IMPLEMENTATION OF ADVANCED SAFETY FEATURES IN ELECTRIC CARS

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Abstract : **On a survey that has been done recently, said that nearly 70% of road accidents occur due to drunken drive, with a range of 44% to 67% in small cities. In the already available system, the alcohol sensor is kept on the car steering and thereby controls the vehicle according to the presence of alcohol as the active fire protection is getting more and more important for electric vehicles in general and more so in battery pack assembly. In case of such an eventuality a Smoke sensor located at a strategic location inside the battery pack assembly is designed to sense the Smoke and give a signal. The Objective of this project is to develop a system to keep the vehicle secure and protect it by the occupation of the intruders. Using eye blink sensor it is possible to know if anybody loses conscious and the speed of the electric car will gradually decreases and the ignition will be locked. In case of alcohol detection, if the driver is found drowsy the speed of the car is decreased and ignition is locked. All the above mentioned safety features can be incorporated in a single unit.**

IndexTerms **- Alcohol sensor, Eye blink sensor, Arduino micro controller, Ignition control.**

I. INTRODUCTION

In Alcohol detection system recent approach, there happens to occur lot of road accidents due to drunken driving and rash driving. Drinking and driving is already a serious public vigour problem, which is likely to emerge as one of the most noteworthy problems in the near prospect. The existing system provides system provides a safety feature where the driver cannot start the ignition when the driver is drunk above the verge value. The proposed system aims at reducing the road accidents and fatal deaths due to drunken and rash driving. The system looks for the presence of alcohol consumption of the driver and locks the ignition if positive. The lock on the car ignition is released.

Smoke Sensors used in many critical applications, such as fire detection, require precise positioning. In addition, many parameters need to be considered during the deployment process for its efficient operation. Therefore, the ultimate objective of the practical design is related to early and accurate smoke detection, which will determine the number and placement of smoke sensors, so that the cost is minimized. When designing the deployment strategies, monitoring area, and sensor capability, and design requirements are usually given. The smoke sensor unit is planned to be located in between the battery packs in the passenger compartment. The smoke sensor unit location will be within the battery pack. Battery pack is sealed expect for the cabin air can enter for sensor. The objective of this study is to verify the performance of the smoke sensor with respect to time in different real life conditions.

Eye blinking is one of the most natural and frequently occurring human activities that can be used in diverse applications. Because the frequency and duration of eye blinking are known to be related to the physical and psychological conditions of a subject, the investigation of eye-blinking activity can have applications in the detection of the unconsciousness of pilots and the drowsiness of drivers.

II. SYSTEM ARCHITECTURE

The main essential ingredient of the proposed system is “alcohol sensor”. If the driver alcohol, then it is detected by the alcohol sensor and the output of the sensor goes high to indicate the presence of alcohol or low to indicate its absence. In order to detect the drowsiness of the driver IR sensors are used. In both the case the ignition of the electric vehicle is made to stop if the condition is true. The outputs from both the sensor is passed to the comparator where it checks and examines the output. The output of the comparator is passed to the micro controller. The central tune- up contributor is Micro controller.

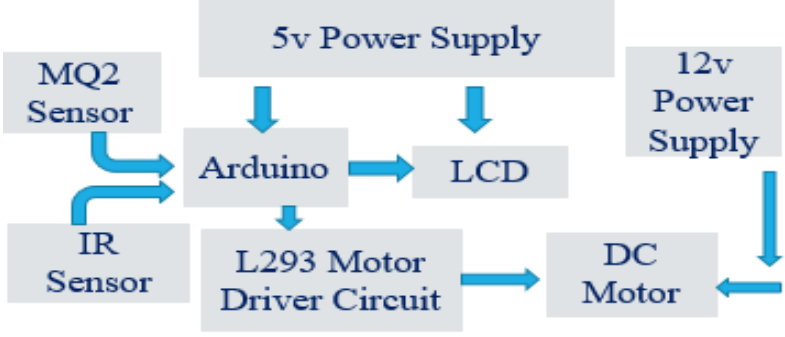


Fig.1. Block Diagram

The work of the comparator is that, it produces the output as high only if both returns are positive, for that to begin we have to set sensor values as true and if any change in stipulation then turned to false. Now when the comparator sends the yield to the micro controller as true it sends an input to the relay making the car ignition to start. Or else, if the output of the comparator is false, then it sends an input to the L293 motor driver circuit to slow down the speed of the DC motor and to stop the ignition.

III. COMPONENTS

A. MQ2 Sensor

It helps to perceive whether the driver has frenzied alcohol or not. It has unwavering and long life, high compassion and faster retort. It also detects the presence of smoke.

Fig.2. MQ2 Sensor.

B. Eye Blink Sensor

The eye is illuminated by an IR led, which is powered by the +5v power supply and the reflected light is recorded by an IR photo diode. This eye blink sensor is IR based; the variation across the eye will vary as per eye blink. This to know the eye closing or opening position. This can be used for controlling accident due to unconscious through eye blink.

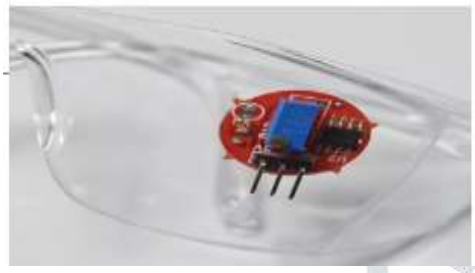


Fig.3. Infrared (IR) sensor

C. L293 Motor Driver Circuit

The L293 is an integrated circuit motor driver that can be used for simultaneous, bidirectional control of two small motors. Small means small. The L293 is limited to 600 mA, but in reality can only handle much small currents unless you have done some serious heat sinking to keep the case temperature down.

D.DC Motor

NR-DC-ECO is high quality low cost DC geared motor. It contains Brass gears and steel pinions to ensure longer life and better wear and tear properties. The gears are fixed on hardened steel spindles polished to a mirror finish. These spindles rotate between bronze plates which ensures silent running. This is used to show the controlling of speed and bringing it back to the static position when any of the conditions met.

Fig.4. DC Motor

IV.ARDUINO SOFTWARE

The Mega 2560 board can be programmed with the Arduino Software (IDE). The ATmega2560 on the Mega 2560 comes pre-programmed with a boot loader that allows you to upload new code to it without the use of an external hardware

programmer. It communicates using the original STK500 protocol (reference, C header files). You can also bypass the boot loader and program the microcontroller through the ICSP (In-Circuit Serial Programming) header using Arduino ISP.
The ATmega16U2 (or 8U2 in the rev1 and rev2 boards) firmware source code is available in the Arduino repository. The Arduino Software (IDE) uses this capability to allow you to upload code by simply pressing the upload button in the Arduino environment. This means that the boot loader can have a shorter timeout, as the lowering of DTR can be well coordinated with the start of the upload. This setup has other implications. When the Mega 2560 board is connected to either a computer running Mac OS X or Linux, it resets each time a connection is made to it from software (via USB).

V.SYSTEM SOFTWARE DESIGN

The development environment is done by merely a set of C/C++ functions that can be called from the code. The Flow Chart of the system is shown in the figure 4.At first, we have to initialize the system with the basic values that alcohol is not detected, smoke is not detected. And eye blink rate for not found drowsy. So when the system is started, the sensor automatically starts sensing for the presence of alcohol and smoke. If the alcohol is present, then the system automatically slows down the speed of the electric car and ignition is locked. The controller decides whether to twitch the detonation as all the utilities are carried out by it . If the driver found drowsy then again there will be reduction of the speed and hence the ignition of the system is locked. If in case the presence of alcohol or smoke is not detected or if the driver is not feeling drowsy then the system runs in the normal condition. It continues checks for the presence of the impurity and monitors the eye blink.

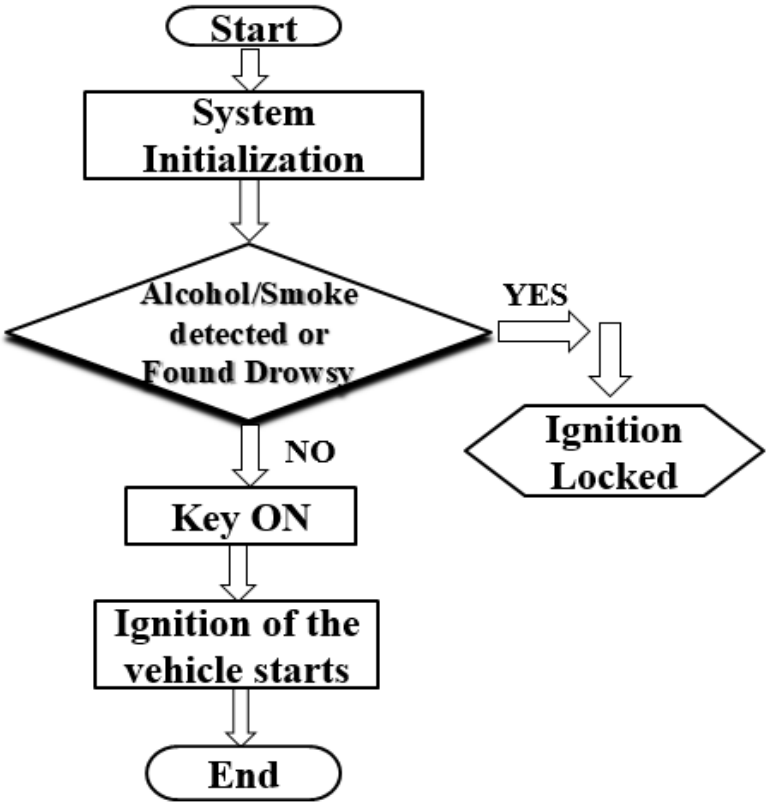
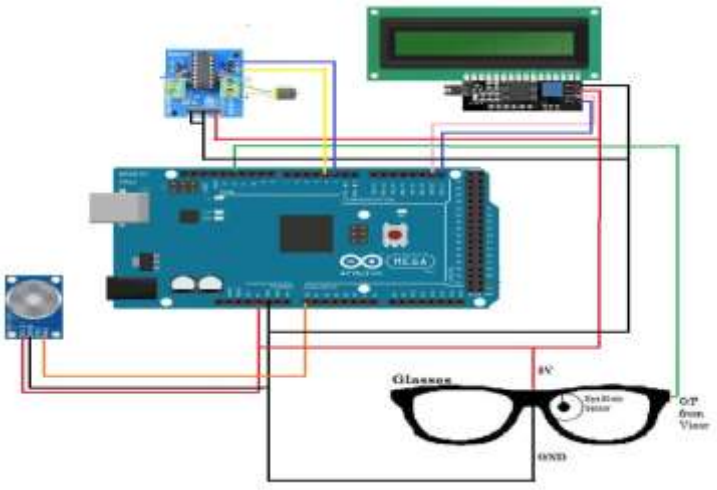


Fig.5. Flow Chart of the Process

VI. CIRCUIT DESIGN



VII. EXPERIMENT RESULT

A. Alcohol and Smoke Detection System

For the detection of both smoke and alcohol we are using MQ2 sensor. The main purpose of our project is to minimize the possible road accidents. MQ2 sensor detect the presence of smoke and alcohol content in the air. We are proposing an idea of placing the MQ2 sensor in the steering. We have to initialize the system with the basic values that alcohol and smoke to be detected. So when the system is started, the sensor automatically starts sensing for the presence of alcohol. If the alcohol is present, then the system automatically locks and the ignition of the EV will stop. If alcohol is not detected, then even on keying, the controller looks for input from the IR sensor. In case of driver drinks during driving, the ignition system will robotically stop. The same principle holds good for smoke detection also. If either of them is detected the vehicle slows down its speed and hence the ignition is locked. In the LCD we can see the display as "Impurity Found" which is as shown in Fig.6.

Fig.6. LCD display for alcohol and smoke detection system

B. Drowsiness Detection System

The objective of the prototype is to monitor driver fatigue by sensing physiological signals like eye blink. It is necessary in our working to find the blinking of eye, since it is used to drive the device and to operate events. So blink detection has to be done. The most realistic method that can be implemented to detect decline in driver alertness is by sensing physiological signals like eye blink. Time greater than the human eye blinking time then consider an event called "blink", for which the set of operations will be followed. If eyes are closed for a short span of two second or more it concludes that the driver is feeling drowsy and is not in a condition to drive the vehicle. The blink time difference between the previous and next blink is monitored.
At that particular time the IR sensor senses the eye blink and indicates that the driver is feeling drowsy and gradually the vehicle speed is slowed down and finally the ignition of the vehicle is locked. When the driver himself restarts the engine at that particular time the engine can be unlocked and ignition can be started. When the drowsiness is detected we can see the LCD display as "Found Drowsy" which is as shown in Fig.7.

Fig.7. LCD display for drowsiness detection system

VIII. CONCLUSION

The main purpose of our project is to prevent the possible accidents. Our system efficiently checks the accidents occur or not and drunken driving. By implementing this system in vehicle, a safe journey is possible which would decrease the injuries during accidents and also reduce the accident rate due to drunken driving. This system has also accident prevention technology which would reduce the accident. Proposed system will resourcefully detect alcohol through driver breath and stop the vehicle by interrupting the ignition, instead of directly stopping the vehicle. We are implementing by slowing down the vehicle movement and then locking the ignition. Smoke detection is also made possible in our work. The system also reduces the accidents which are caused by the drowsiness of the driver by locking the ignition. All these safety features are implemented on a single board.

IX. FUTURE SCOPE

The present work is not adding the GSM to the system. Hence we can add GSM to the system to make the system more effective. Besides using GSM, it is possible to implement the system using GPRS technique. An additional setting could be implemented to interface the system to the car's alarm to alert the owner on his phone if the alarm is set off.

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