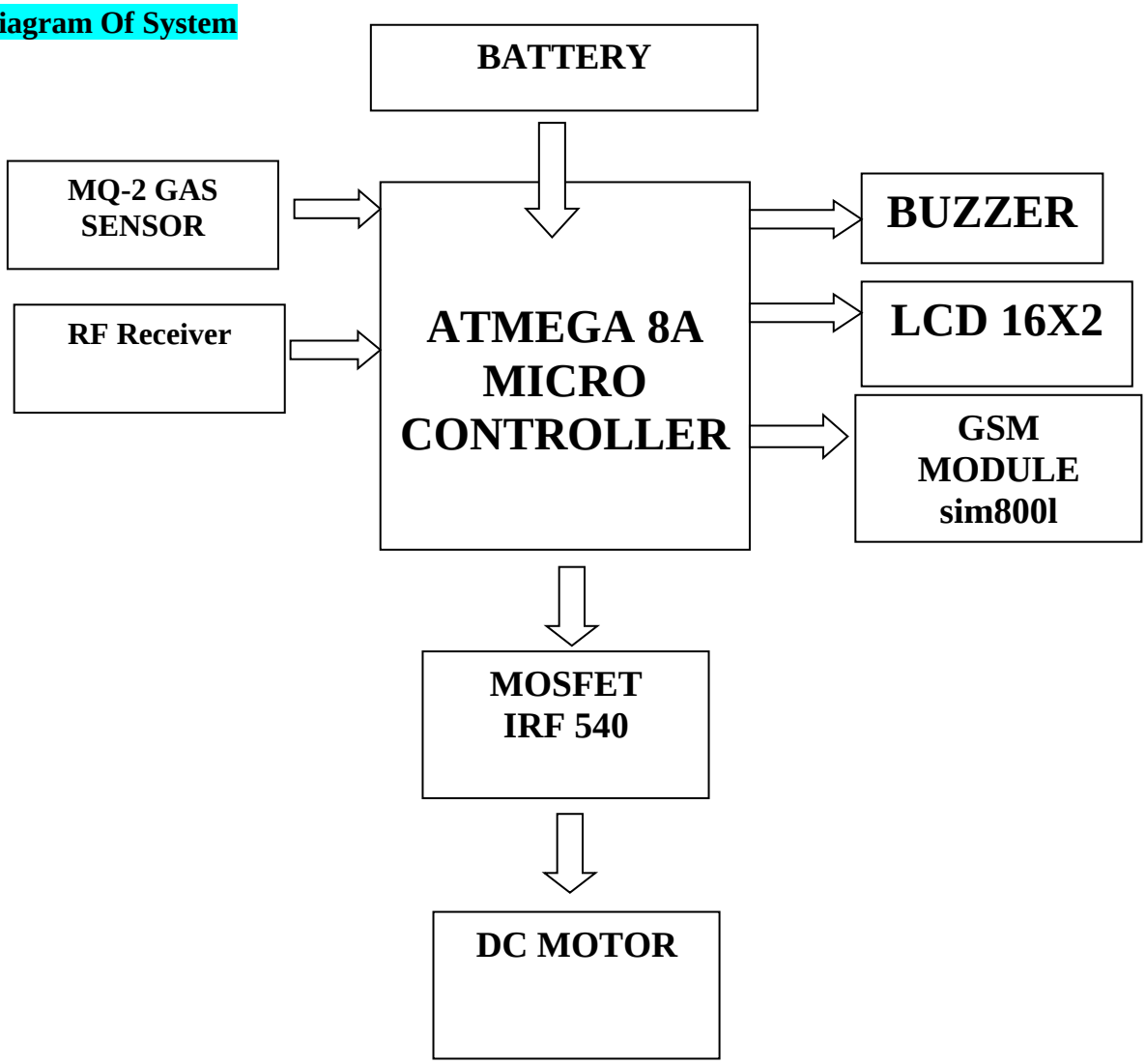
The system has an alcohol sensor embedded on the steering of the car. Whenever the driver starts ignition, the sensor measures the content of the alcohol in his breath and automatically switches off the car if he is drunken. In this system the sensor delivers a current with a linear relationship to the alcohol molecules from zero to very high concentration. The output of the sensor is fed to the microcontroller for comparison. If the measured value reaches the threshold, relay cut off automatically and the buzzer produces sound. This alcohol detection system works only when the driver starts ignition but the driver can start the car by other person (who is not drunken), our project solves this problem whenever the driver is drinking alcohol, the alcohol sensor detects level of alcohol concentration and if it is abnormal the system display and send the information to the driver and traffic station respectively.

7. METHODOLOGY

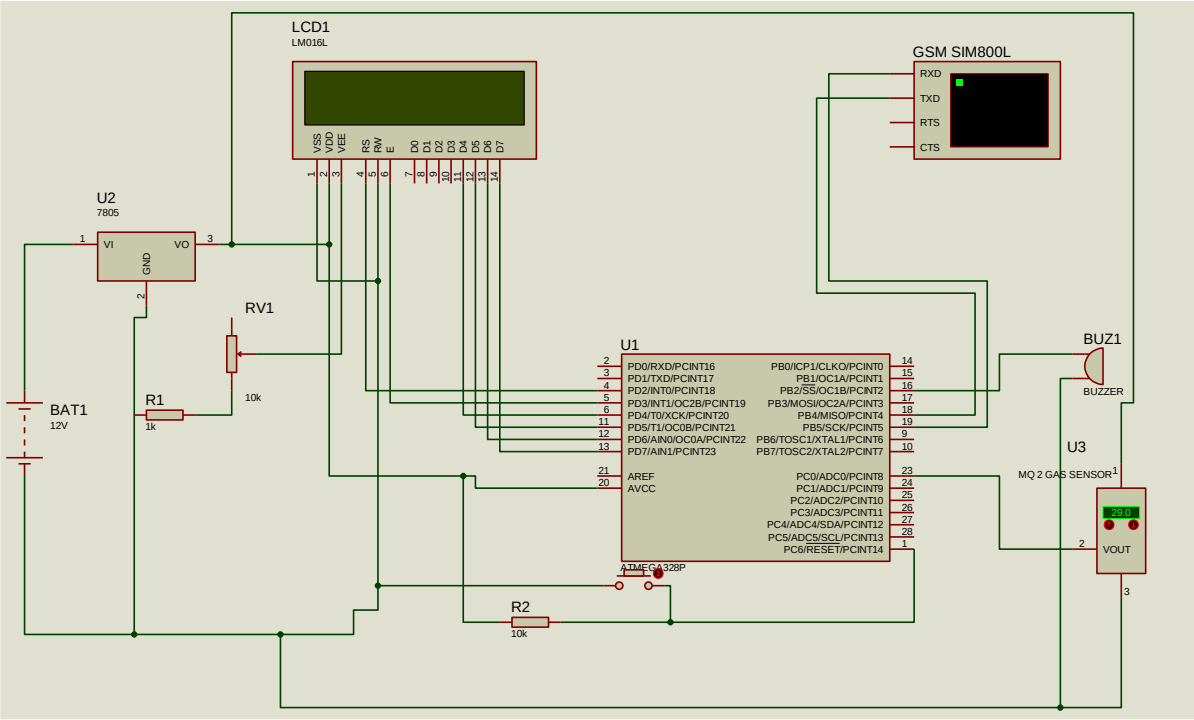
The Alcohol Detection with Engine Locking system and auto speed restriction helps to reduce accidents which are occurring due to drunk driving and in speed restriction zone . MQ-2 sensor detects the presence of alcohol in the surroundings. The sensor provides output on the basis of the concentration of the alcohol, if the alcohol concentration is higher the conductivity of MQ-2 sensor increases which in turn gives the reading to microcontroller Atmega 8A. If the reading is greater than the threshold level, microcontroller will stop the DC motor. Now, with the help of SIM800L the message will be sent to the civil forces that the particular vehicle is unsafe and can be a threat to other people . For speed limit zone RF transmitter and Receiver is use and for speed reducing Mosfet is used

Working Model Working Regulated power supply is fed to Microcontroller which is also supplied with crystal oscillator frequency (i.e.) from OSC 1 and OSC 2 for the working of the microcontroller. With the help of SMPS of 230V AC primary to 12V, 1000mA secondary power supply is taken from main supply. Full-wave rectifier and a capacitor filter provide the output voltage and then fed to 5-volt regulator (LM7805) whose output is used as power supply for IC's and microcontroller. Furthermore, temperature sensor and gas sensor is connected to the microcontroller. The Complete Connection Diagram consists of the Microcontroller Circuit, GSM Module, Power Supply, GAS Sensor Module. The Power Supply is fed to the GSM Module. The output of the sensor goes low as soon as the MQ-2 Gas Sensor senses any gas leakage from the storage. This is detected by the microcontroller and the LED & buzzer are turned ON.

Block Diagram Of System



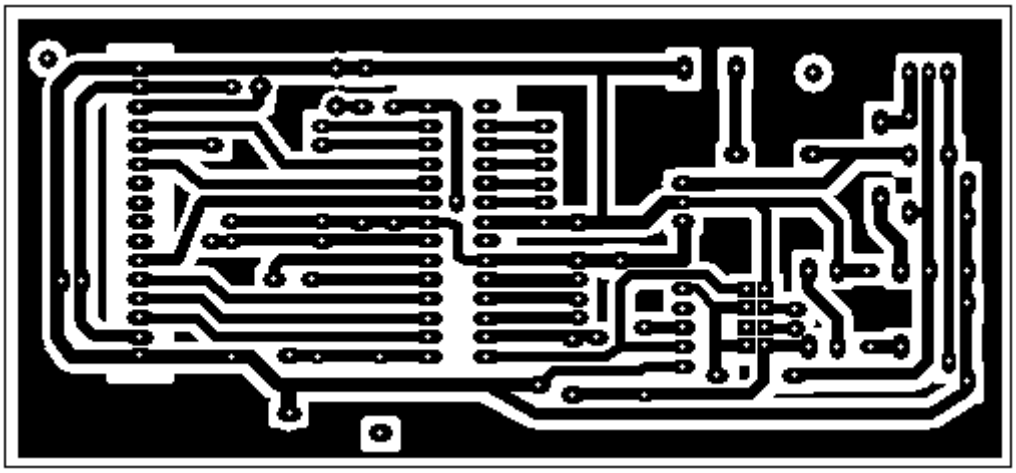
8.CIRCUIT DIAGRAM

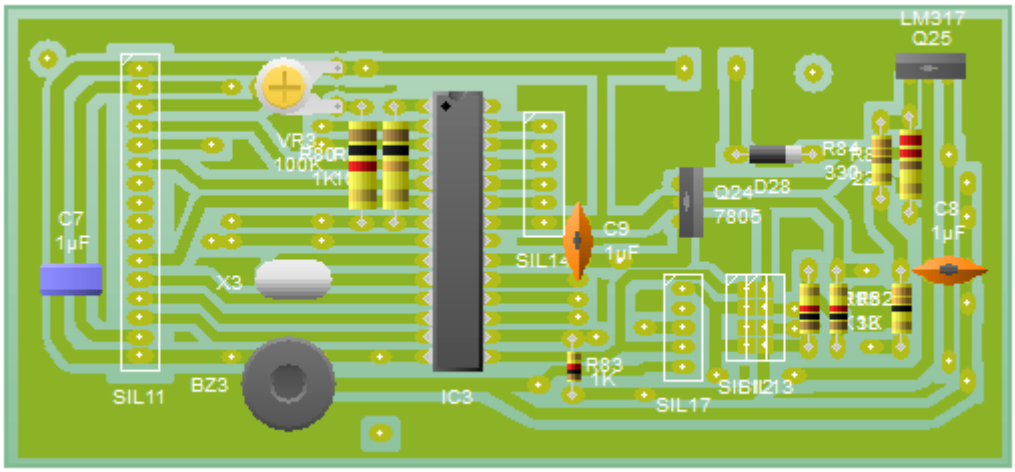


The sensing material in TGS gas sensors is metal oxide, most typically SnO2. When a metal oxide crystal such as SnO2 is heated at a certain high temperature in air, oxygen is adsorbed on the crystal surface with a negative charge. Then donor electrons in the crystal surface are transferred to the adsorbed oxygen, resulting in leaving positive charges in a space charge layer. Thus, surface potential is formed to serve as a potential barrier against electron flow. Inside the sensor, electric current flows through the conjunction parts (grain boundary) of SnO2 micro crystals. At grain boundaries, adsorbed oxygen forms a potential barrier which prevents carriers from moving freely. The electrical resistance of the sensor is attributed to this potential barrier. In the presence of a deoxidizing gas, the surface density of the negatively charged oxygen decreases, so the barrier height in the grain boundary is reduced. The reduced barrier height decreases sensor resistance. Working Model Working Regulated power supply is fed to Microcontroller which is also supplied with crystal oscillator frequency (i.e.) from OSC 1 and OSC 2 for the working of the microcontroller. With the help of SMPS of 230V AC primary to 12V, 1000mA secondary power supply is taken from main supply. Full-wave rectifier and a capacitor filter provide the output voltage and then fed to 5-volt regulator (LM7805) whose output is used as power supply for IC's and microcontroller. Furthermore, temperature sensor and gas sensor is connected to the microcontroller. The Complete Connection Diagram consists of the Microcontroller Circuit, GSM Module, Power Supply, GAS Sensor Module. The Power Supply is fed to the GSM Module. The output of the sensor goes low as soon as the MQ-2 Gas Sensor senses any gas leakage from the storage. This is detected by the microcontroller and the LED & buzzer are turned ON.

9.PCB LAYOUT

1-Controller PCB

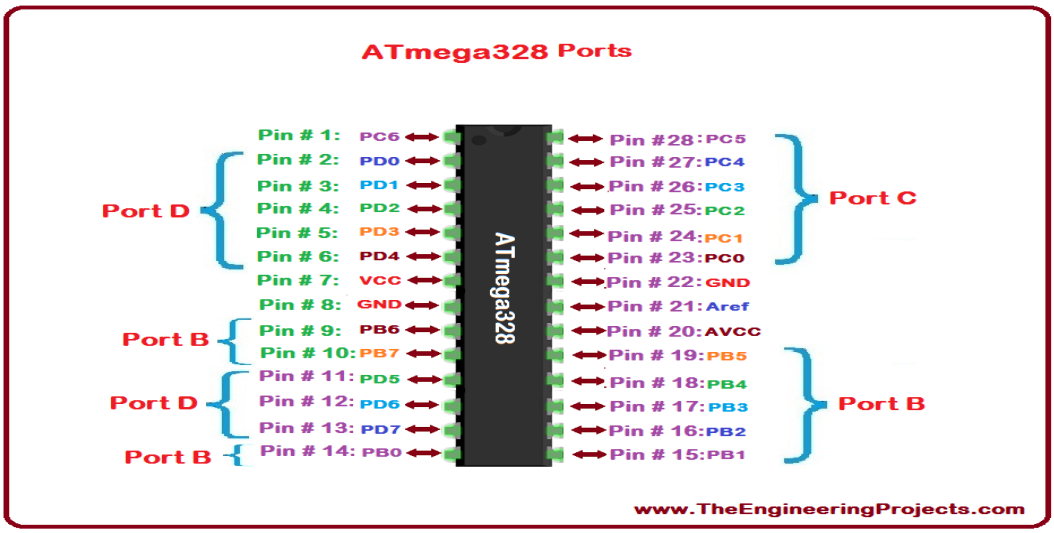




10.PARTS USE IN PROJECT

- **Atmega328 Microcontroller**

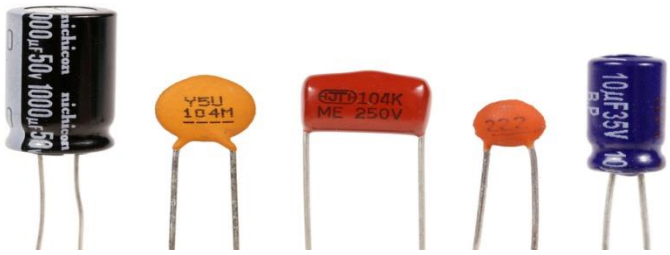
ATmega-328 is basically an Advanced Virtual RISC (AVR) micro-controller. It supports the data up toeight (8) bits. ATmega-328 has 32KB internal builtin memory. This micro-controller has a lot of other characteristics. You should also have a look at Introduction to PIC16F877a (it's a PIC Microcontroller) and then compare functions of these two Microcontrollers



- **Electrical resistance**

The electrical resistance of an electrical conductor is the opposition to the passage of an electric current through that conductor. The inverse quantity is electrical conductance, the ease with which an electric current passes. Electrical resistance shares some conceptual parallels with the mechanical notion of friction. The SI unit of electrical resistance is the ohm (Ω), while electrical conductance is measured in Siemens (S).

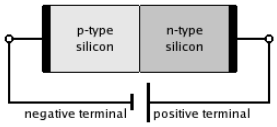
- **Capacitor**



A capacitor (originally known as a condenser) is a passive two-terminal electrical component used to store energy electro statically in an electric field. The forms of practical capacitors vary widely, but all contain at least two electrical conductors (plates) separated by a dielectric (i.e., insulator). The conductors can be thin films of metal, aluminum foil or disks, etc. The 'non conducting' dielectric acts to increase the capacitor's charge capacity.

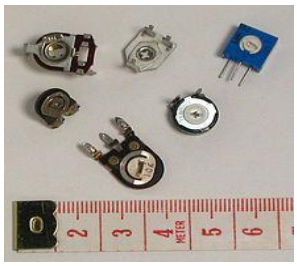
- **P–n junction diode**

A p–n junction is a boundary or interface between two types of semiconductor material, p-type and n-type, inside a single crystal of semiconductor.



- **potentiometer**

A potentiometer informally a pot, is a three-terminalresistor with a sliding contact that forms an adjustable voltage divider. If only two terminals are used, one end and the wiper, it acts as a variable resistor or rheostat.

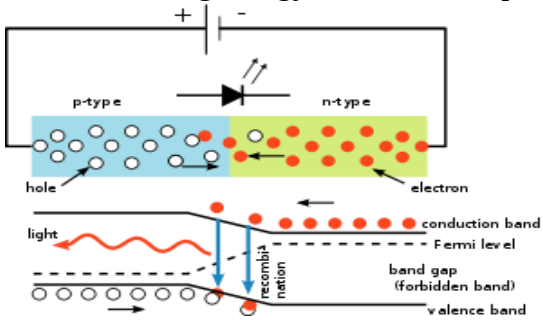


- **Voltage regulator IC**

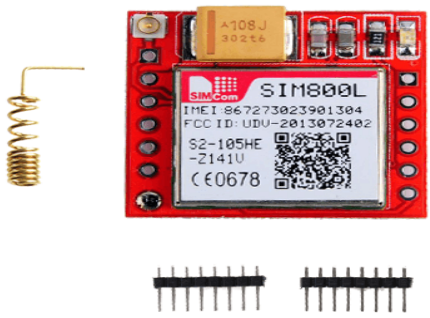
A voltage regulator is designed to automatically maintain a constant voltage level. A voltage regulator may be a simple "feed-forward" design or may include negative feedback control loops. It may use an electromechanical mechanism, or electronic components. Depending on the design, it may be used to regulate one or more AC or DC voltages.

- **Light-emitting diode**

A light-emitting diode (LED) is a two-lead semiconductor light source that resembles a basic pn-junction diode, except that an LED also emits light. When an LED's anode lead has a voltage that is more positive than its cathode lead by at least the LED's forward voltage drop, current flows. Electrons are able to recombine with holes within the device, releasing energy in the form of photons.



- **GSM Sim800L**



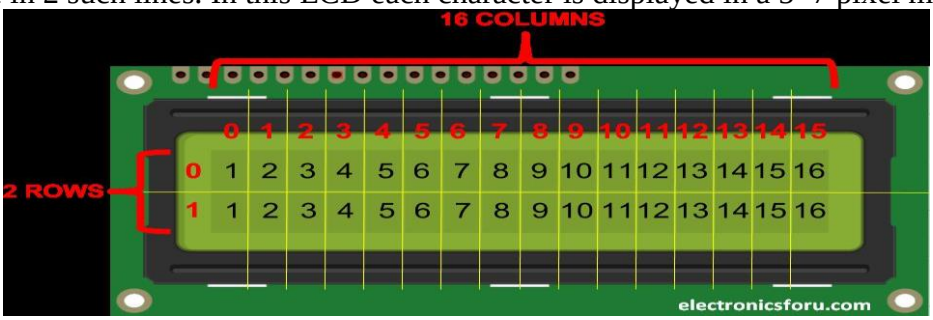
SIM800L Module is a small GSM/GPRS Module and ideal for small ideal projects. The module supports quad-band GSM/GPRS network, available for SMS and GPRS message data remote transmission. The

SIM800L communicates with the microcontroller via UART port, supports command including 3GPP TS 27.007, 27.005 and SIMCOM enhanced AT Commands. Besides, the board also supports A-GPS technique which is called mobile positioning and gets the position by mobile network. This feature makes it can also be a tracker module.

The SIM800L can work up to 2Amps current at peak. It also has a low power consumption feature that consumes 1mA Current in sleep mode. You need to power the module from **3.7V to 4.2V** as per the datasheet. More than that will damage the module. You can use a buck converter to achieve this voltage range.

- **16×2 character LCD**

An LCD is an electronic display module which uses liquid crystal to produce a visible image. The 16×2 LCD display is a very basic module commonly used in DIYs and circuits. The 16×2 translates o a display 16 characters per line in 2 such lines. In this LCD each character is displayed in a 5×7 pixel matrix.



- **Alcohol sensor(MQ-23)**

This alcohol gas sensor detects the connection of alcohol gas in the air and output its reading as an analog voltage. The concentration sensing range of 0.04 mg/L is suitable for breath lyses.

Figure 1-MQ3 Alcohol sensor

Basically, MQ3 alcohol sensor has 6 pins, the cover and the body. Even though it has 6 pins, you can use only 4 of them. Two of them are of the heating system, which call H and the other 2 are for connecting power and ground, which called A and B.

- **DC motor**

A DC motor is any of a class of electrical machine that convert direct current electrical power in to mechanical power. The most common types rely forces produced by magnetic fields. Nearly all type of dc motor have some internal mechanism, either electromechanical or electronic to periodically change the direction of current flow in part of the motor.

Figure 4-Dc motor

- **MotorDriver**

This is a motor driver IC that can drive two motor simultaneously. L293D IC is a dual H-bridge motor driver IC. OneH-bridge is capable todriveademotorinbidirectional.L293D IC is a current enhancing IC as the output from the sensor is not able to drive motors itself so L293D is used for this purpose. L293D is a 16 pin IC having two enables pins which should always be remain high to enable both the H-bridges and can run a motor up to 600 mA. Logical Supply Voltage will decide what value of input voltage should be considered as high or low. So if weset Logical Supply Voltage equals to +5V, then -0.3V tol.5V will be considered as Input Low Voltage and 2.3 V to 5V will be considered as Input High Voltage.

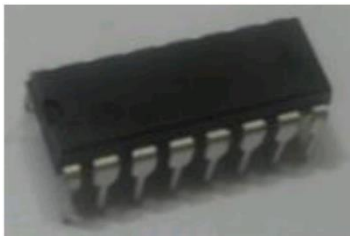
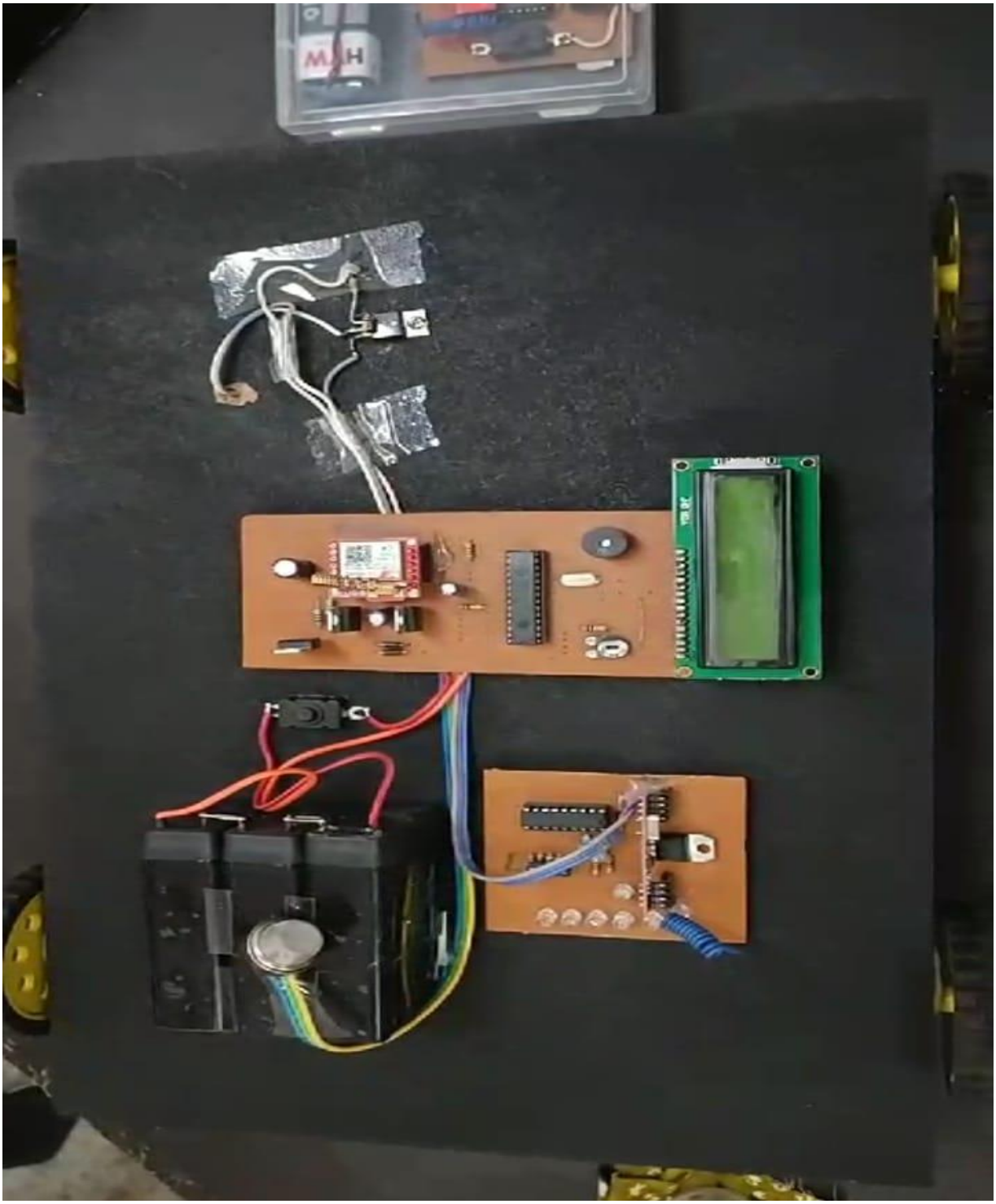


Figure5-L293DMotordriver

11.Hardware result



12. CONCLUSION AND FUTURESCOPE OF WORK

- **Conclusion**

The project gives a system that can detect the amount of alcohol concentration of the driver in the vehicle to certain range and activates the microcontroller to control the engine and other extra information which acts as an indicator that enables other drivers to judge the driver has taken alcohol and needs any assistant or help. In addition to this, the system can detect the over speeding of the vehicle and took action by sending the appropriate information to the traffic police station via RF module (Xbee) and those who have the authority takes necessary penalty to drunken and over speed drivers to prevent from similar situation.

- **Limitation**

Since the system needs a well-coordinated traffic police stations, therefore this might be hold back the feasibility of the project in most Ethiopian road.

- **Future Scope of Work**

The project can be further advanced by interfacing a GPS in the system that will inform about the position of the vehicle; as a result provides easy location and since the blood pressure change due to the alcohol consumption, instead of using alcohol sensor we can monitor the blood pressure or heart beat by different sensors, which can lead to a better method. Finally, more advanced control algorithm designed by Fuzzy

logic or neural network can lead to a stable control of the vehicle.

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