Deactivation of Engine Due to Alcohol Detection

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Abstract –: Accidents are made due to overloading, over speeding, wrong direction driving, driving by not qualified persons, and driving under alcohol influence. Also, incidents of accident occur due to other reasons, including faulty brakes, missing or neglecting traffic signals and traffic rules, careless driving, and distractions while driving. Among these, alcohol consumption is most and highly estimated as the reason for car accidents. Accidents damage the vehicles, cause disability and even claim lives. Alcohol levels in blood affect the nervous system and there by the driver perception and control of vehicle. Regular and period verifications by authorities like cops for the condition of intoxication of the driver only a corrective action and an absolute safety action. A reliable device for stopping intoxicated drivers from driving a vehicle is of need right now. An alcohol sensor that estimates the alcohol content in breath and the deactivate the engine from starting is designed and assembled.

Keywords – Micro controller, Alcohol sensor, Servo motor, LED Display, intoxicated.

I. INTRODUCTION

Driving in inebriated condition is a very dangerous to self and others, as these drivers' response unforeseen conditions like emergency situations on road is less and level of control on the driving is poor. As per the surveys conducted on reasons for road accidents due to motor vehicles, contribution of fatigue in drivers is about 20% and around 31% is the contribution by drivers inebriated condition. According to the survey by World Health Organization in 2008, 50% to60% of road accidents, fatal in nature are due to driving under the influence of alcohol or drugs. A device which is simple, accurate and precise is of necessity and must be made mandatory for all the manufacturers of automobiles to install it near steering to detect and act immediately in case any driver is in inebriated condition. The installed device is tobe integrated with the ignition system, such that ignition motor of the automobile gets locked and does not allow the inebriated driver to drive. Levels of alcohol in blood and concentration of alcohol in breath are directly related and a sensor detects the levels of alcohol in the breath is main component. The allowable blood alcohol concentration (BAC) is 10 to 40 milligrams (mg) per deciliter (dL), written as mg/dL. If the levels of alcohol in blood are beyond this limit, the sensor used must detect, and actuate a relay to stop the engine of the vehicle and locks against starting. However, a sudden response from the device may lead to accidents, a three-stage system is suggested. In the initial stage, as soon as alcohol level beyond the permissible level is detected by the device, a wild beep is to be given alerting the driver and surrounding people. In the second stage, the engine starts retarding supplying fuel at a reduced level in order to further caution the driver and a continuous blinking of flash lights happen. In the final stage the engine gets locked against starting using with both flashing of lights and wild beep. The sensor besides detecting the alcohol levels in the breath, it must differentiate the sweat from the driver body and predicts the alcohol ratio with the blood oxygen content.

P. Ranjana et al [1] developed a system with Global System for Mobile Communications (GSM) and Global Positioning System (GPS) modules in order to track the location of the vehicle and inform the road transportation authorities about latitude and longitude of the vehicle in which the inebriated driver involved in the accident. Ugochi A Okengwu et al [2] used Internet of Things (IoT) to detect the alcohol levels in breath and vehicle speed at any given time.In this work, an alcohol sensor is used to detect alcohol levels in blood and breathe and speed and direction of the vehicle are regulated using relay and actuator combination. Kanishka Jose, et al [3] gave a solution to detect alcohol levels in a driver breath quickly and the system proposed is suitable to any type of vehicle on road. The size of the device was small enough to be noticed by the driver under surveillance. The car ignition is disabled as and when levels of alcohol are detected as above the permissible limits. Pranavan S et al [4] also discussed a similar system, where in a transdermal blood alcohol

concentration sensor attached to the steering wheel detects limits of alcohol in breath, cut-off the fuel supply through a controller when the alcohol levels are beyond the permissible limits and also transfer the information via a GSM module to concerned authorities.

II. METHODOLOGY

The three main objectives of this are: the first objective is sensing the presence of alcohol in breath of the driver. The second one is cautioning the driver about his non-permissible inebriated condition and making a wild noise to caution surrounding people and ultimately locking the engine against running is the third objective. The system is built with a mini controller, a sensor module, a buzzer, a relay and power supply battery. After dumping the code and using data from the breath sensor, the program acts on the car ignition system through the relay. Based on the information from this unit, engine of the vehicle may gradually decelerate and stop or continue to move. The block diagram showing the arrangement of components is given in Fig.1.
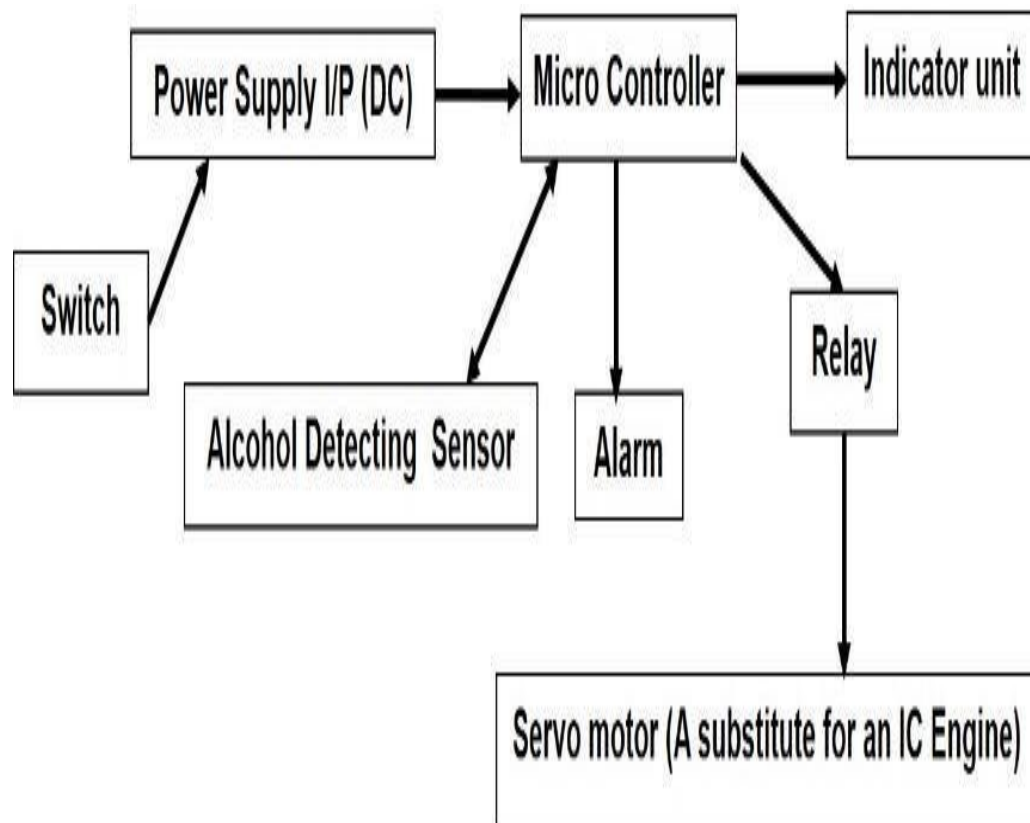

Fig:1 Block schematics of the circuit

The micro controller board based on the output from the alcohol sensor detects levels of alcohol both indoor and outdoor. The sensor is characterized by its high sensitivity and fast response time, thus enabling an almost immediate data retrieval of the measured gases. The details of the alcohol sensor are shown in figure 2.
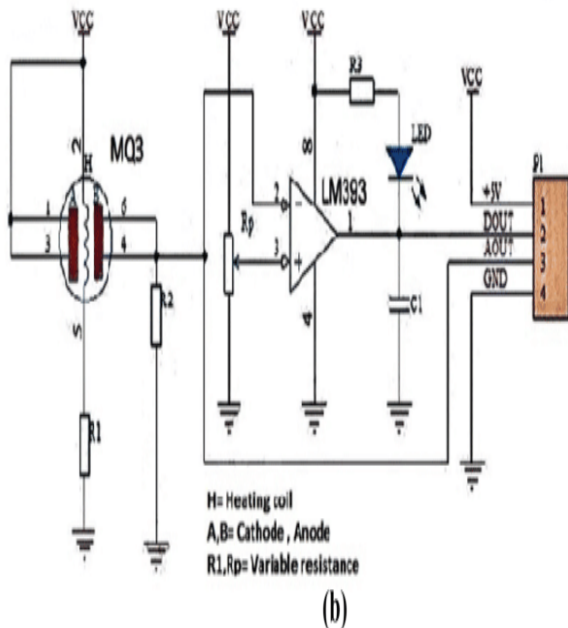
H= Heating coil
A,B= Cathode , Anode
R1,Rp= Variable resistance

(b)

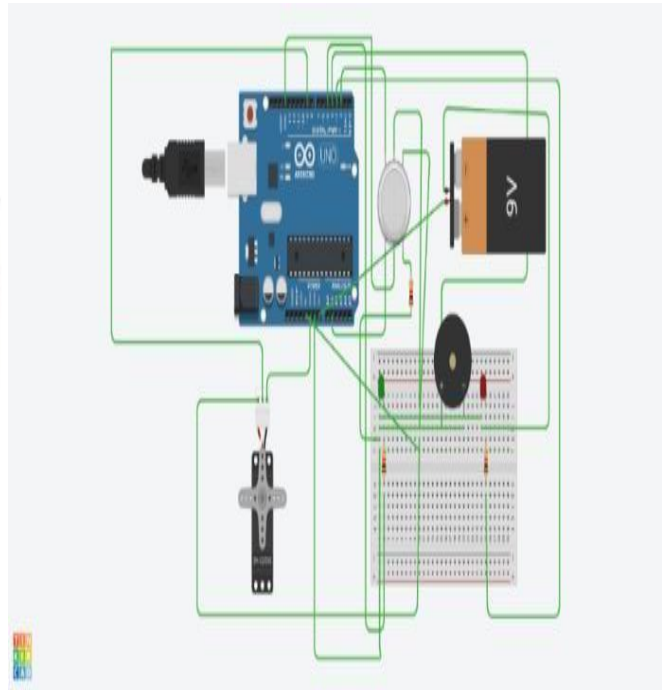Fig:2 Breath Sensor Schematic   Fig:3 Circuit of the alcohol detecting device

III. WORKING ALGORITHM

Driver starts the vehicle. The sensor is set to zero setting, the normal breath condition, by default. If the driver consumed alcohol and the levels of alcohol in his breathe above allowable levels, the sensor detects and sends the information to the controller for necessary action. First a warning in the form of a wild beep is given. With the set time, again a wild beep and flashing of parking lights start. Finally, along with continuing wild beep, the engine gets locked and fuel supply gets blocked. The ignition switch is activated only if the alcohol content in the driver breathe is below the permissible limit.

The alcohol sensor continuously monitors the levels of alcohol in the driver's breath and the vehicle is to start and run till the detected alcohol levels in driver's breathe are within limits with glowing of a green LED in front of the steering wheel. In the event the alcohol level in the breath exceeds, a red LED starts glowing and the green LED goes off. Even when the red LED is glowing, if the driver in inebriated condition tries to start the engine, the buzzer blow with high volume to caution the driver and the surrounding people. In this work to simplify the arrangement, yet demonstrate the functioning of the device designed and assembled, in place of an IC engine a Servo motor is used. As long as the sensor is active, the engine of the vehicle remains locked ensuring safety of the driver, passengers and the surrounding persons. The arrangement of various components in the alcohol detecting device are shown in figure 3. The sensor air capture index drops post the atmospheric ppm level which when drops to zero vehicle's ignition value will then drop to zero until it is safe to drive again. The following logic is used to build the code, and the hardware and software used make the system run smoothly. The logic used for the code is Using the Arduino ide, the digital pin and an analog pin for the sensor are identified. Also, digital pins for the LED and buzzer are defined. Using the include servo library, the Servo motor controlling variable is initialized. At the start, the Servo position to set to zero and in the void setup block output and input pins are initialized. Next, in the void loop block digital and analog values are read. Also, presence alcohol in breath sensed by the sensor in analog form is used to make decision using decision statement like if. If alcohol is present in breath beyond a set value, condition becomes TRUE and action pulses are sent by the controller to the red LED and buzzer to turn ON. And, a signal is sent to the engine, in this case the Servo motor, to stop and get locked. However, if the condition is FALSE under safe levels of alcohol in breath the sensor does not send any information, allowing the green LED to glow and Servo motor keeps running. A push button is incorporated in the device to start the device and save the battery. A LED display is used to display the data from sensor.

When the device was tested using different samples of three alcohol concentrations, the display given by the device are sober at 100 ppm level, at 292 ppm level mild and at 367 ppm level the display is drunk. The Servo motor stopped only when the display is drunk. This indicates the levels of the alcohol in breath. The three conditions are shown in figures 4 (a), (b) and (c).

Fig: 4 a. Sober condition

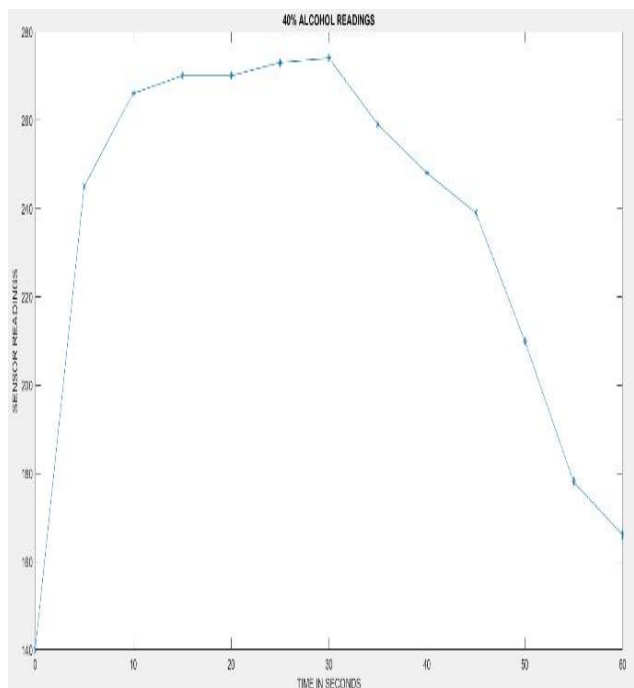Fig: 4 b. Mild condition

Fig: 4 c. Drunk condition

Fig: 5 a. Response with 40 % Alcohol

Also, to estimate the response time of the device with a simple sensing element, the following tests are made. When 40 % alcohol is used the response is slower and with 100 % alcohol the response is faster. These two results are shown in figures 5 a and b. The disturbing observation is the device reacts even when sanitizer is used. Hence, drivers must be cautioned against using sanitors before entering the vehicle. This observation is shown in figure 6.
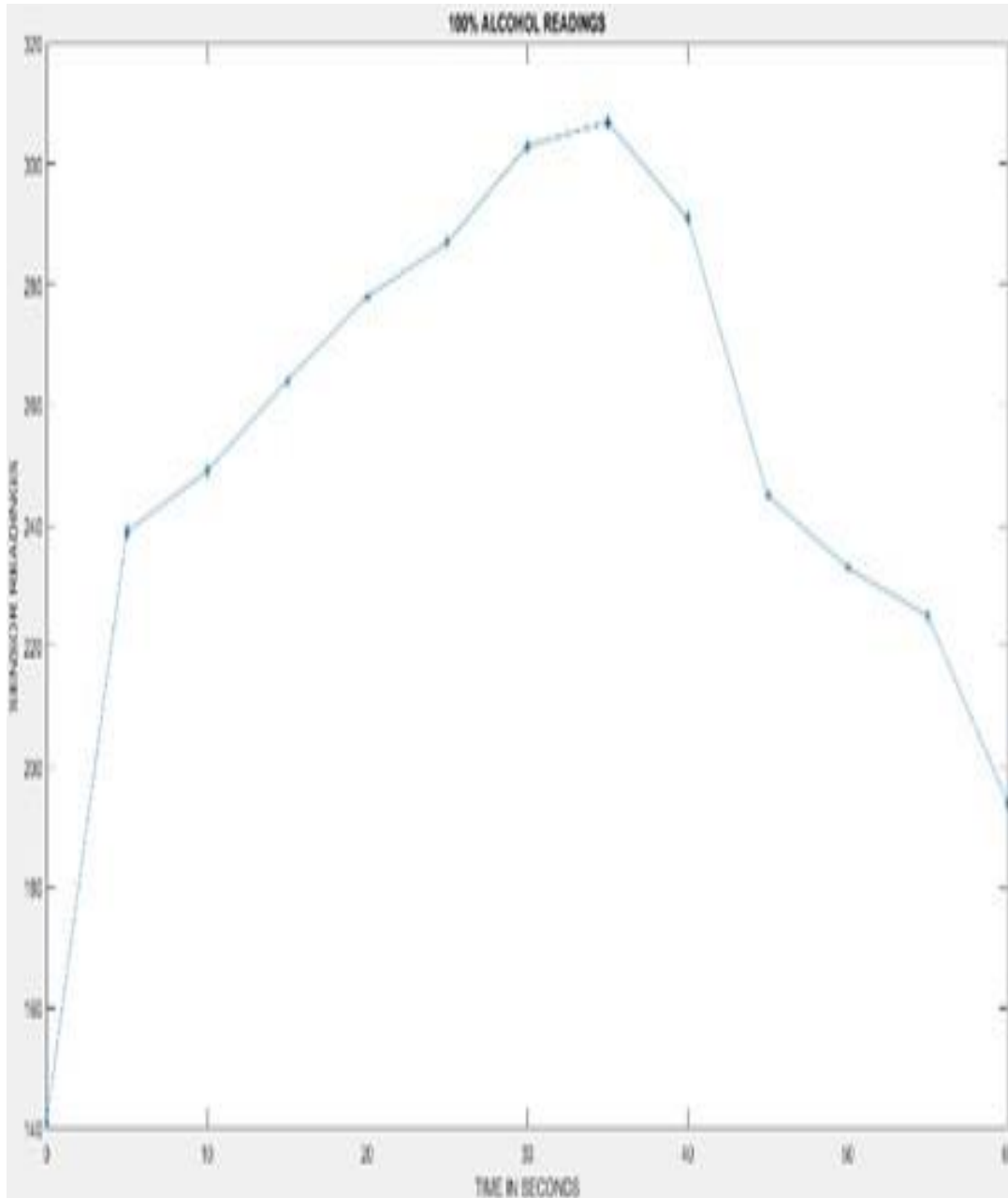

Fig: 5 b. Response with 100 % Alcohol

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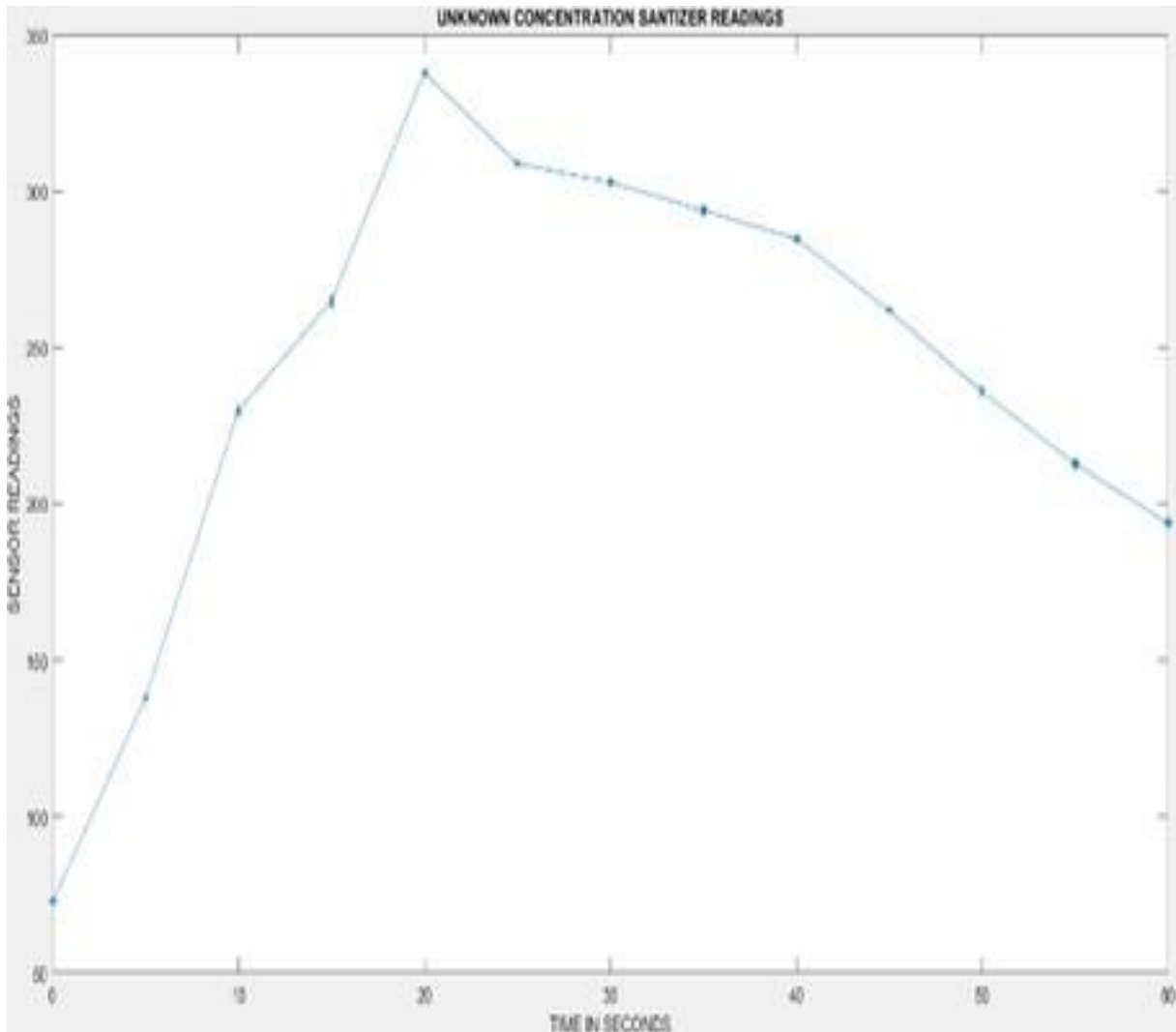
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Fig: 6. Response with Sanitizer

It is advisable to locate the alcohol sensor at a place very close to the steering wheel, in order to detect the alcohol levels in the breath of the driver quickly and not influenced by the level's alcohol in the breath of other occupants in the vehicle. Arranging this device very close to the driver increases effectiveness of the device and makes it more efficient. Our design and assembly are compact and it is clearly a rudimentary setup. More features are set for further work.

IV.   CONCLUSION AND SCOPE:

As driving in inebriated condition is a very dangerous to self and others, it is of necessity to design a device withbreath analyzing sensors to detect the intoxicated condition of a driver and inactivate the ignition system of the engine in the vehicle. It is desirable to detect the driver condition alone and not influenced by the condition of the other passengers.The device designed and assembled is enabled to detect the levels of alcohol in the driver breathe. The device is tested with two inebriated conditions of 40% and 100 % alcohol levels. Also, test was made applying sanitizer to hands. The device reacted quickly even when sanitizer is used. Every system has built-in flaws and limits and even the sensor usedin this system for detecting the levels of alcohol in breath is not devoid of malfunctions or crashes. However, it is necessary to design the system such that it works well under any

temperature conditions and regardless of the vehicle glass panes are open or closed. In normal working conditions, our device was found to be functioning well.

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