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Alcohol Detection with Engine Locking

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Abstract. Consumption of Alcohol is considered bad for our health, as it affects our body parts like the liver, in addition to that, driving after alcohol consumption is affecting so many things in the world, a drunk driver who is affecting his/her body by taking alcohol also become a problem for other people and property. A drunk driver does not have enough control over their mind to control the vehicle, which leads to accidents causing many deaths, damage to vehicles, properties, and traffic jams that waste the time of millions more people in the whole world. This project presents thedesign and implements a device to eradicate accidents caused due to Alcohol Consumption by engine locking.
Key words: MQ-3 sensor, DC motor, Ignition Lock, Relay, Battery.

1. Introduction

In the present day, Technology is getting upgraded as soon as possible. But the occurrence of an accidentisquite frequent. Nearly averages of 12,000 accidents are occurred within a year because of drunk driving. This creates a huge loss to the person and their beloved who met with an accident. To avoid this, we are presenting the design of a device that senses the alcohol and cut off the supply to the engine or motor on which the vehicle runs. This work aims to avoid drunken-driving accidents by using an alcohol detecting sensor. Uncontrolled many accidents were happened because of the influence of alcohol during driving. We have proposed an alcoholic sensor in the vehicle ignition system to avoid such accidents. The alcohol sensor detects the presence of alcohol content in human breath. The ignition system will operate based on the level of blood alcohol content (BAC) in human breath detected by the alcohol. Moreover, WHO information on road traffic deaths disclosed 1.25 million traffic deaths were recorded globally in 2013 with the low- and middle-income countries having higher fatality rates per a 100K population (24.1% and 18.4% respectively), information collected showed that several of economic vehicles drivers in Bharat admitted to drinking alcohol throughout operating days. This shows that almost all drivers, particularly business and serious duty trucks drivers interact in drink-driving, which may result in an accident. Bharat sets a legal limit of 30mg/100mL blood alcohol concentration (BAC), any level higher than that's the same to be ineligible. The BAC depicts the amount of alcohol in an exceedingly sure volume of blood. It's measured as either gram of alcohol per metric capacity unit of blood or milliliters of blood, (mg/ml, utilized in a lot of Europe). For BAC levels from 0.4 to 0.6, drivers feel dazed/confused or otherwise disoriented, and it's typically not safe for a driver to drive a vehicle beneath such conditions. Also, a BAC level of 0.7 to 0.8 makes a driver's mental, physical and sensory functions to be severely impaired. At this stage, a driver is inactive and incapable of driving. BAC level of 0.2 to 0.3 continues to be not safe however the motive force still. So, there is a need for such a system that can reduce the number of road accidents caused due to drunk driving

2. Methodology

The Alcohol Detection with Engine Locking device helps to reduce the accidents which are occurring due to drunk driving. MQ-3 Sensor detects the presence of alcohol in the surroundings. The sensor provides an output based on the concentration of the alcohol which can be adjusted by using the potentiometer. If the reading is more than the threshold, then the power cut of using the relay. The following block diagram represents the hardware module.

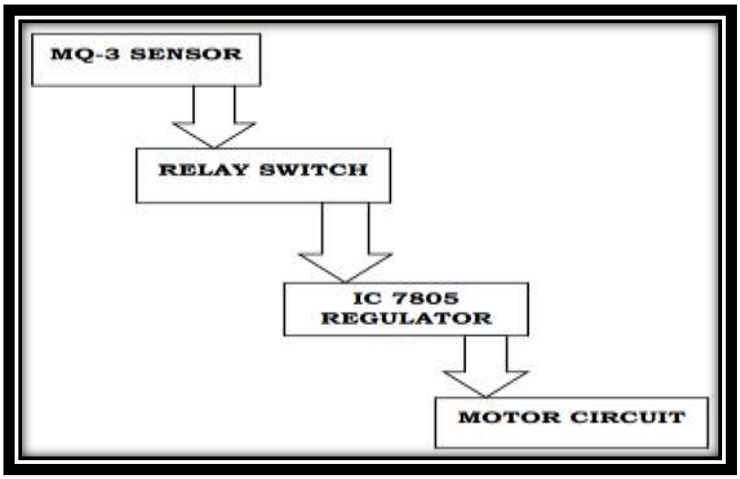

FIGURE 1. Hardware Module

MQ-3 Sensor: The MQ-3 sensor is made of Tin Dioxide (SnO_2) layer and Aluminum Oxide (Al_2O_3) connected via a Nickel-Chromium coil. The SnO_2 semiconductor layer is heated at a high temperature when oxygen is absorbed on the surface. In the presence of alcohol, however, the surface density of adsorbed oxygen decreases as it reacts with the alcohols; which lowers the potential barrier. Electrons are then released into the tin dioxide, allowing current to flow freely through the sensor. The sensor has 4 pins namely VCC, GND, DO, AO.

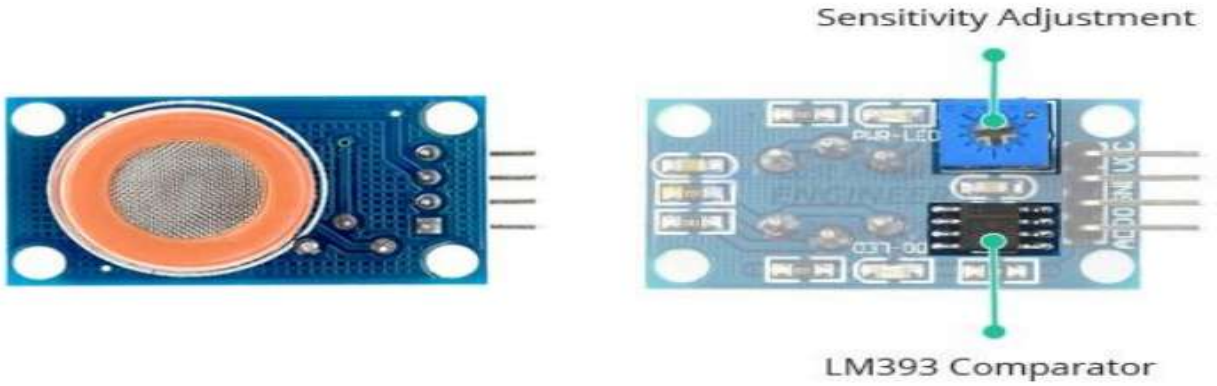

FIGURE 2. MQ-3 Sensor

Relay: A Relay is an electromechanical device that can be used to make or break an electrical connection. It consists of a flexible moving mechanical part that can be controlled electronically through an electromagnet a relay is just like a mechanical switch but you can control it with an electronic signal instead of manually turning it on or off. Again, this working principle of relay fits only for the electromechanical relay. Generally used relay is made up of electromagnets which in general are used as a switch. Dictionary says that relay means the act of passing something from one thing to another, the same meaning can be applied to this device because the signal received from one side of the device controls the switching operation on the other side. So, the relay is a switch that controls (open and close) circuits electromechanically. The main operation of this device is to make or break contact with the help of a signal without any human involvement to switch it ON or OFF. It is mainly used to control a high-powered circuit using a low power signal. Generally, a DC signal is used to control the circuit which is driven by high voltage like controlling AC home appliances with DC signals from microcontrollers.

FIGURE 3. Relay

IC 7805 Voltage Regulator: Voltage regulators are very common in electronic circuits. They provide a constant output voltage for a varied input voltage. In this case, the 7805 IC is an iconic regulator IC that finds its application in most projects. The name 7805 signifies two meanings, "78" means that it is a positive voltage regulator and "05" means that it provides 5V as output. So, our 7805 will provide a +5V output voltage. The output current of this IC can go up to 1.5A. But the IC suffers from heavy heat loss hence a Heat sink is recommended for projects that consume more current.

FIGURE 4. IC 7805 Voltage Regulator

Battery: The battery is the main source of power for the motor. Here, we used a lead-acid battery with the rating of 12v and 65ah in several 4. These batteries are stored and are connected in series such that the voltage increase to 48v. And also, we can use only 3 batteries for running a motor i.e., we use run 36v battery for running a battery at lower speeds. After the discharge, the battery is to be recharged by using the charger for further use. This recharged battery can again be used for further usage.

Process: The prepared circuit is attached to the key's power supply wire such that, when the alcohol is detected, then the supply will cut off else when the alcohol is not detected, the supply goes as usual. Even during running also, if it detects alcohol then the supply will cut off. The power to the relay and sensor is regulated by using an IC7805 voltage regulator that converts 12v to 5v supply. Such that no component gets damaged with overvoltage.

FIGURE 5. Connected Circuit

3. Result

This project presents a design and implementation of a device that stops a vehicle by power cut-off when alcohol is detected at a certain concentration else the vehicle will run as usual. The device is created by using the MQ-3 Sensor attached to the relay switch. The sensor is adjusted with a sensitivity adjustment knob up to a certain level. And then the result is passed through a relay switch which in turn works like an on/off switch for a circuit. And that is connected to an ignition circuit. If the connection is breached, then power to the ignition key will not pass else the power to the ignition key will pass. The power will cut off when the alcohol is detected in a range of 25 to 500 ppm i.e., 0.04 mg/L to 4 mg/L.

4. Conclusion

We have given an incredibly capable way to deal with and develop a Drunk Drive Detection system is a combination of economically effective and technology. The main unit of this project is the associate "Alcohol sensor". If the person within the automobile has consumed alcohol, then it's detected by the sensing element. The sensing element provides this signal to a microcontroller. The microcontroller is connected to the DC MOTOR, which will automatically stop. This device will be able to reduce Road Accidents happening because of drunk driving on a large scale. The vehicle stops moving when it detects alcohol presence in the breath of the one who drives a vehicle else in other cases the vehicle won't stop since the alcohol present in the breath is lower than optimum. Previously, there are several accidents caused due to drink and drive i.e.,

on average in 2019, there were 10,142 people killed in these preventable crashes. In fact, on average over the 10 years from 2010-to 2019, more than 10,000 people died every year in drunk-driving crashes. With the help of this device, we can minimize the accidents caused in case of drunk and drive at least 50% of accidents.

5. Future Scope

In the future, we can expect this to be a pre-installed feature in vehicles. The future is of Self-driving Cars, so they will automatically turn on the self-driving mode in case alcohol is detected. This device can be available in the market as such poor people can also afford it to reduce the accidents caused. As there is an increase in health consciousness in people of today's world, we can make a device with pre-set such that no person can make any modification to that device.

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