

Alcohol Detection and Seat Belt Check System

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Abstract –In this paper, a smart seat belt system is proposed to reduce the number of deaths/accidents due to drunken driving and also due to seat belt not being worn. The idea is to completely prevent the cranking of the engine unless the tests were taken, thus allowing the driver to access the air conditioner and the stereo systems, but preventing the car from igniting. This is suitably done using a microcontroller (Arduino UNO), an MQ3 alcohol sensor, some ultrasonic range detectors and electrical relays. Using suitable coding (discussed in the upcoming sections), a suitable range can be determined for which a person is deemed safe to drive. The no. of road accidents (both driver and pedestrian) due to drunken driving is on the high. This system would help safe driving and also reduce the number of deaths due to the carelessness of human being. The system proposed must be implemented in all cars for our country's development.

Keywords –Alcohol Sensor, Reed Switch, Two Channel Relay and Ultrasonic Range Detectors.

I. INTRODUCTION

The two main reasons for accidents as told earlier are drunken driving and seat belt not being worn. The two channel relay prevents cranking of engine in both the cases. Drunken driving cases can be eliminated by using alcohol sensor which is very much similar to a breathalyzer. To know if seat belt is worn or not, reed switch is used. This is an electrical switch operated by magnetic field. A recent research by Accident & Emergency (A & E) department of a District General Hospital (DGH), in the year before and after the introduction of seat belt legislation, the number of those who escaped injury increased by 40% and those with mild and moderate injuries decreased by 35% after seatbelt legislation. The Hindu states that 70 per cent of road accidents in India are due to drunken driving. 24-hour availability of alcohol along

National and State Highways has resulted in increase in drunken driving cases of about 7 times in Delhi and 16 times in Mumbai since 2001.

II. SYSTEM MODEL

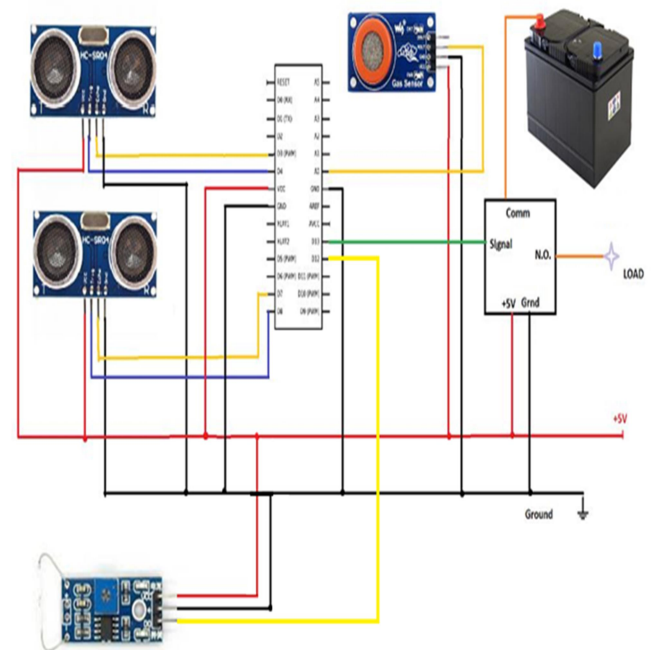


Fig 1: Block Diagram of the proposed project

Arduino gets the inputs from the two sensors (One ultrasonic range sensor and reed switch) via the two channel relay.

The various components that are used in this project and their working is discussed in this section.

[A] ARDUINO: The central processing unit of the system is the Arduino board. All the components are interfaced to the board as per the functionality of the system.

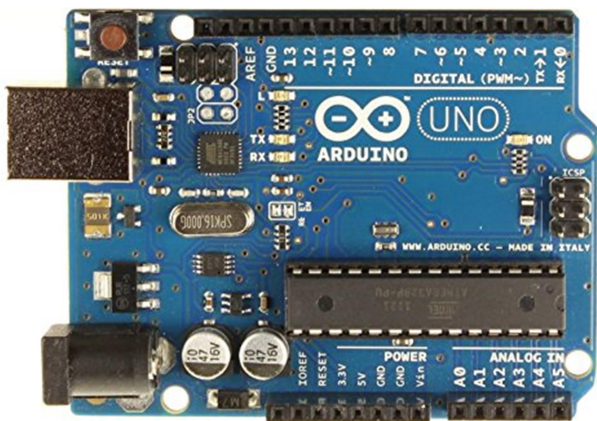


Fig 2: Arduino UNO board

The Arduino Uno board has an ATmega 328p microcontroller. This acts as the command unit, which carries out instructions as given by the user. The Arduino board has 18 input-output pins: 12 digital pins and 6 analog pins. It consists of two different power out pins, apart from 3 ground pins: a 5V pin and a 3.3V pin. It has Rx and Tx pins to set up serial communication and also 6 digital pins which can be used as PWM outputs. Apart from this, there is a 16MHz crystal oscillator, a power jack and a reset button. There are two ways to power up an Arduino: 1. connect it to a computer using a USB cable or 2. Use a battery and connect it to the DC jack.

[B] ALCOHOL SENSOR: An alcohol sensor is an instrument which detects the presence of alcohol vapours in the surrounding. The MQ3 sensor is used in this project for the same. Only when there is minimal alcohol detection, a signal is sent to the relay system which allows the car's engine to crank up.

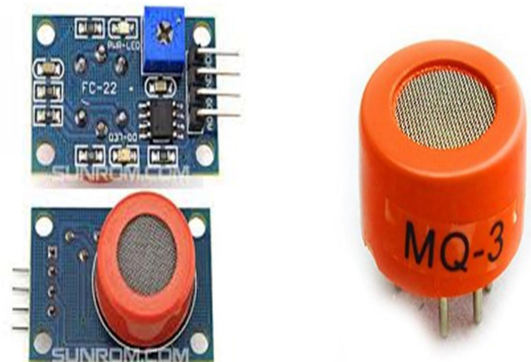


Fig 3: Alcohol Sensor

It has a high sensitivity to alcohol. It works on the principle when the alcohol molecules in the air meet the electrode that is between alumina and tin dioxide, ethanol burns into acetic acid then more current is produced. So the more alcohol molecules there are, the more current we will get. Because of this current change, we get the different values from the sensor.

[C].ULTRASONIC RANGE SENSOR:

The ultrasonic range detectors are devices used to detect the range of any object present in front of it. It gives us the distance of an object placed in front of the sensor module. Two Ultrasonic range detectors are placed in suitable positions (one next to the steering wheel, the other on the seat near the neck) to ensure that the driver gets close enough to the MQ3 sensor such that it detects the presence or absence of alcohol molecules.



Fig 3: Ultrasonic Range Detector

[D] ELECTRICAL RELAY:

An electrical relay is similar to a switch. It allows conduction only during the presence of a trigger, and this trigger is sent, by the microcontroller, only when the MQ3 sensor sends a clearance. With the help of a simple calculation, a clearance level is set in the AtMega328 Microcontroller. If the value detected by the sensor is less than clearance level, then the driver is alcohol free and is permitted to start the car. A trigger HIGH is sent to the relay circuit which acts as a closed switch and thereby starting the car. If the sensor value is greater than the clearance level, a trigger LOW is sent to the relay circuit thus preventing ignition.

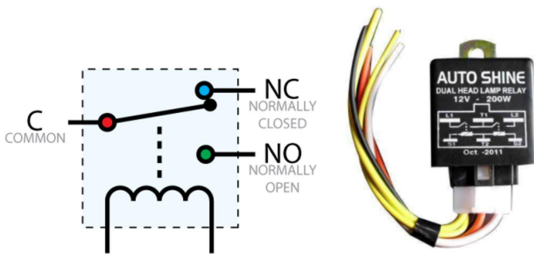


Fig 4: 2 Channel Relay

[E] REED SWITCH:

The reed switch is an electrical switch operated by an applied magnetic field. It consists of a pair of contacts on ferromagnetic metal reeds in a hermetically sealed glass envelope. The contacts may be normally open and closed when a magnetic field is present. Due to magnetic field opposite polarity gets induced on both the ends of the open switch and gets closed.



Fig 5: Reed Switch

III. PRINCIPLE OF OPERATION

The microcontroller here acts as the heart of the system giving all commands to the motor driver after collecting inputs from the sensors. An alcohol sensor is an instrument which detects the presence of alcohol vapours in the surrounding. The MQ3 sensor is used in this project for the same. Also, reed switch is used to check if seat belt is put or not. Only when there is zero alcohol detection and if seat belt is worn, a signal is sent to the relay system which allows the car's engine to crank up.

There are two ways to prevent the cranking of the engine:

1. Mechanical manipulation of the Ignition Key system by ignition key interlock mechanism.
2. Electrically cutting off the supply using relays.

In this project, we have proceeded with the electrical implementation as:

1. Mechanical interlock systems involve manipulation in the size and shape of car keys and key holes which vary from car to car.
2. Moreover, the dawn of technologies has eliminated keys and now button ignition has come into play.
3. Electrical systems are easier to handle, and the system is the same for a varied range of cars.
4. Even though, the heat would pose a problem to the relay system there are suitable ways to implement this project successfully.

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value is greater than the clearance level, a trigger LOW is sent to the relay circuit thus preventing ignition. A Reed switch detects if belt is worn or not, i.e, it gives a HIGH if seat belt is worn and vice versa.

The ultrasonic range detectors are devices used to detect the range of any object present in front of it. It gives us the distance of an object placed in front of the sensor module. Two Ultrasonic range detectors are placed in suitable positions(one next to the MQ3 sensor on the steering wheel, the other on the seat near the neck) to ensure that the driver gets close enough to the MQ3 sensor such that it detects the presence or absence of alcohol molecules.

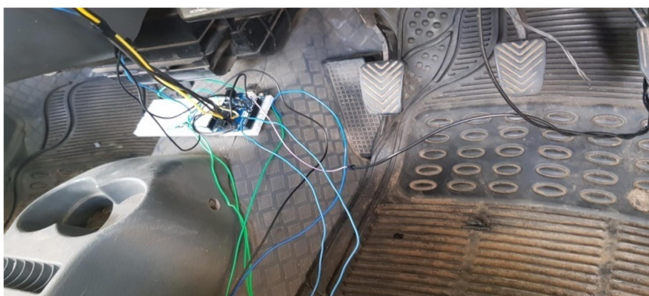
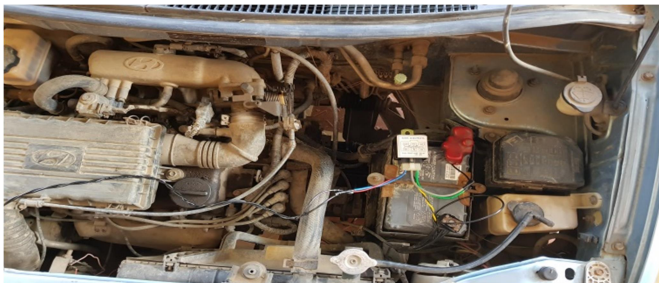


Fig 6: Implementation diagram of the project

IV. CONCLUSION

Thus an effective and efficient system has thus been implemented which can really bring down the number of accidents due to the drunken state of driver and seat belt ignorance.

The future scope is to employ GSM module and use ESP8266 and connect cars to cloud to get constant feed of location of cars and use data wherever necessary. Also employment of pressure sensors and monitor safety bag release can also be done including emergency contacts can be informed using IOT.

V. REFERENCES

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