Alcohol Detection System in Vehicle Using Arduino

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Abstract

The current investigation is to epitomize the technical work in the form of project which illustrates how human driving can be made safer so to avoid accidents and make the roads safer to drive for the driver & also the commuters. The work is developed by integrating sensors based on alcohol content detection conglomerating with Microcontroller board like Arduino, ATmega328 is more versatile in handling more functions than any other conventional microcontroller. The MQ3 module is used to detect the alcohol particle which has reasonable sensitivity range around two meters, and is suitable for any kind of vehicle. The sensor has one more unique quality that it can simply be unseen from the defendants. It is too compact to fit complete set up in the form of product in automobile.

*Keywords-*Arduino, Alcohol detector, LCD, ATmega, USB, PPM (Parts per million), MOS (Metal oxide semiconductor)

I.   INTRODUCTION

The project comes into existence due to the inseparable habit of drinking alcohol and then driving the vehicle which is a serious offence in the eyes of law. The issue is also a serious public health problem and can arise as a important hitches in near coming days. The arrangement developed targets to lower down the risk of driving and also reduce the misfortune on road in the coming days due to drunken driver. The work done in this area uses different application of electronic sensors and microcontroller [10]. The investigation discusses the development in alcohol sensor that read a change in the alcohol particle present in the air. Such kind of detector is known as a breath analyzer [8], as it used to finding the analysis of the alcohol content present in human breathe. The product incorporates detector, microcontroller and other electronic components find the existence of alcohol nearby instantly block the fuel and hence the engine stop working. This activity will not permit drunken driver to run the engine and thus the arrangement enables passengers to be safe.

II.   LITERATURE REVIEW

In many civilized culture use of alcohol is taken as a tradition. The habit is also connected with traditions, used in festivities and different personal parties [3]. A small level of alcohol will change the way human behave where its bodily behavior, its actions are diminished. This type of body inability to control itself can be highly dangerous and can involve car accidents which will risk the persons sitting inside the car also on the persons on the road [5]. The legislation has brought in number of laws like fine, cancellation of driving license etc. so that this can be minimized [6]. The above mentioned causes show the necessity of a simple, accurate and precise instrument to be used by the automobile manufacturers and vehicle modifiers so that vehicle will not start due to alcohol content in the air inside vehicle [6, 7]. The consumption of the people is more common in young group where they drink and cause accidents due to rash driving. The person consumed alcohol changes the blood alcohol concentration in the body thus affects the body actions. There is direct connect between blood alcohol and breathe alcohol concentration [4]. For the blood alcohol content measurement blood samples have to be taken but for breathe alcohol concentration measurement there are sensors available which detects breathe [7, 8]. The first method of taking blood samples can be possible by taking on the spot samples by the traffic police which is also a good method In the second method breathe analyzers are used to sense the breathe but this itself is not enough, this method can be integrated with car system [9] so that any smell of alcohol in the car will force the inability of car to start. The system proposed is developed on embedded applications on Arduino family of boards [1, 2].

III.   THEORY

A.   Block Diagram

The complete system uses the Arduino Uno (Based on ATMEGA 328) [4]. The practical blocks diagram of the arrangement is presented in Fig.1. MQ3 module, LCD display, buzzer, relay are handled by Arduino Uno. All the modules are interface and programmed in a way to wok the entire module in synchronization [5]. The panel can be linked to the personal computer and the programming of the microcontroller can be done for sensor to work and can sense breathe. The reading will be demonstrated on the LCD board which is interfaced with the Arduino Uno board. Once the sensor detects it transfer the information to car ignition system which will not start the engine of the vehicle.
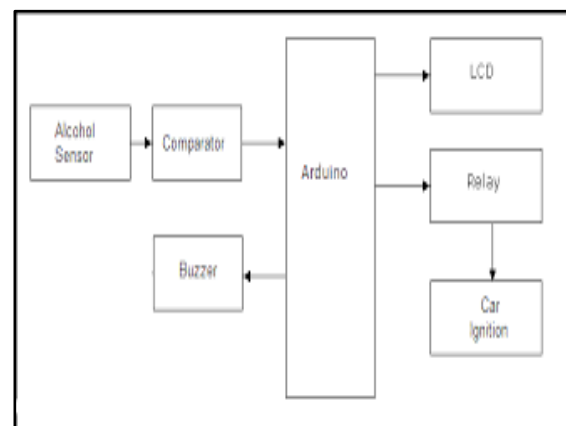
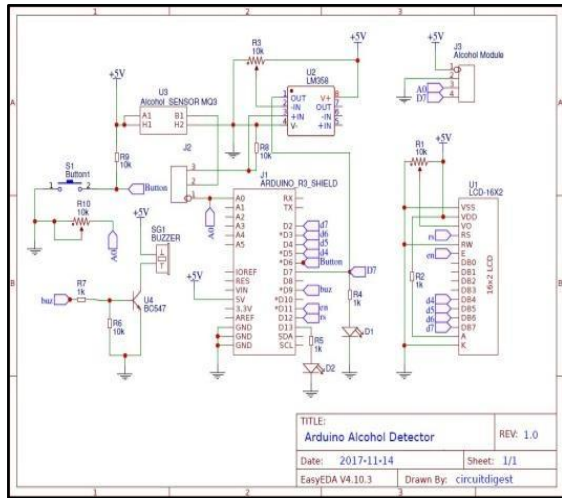*Fig.1. Block Diagram arrangement*

B. Architecture

Fig.2. Architecture of the System

Fig.2 illustrates the construction of the system developed. The Arduino Detector Shield uses a MQ3 alcohol based sensor to identify the existence of alcohol in the breath. LCD is used to display the PPM (Parts per million) amount of the alcohol. An LM358 IC is analog to digital converter which gives digital of alcohol sensed. A buzzer is also place for indicating high alcohol level. The preset voltage at pin 7 is compared with present voltage of alcohol sensor through a comparator. Alcohol sensor output and Buzzer are placed at Pin A0 & D9. For initiating the recording from alcohol sensor a push button is used at Ardiuno.
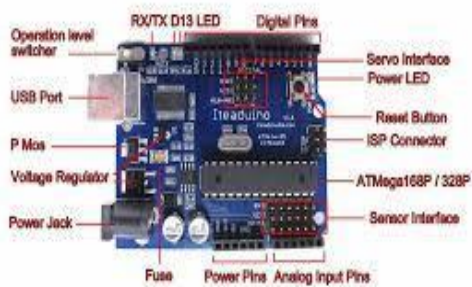
C.   ARDUINO BOARD

Fig.3. Arduino Board ATmega 328

Fig. 3 shows the main part of the system is Arduino board which is microcontroller section based on ATmega328 [3]. Because the use of ATmega328 this board has different features from previous board that it does not use the FTDI USB to serial driver. This is a very cheap device and available source and it is very much comfortable to use hardware and software. This   can powered by USB connection and DC batteries.

D. Alcohol Sensor (MQ3)

This sensor is based on MOS and used for alcohol sensing. It has high sensitivity for alcohol sensing and has low sensitivity for the gases like CO and Benzene. The sensitivity can be varied with the use of SnO2 which is good to sense the alcohol. When the concentration of the alcohol is high the resistivity of the sensor will changed and hence the output voltage will change. This can be used to detect the presence of alcohol within 2 meter range. Fig.4. shows the diagram of this type of sensor mentioned above. There are different characteristics of this sensor which is mentioned below. Thus the sensor is very useful component in such type of system which is used in sensing air from breathe.

Fig.4. Alcohol Sensor- MQ3 Sensor

E. Liquid Crystal Display

Fig.5. LCD Display

Fig. 5 shows the diagram of the very basic module of liquid crystal display used in different device and circuits with numerous applications [3]. The LCD can replace 7 segments display LED's and other multi- segments LEDs. It has low cost, convenient to program and has no constraint to display special and custom characters. It uses 5*7 pixel matrix to display each character. The command registers stores the command instructions given to the LCD. The files are the ASCII value of the character to be displayed on the LCD.

F. Buzzer

To alarm the status of the presence of alcohol is done through buzzer. As shown in fig. 6 the buzzer uses piezoelectric crystal type buzzers with small diaphragm attached to it. Piezoelectric crystal will start vibrating

when voltage is applied and hence the sound will generate.

Fig.6. Buzzer

This type of buzzer consumes low power and can be easily integrated into other circuits. As this is placed externally hence it can be used as musical tone oscillator also.
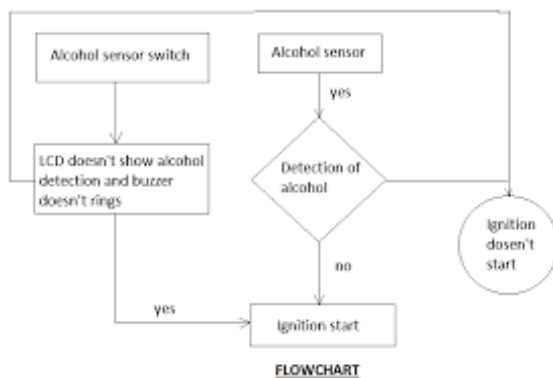
G. System Flow Chart

Fig. 7. System Flow Chart

Fig. 7 shows system flow chart of the system wherein when alcohol sensor detect the presence of alcohol the ignition will start simultaneously the LCD panel will show the presence of alcohol and buzzer will start ringing. In the absence of alcohol content detection the ignition will start and the buzzer will be silent.

H. Advantages

The designed system has several advantages in terms of easiness, efficiency, safety of the passenger from accidents. It is very much accurate to detect the presence of alcohol inside the vehicle

I. Application

This device can be used widely like automobile industry, industries, complex, mall etc.

J. Results & Discussion

The alcohol sensor first senses the presence of alcohol content present closely in the atmosphere and then it will go to Arduino board where it is compared with preset

voltage. The comprator output goes to the LCD interface to display the the presence of alcohol as shown in fig. 8. And at the same time buzzer will sound and the ignition will be turned off by operating relay.

Fig. 8. LCD Display of Alcohol Detection

K. Conclusions & Future Scope

This paper defines a very real solution to cultivate an smart system for alcohol detection which mainly based on Arduino. The advantage of this system is its range of detection which can be customized as per the requirement of the vehicle and can be placed without getting noticed from accused. The whole embedded system is connected to the vehicle electronic system which will disable the car ignition system when it is detected that driver is drunk. This is one of the best solutions to reduce number of accidents. The system can be further improved by using other more accurate type of sensors better specifications of microcontroller, stability system, temperature sensors, LEDs to glow and better sound system. This system has various other advantages like small volume, small size or compact in nature and more trustworthiness. This arrangement advances the care of human being and hence providing the actual growth in the industry concerning to reduce the accidents source due to alcohol. The legislation instead of putting more police such systems can be inbuilt in the vehicle by the vehicle manufacturers so that driver or person driving the vehicle is alert and make himself responsible.

IV.   REFERENCES

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