International Journal of Scientific Research & Engineering Trends
Volume 4, Issue 4, July-Aug-2018, ISSN (Online): 2395-566X

Automatic Alcohol Detection and Vehicle Controlling System for Prevention of Road Accidents

Sunkavalli Raviteja
Dept.of ECE
VFSTRU, Vadlamudi
Andhra Pradesh, India
ravisunkavalli80@gmail.com

Aluru Jawahar
Dept. of ECE
VFSTRU,Vadlamudi
Andhra Pradesh, India

P Harsha Vardhini
Dept.of ECE
VFSTRU, Vadlamudi
Andhra Pradesh, India

Y Thejaswi
Dept.of ECE
VFSTRU, Vadlamudi
Andhra Pradesh, India

***Abstract* – Our paper proposes a new design to control the fatal road accidents caused due to the drunken drivers with the help of automatic alcohol detection and vehicle controlling unit (ADVCU). Now-a-days, most of the detection model's senses alcohol but unable to control the vehicle automatically. Here, we developed a new design which prevents the movement of vehicle when the driver was detected with consumption of alcohol. The proposed system determines the amount of alcohol consumed by the driver and if it exceeds the permissible limit, the vehicle will be automatically stopped for stipulated time and message along with vehicle location will be sent to concerned personnel. For this purpose, we have used breath-analyser (MQ3), ATMEGA 328P microcontroller, NEO-7M GPS, SIM 800L GSM Module. The breath analyser senses the level of alcohol present in the breath of driver and acknowledges to Microcontroller. If it is beyond the limit then ATMEGA 328P will drive the signal to GSM, GPS modules and immediately bike engine will be stopped and location from the GPS module will be sent to the person concerned through text message from GSM module.**

***Keywords* – Road Accidents, Alcohol detection, Vehicle Controlling, GPS module, GSM module; Arduino Uno, MQ3 sensor, ADVCU.**

I. INTRODUCTION

Recently, there Is a rapid increase in the usage of motor vehicles as a purpose of personal transportation in India. However, the dreadful fact is that most of the people are losing their lives due to innumerable accidents. In India, around 4 lakhs accidents happened last year according to the survey done by Ministry of Road Transportation & highways.

National Crime Records Bureau (NCRB), declared that drunk driving was responsible for around 2% of the 4 lakhs road accidents in India in 2015. Even though, the drunk driving tiny share of accidents as a whole, they were the deadliest one's.

As per NCRB, drunk driving accidents have a high fatality rate than other accidents and 42% victims of drunk driving accidents ended up dead. So, we developed ADVC unit to prevent a possible accident using the MQ3 sensor and ATMEGA 328P microcontroller.

If the amount of alcohol detected exceed a threshold limit, then the motor vehicle engine will be automatically stopped and the alert message containing the GPS location where the drunk driving detected will be sent to concerned personnel

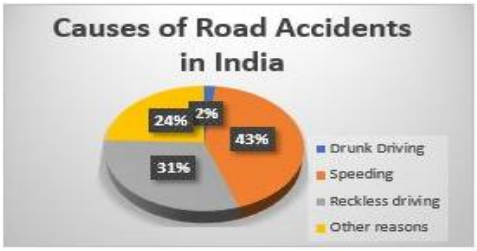


Fig. 1 Pie chart showing cause of road accidents in India in 2015.

II. RELATED WORKS

There are different vehicle control systems for safety of driver but with different approach.
Sayan Tapadar [1] has proposed accident and alcohol detection in Bluetooth enabled smart helmets for motorbikes which detects the level of alcohol and sends the emergency signals through internet.

Sreenithy Chandran [2] has proposed an Internet of Things (IoT) based smart helmet for accident detection and notification which monitors values of accelerometer and communicates to processor continuously. If any sudden variation among the values, then related details are sent to emergency contacts using internet and Global Positioning System (GPS).

Prajnyajit Mohanty [3] proposed driver assistant for the detection of drowsiness and alcohol effect by collecting electroencephalogram (EEG) based brain signals of different frequency and amplitude. The collected signals are analyzed using Data Acquisition system and MATLAB.

Anand Kumar [4] proposed automatic toll payment, alcohol detection, load and vehicle information using internet of things and mailing system in which if alcohol detected exceeds the limit, the accelerometer reduces the speed of the vehicle.

M. Malathi [5] proposed alcohol detection and seat belt control system using Arduino in which the system detects the alcohol and if the alcohol is above permissible limit, the seat belt will be locked and driver cannot wear the seat belt. If seat belt is not worn the system will lock the ignition of the engine.

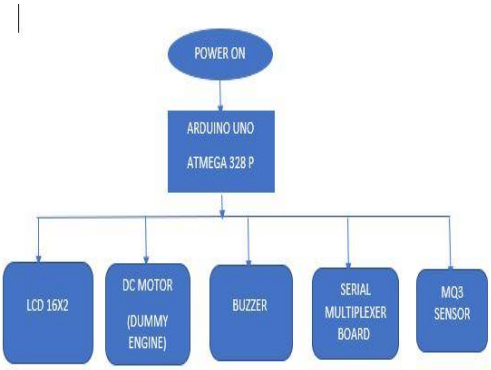
III. SYSTEM MODEL

Fig.1 Block diagram.

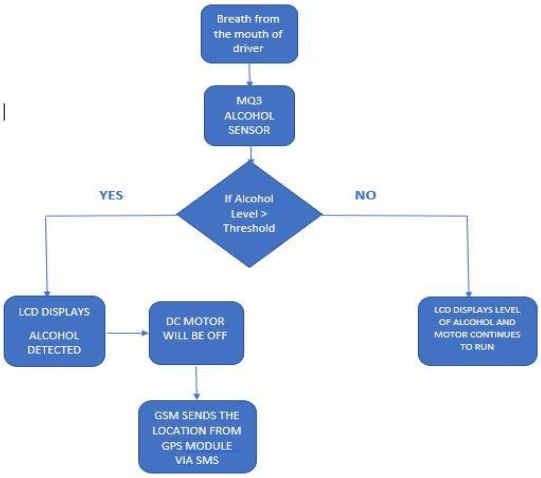
Here, automatic alcohol detection and vehicle controlling system unit (ADVCU) proposed system model is shown in above fig. It consists of two sections, first one is ADVCU which will be situated in the motor vehicle and other is a telephonic system which will receive the message wirelessly transmitted from GSM present in ADVCU.

IV. FLOW CHARTS

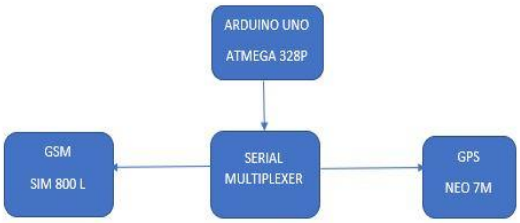
1. ADVCU Block Diagram



2. MQ3 Sensor



3. Serial Multiplexer Board



4. GSM Initialization

V. MATERIALS DESCRIPTION

1. Breath analyzer sensor

Fig.3 Breath Analyzer Sensor.

MQ3 sensor is used to detect alcohol level consumed by the driver. It can detect alcohol ranging from 0.05mg/L to 10mg/L. The MQ3 sensor outputs a digital signal taking the input breath of the driver as analog signal. The analog signal output in terms of voltage. If analog voltage crossed the threshold limit, the microcontroller drives the signal to the motor and vehicle is stopped. Principle behind the working of the

MQ3 sensor is, it has a substance called SNo2 which when reacted with alcohol increases its conductivity.

2. Arduino Uno

Fig.4 Arduino Uno.

We have used Arduino Uno development board which is embedded with ATMEGA328P microcontroller. It has 32 pins. It has 32 kb flash memory with read and writes modes. Among 32 pins, 23 pins are used as general I/O pins.

The ATMEGA 328P is connected to motor (engine), LCD display, MQ3 (breath analyser), buzzer, GSM (SIM 800L) and GPS (NEO-7M) with the help of serial multiplexer. The controller is used to check the level of alcohol consumed and based on the threshold condition the microcontroller will send the signals to the respective modules.

3. Liquid Crystal Display

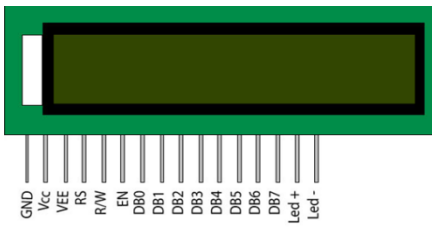


Fig.5 Liquid Crystal Display.

Liquid Crystal Display (LCD) has 16 pins in total and it is directly connected to AT mega microcontroller. We use 8 data bus lines through which messages are sent from microcontroller. We use the 16 X 2 LCD as to display the messages from GSM module and level of alcohol.

4. Neo-7m GPS Module

Fig.6 GPS NEO 7M Module.

NEO-7M GPS development board has two modules embedded within it. The first one is GPS module which has 6 pins and the second one is HMC5883L digital compass. It uses active ceramic path antenna to give signals. It also has storage with help of EEPROM to store the configuration and runs at 38400 bands. The operating voltage is 3.3 volts. We used this module to identify the location of the driver along with the vehicle when the driver consumed alcohol more than the threshold limit.

5. GSM Module

GSM (Global System for Mobile Communication). The operating voltage of GSM is 3.7V to 4.2V. So, we use a voltage regulator (LM317) generally to connect it to Arduino Uno. It has transmitter and receiver pins. The working temperature of GSM module is up to 85 degrees Celsius. We use GSM module to transmit and receive messages. Receiving.

Fig.7 SIM 800L GSM Module.

is used to store the number of home mates and transmitting is used to send the location of the driver to the home mates.

VI. RESULT DECLARATION

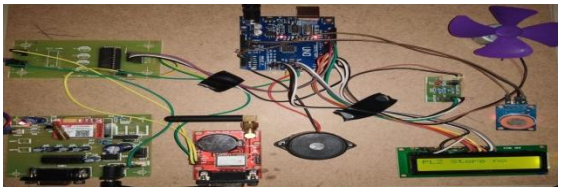


Fig.8 Storing the number in ADVCU.

Firstly we have to store the phone number of authorized personnel to whom which the GSM have to send the alerts.

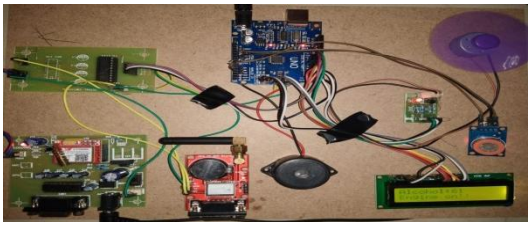


Fig.9 Motor Vehicle Engine On.

Next, after storing the number the ADVC unit starts sensing the breath from the mouth of driver.

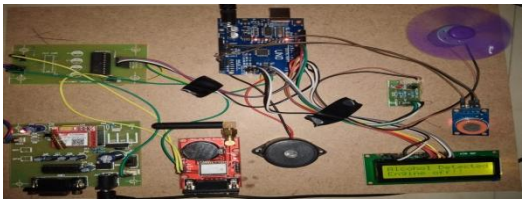


Fig.10Alcohol detected and Engine OFF.

When it senses the alcohol, first LCD displays alcohol is detected and vehicle will be stopped working.

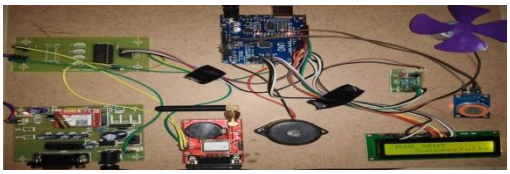


Fig.11Message sent successfully.

Finally, the message is sent and the concerned personnel will come to know that the person who is driving the vehicle was drunk.

VII.CONCLUSION

The proposed system continuously monitors for the drunken drive and vehicle is stopped immediately there by avoiding the possible accident.Now-a-days, so many technologies have come into our life and dominating since a decade, but they are helpless in preventing the accidents caused due to drunken drive. Our ADVC unit caters such needs.

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