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ALCOHOL DETECTION AND VEHICLE STOPPING SYSTEM

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***Abstract* - Accidents due to drunken drivers have increased in large scale leading to rise of questions about safety of roads. This has resulted in large damage to both life and assets. This proposed project deals with this issue in a more advantageous way using microcontrollers. It proposes a system that deals with design and implementation of Arduino driven Alcohol detector and engine locking system for cars. The alcohol concentration level will be monitored continuously by the alcohol sensor and the engine will be shut down if the alcohol concentration increases the permitted threshold level. The location of the vehicle will be set to the updated mobile number with the help of the installed GSM/GPS module. This helps in tracking down the vehicle in case of any emergencies.**

***KeyWords:* Arduino UNO, MQ-3 Sensor, Ultrasonic sensor, Buzzer, LED, SIM900A, DC Motor.**

I. INTRODUCTION

Road accidents in India have been a rising issue that needs to be sorted out as soon as possible. Out of many causing factors, accidents and casualties due to drink and drive is a matter of concern. According to reports from the Ministry Of Road Transport and Highways Transport Wing, a total of 449,002 accidents took place leading to 151,113 casualties and 451,361 injuries in the calendar year 2019. To be more precise only 9.3% of the total accidents were caused by drinking and driving. Though speed violation and over speeding has been declared as the prime reason for majority of accidents (nearly 71%) if closely examined most of the speed violations were due to inebriated drivers. According to sources in India, the permissible blood alcohol concentration is 0.03% per 100 ml of blood and any level higher than this permitted level is illegitimate. Though these figures may vary from person to person based upon their physical structure and the amount of alcohol they have consumed for an average male weighing around 65kg to stay within legal limits he can consume beer equivalent to 660 ml or whiskey up to 60 ml or wine up to 200 ml. Human body requires at least an hour to process 29.5 ml of alcohol. As alcohol concentration varies from drink to drink roughly it can be stated that one should wait for a minimum of 90 minutes after a pint of beer and three to four hours after a large whiskey or two glasses of wine, to be able to drive without getting the coordination disturbed by the consumption of alcohol. If gets arrested for drink and drive one can be booked under Section 185 in The Motor vehicles Act of 1988 and Section 304A , Causing Death By Negligence by means of which the accused can be penalized with fine that may extend up to 2000 INR and/or imprisonment for a term of six months. This proposed paper aims on curtailing the road accidents caused by consumption of alcohol by a solution that is a hardware integrated system.

II. LITERATURE SURVEY

A. The author has proposed the use of an MQ2 sensor which is less authentic when compared to an MQ3 sensor as it has a previous record of raising false alarms. Hence we have used an MQ3 sensor that is highly preferable and authentic. **[1]**

B. The author has suggested the usage of the PIC16F877 microcontroller which is an outdated model and very expensive. Hence we have used Arduino UNO which is cost efficient and assured high performance.**[2]**

C. The author has put forth the usage of micro controller P89V5&RD2 that can only be used in case of two wheelers and not in four wheelers. Hence we have used Arduino UNO that can be used in four wheelers and is known for its authenticity.**[3]**

D. The author has suggested for blood sample testing for verification of presence of alcohol in blood concentration whi8ch is practically impossible while driving a vehicle. Due to the availability of breathe sensors that can determine the presence of alcohol we have u7sed MQ3 sensor.**[4]**

III. METHODOLOGY

1. Block Diagram - The system comprises the following parts. Arduino UNO, Alcohol sensor (MQ3), Buzzer, GSM/GPS Module, LCD, Cables and Connectors, Diodes, PCB,LED, Power Supply, Switch, IC and IC sockets. The parts are arranged as illustrated in Fig.1. The sensor MQ3 and buzzer are controlled by Arduino. All the modules are programmed in such a way that the entire system achieves synchronization. The Arduino microcontroller is programmed in such a way that the sensor is made to work in the desirable way. The output from the sensor will be

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displayed in the LED that is connected to the system. Once the sensor detects the alcohol content in the car's atmosphere than the permissible level it prevents the ignition system from getting started and the inebriated driver will not be able to operate the car. The entire working of the system is explained in Fig. 2.

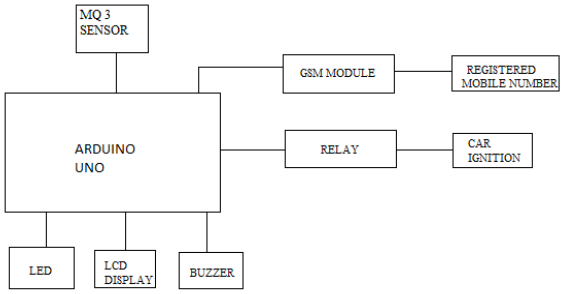

Fig.1 Block diagram of the system

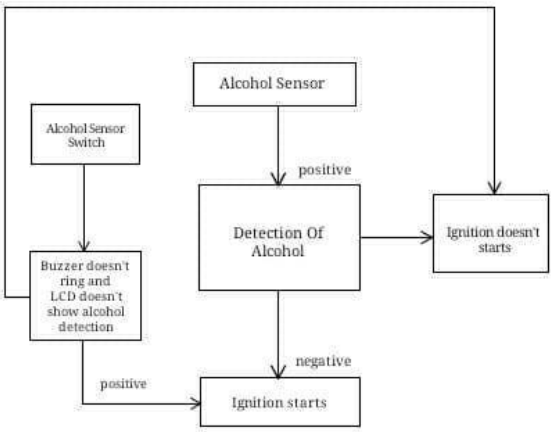

Fig.2 Flowchart of working of system

2. Arduino UNO The Arduino UNO board R3 is an ATmega38 based microcontroller board. It has 14 digital input/output pins. Out of these 14 pins 6 of them can be used as pulse width modulation (PWM) outputs. Arduino UNO has 6 analog inputs, 16Hz crystal oscillator, USB connection, an ICSP header that enables the user to program the Arduino board's firmware, a power jack and a reset button. Arduino firmware is programmed with the help of Arduino IDE (Integrated Development Environment). This receives power either from an external 9-volt battery or a type-B USB cable. The manufacturers of this Arduino UNO are Interaction Design Institute Ivrea (IDII) based in Italy. Out of many other flagships of Arduino, the UNO variant stands out due to its high performance and economical value.
3. MQ3 Sensor - MQ3 sensor is a type of MQ sensor that detects the presence and concentration of alcohol in air. The sensor works on an operating voltage of 5V and it can detect alcohol within the range of 25 – 500 ppm. The sensor consists of a thin film like SnO2 (Tin dioxide). The working of the sensor is based on the formation of potential barriers that either prevents the flow of electrons and blocks the current flow (in case of absence of alcohol in air) or by lowering the potential barrier and allowing the current to pass through the sensor (in case of presence of alcohol in air). This sensor is a heat driven sensor. Hence to avoid explosion during the sensing of alcohol it is enclosed in an Anti Explosion Network which has two thin layers of stainless steel mesh.
4. Buzzer A buzzer is used as an alarm when alcohol is indicated in the sensor. The main use of the buzzer is to indicate to the other vehicles on the road that this particular vehicle is driven by an inebriated driver. This buzzer works when a potential is applied across the piezo crystals that are present in between two conductors. This creates a push pull action of the conductors resulting in a sound wave in the range of 2 to 4 kHz.
5. DC motor DC motor works in accordance with Lorentz law. Lorentz law states that the total force acting on a charged particle due to electric and magnetic fields is equal to the sum of electric and magnetic forces acting on it. A DC motor can be controlled by Arduino by connecting an L298 bridge IC to the Arduino.
6. GSM/GPS Module The GSM/GPS module used in this system is SIM900A. SIM900A is built with a dual band GSM/GPS engine in a SMT module. This works on frequencies 900/1800 MHz. The main advantage of this is that it has provision for installing a sim card through which the whereabouts of the vehicle will be shared.
7. LED Light Emitting Diode is a semiconductor device that emits light upon flow of current through it. When the alcohol sensor senses the presence of alcoho9l and buzzer rings the alarm, the Arduino sends a HIGH signal to the pin to which the LED is connected. If the sensor doesn't sense the presence of alcohol in the air then Arduino sends a LOW signal to the LED and the LED remains turned off.
8. Schematic diagram - The schematic diagram of the entire system is given in Fig. 3.

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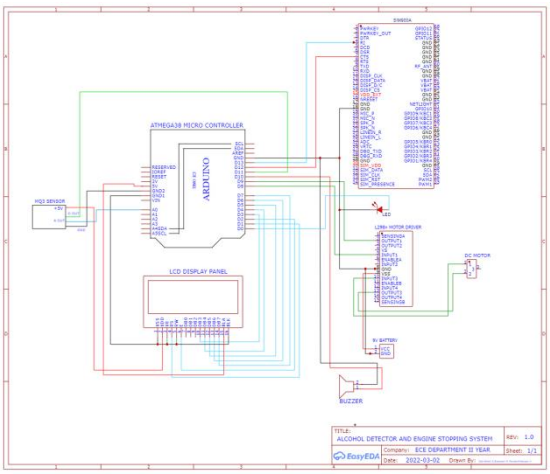

Fig 3. Schematic Diagram

IV. RESULT

If an inebriated driver tries to drive the vehicle under the influence of alcohol, the sensor will detect the presence of alcohol in the air and the vehicle engine will be shut down. In addition to that the LED and buzzer will immediately alert the nearby vehicles about the status of this particular vehicle and they can take due action. At last information will be passed to the updated mobile number about the whereabouts of the vehicle. This system will be more reliable and can be used to minimize the loss of life that takes place due to drunk driving. All the components of the system are tested for its working, assembled accordingly and can be put into use.

V. CONCLUSION

We have proposed a practically efficient and feasible way to develop hardware integrated systems to deal with the rising crisis of alcoholic driving. Further approach of this system will be on controlling the loss of life and assets due to inebriated driving. This proposed system not only improves the security of the drunk individual but also the security of the co riders who travel along this vehicle on the road. This system will be a perfect solution to the setbacks caused by light driving.

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