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Alcohol Detection and Engine Locking System

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ABSTRACT

(Drunk driving is a serious problem and causes many road accidents every year. This project introduces an Alcohol Detection and Engine Locking System that helps stop a vehicle from being driven by a drunk person. The system uses an Arduino Uno and an MQ-3 alcohol sensor to check alcohol from the driver's breath. If the alcohol level is higher than the safe limit, the engine is turned off automatically. A GSM module is also used to send an alert message to a registered mobile number. This system works automatically and helps improve road safety.

Keywords—Arduino Uno, Alcohol Sensor, GSM, Vehicle Safety, DC Motor

INTRODUCTION

Road accidents are increasing day by day, and one of the main reasons is drunk driving. When a person drinks alcohol, their mind does not work properly. They react slowly, lose control, and make wrong decisions while driving. Because of this, many serious accidents happen, and many people lose their lives every year.

Even today, alcohol is mostly checked by traffic police using a breath-checking device. This checking happens only at some places and times. Many drivers escape checking, and accidents happen before anyone can stop them. So, this method is not enough to fully control drunk driving.

To solve this problem, an automatic system is needed that can stop a drunk person from driving before the vehicle starts. The idea of this project is simple. The system checks whether the driver has consumed alcohol. If alcohol is found more than the safe limit, the vehicle will not start.

This system works on its own and does not need police or manual checking. It helps stop accidents before they happen and makes roads safer for everyone. This simple idea can save lives and reduce damage to people and property.

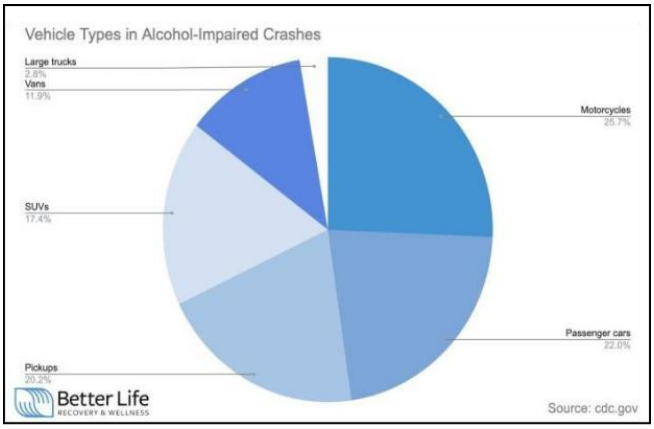

Fig 1. Vehicle types in alcohol impaired crashes

A. Existing Method

Currently, traffic police use a **breathalyzer** to check alcohol levels. The driver blows air into the breathalyzer, and it shows the alcohol amount. If the value is more than the legal limit, the driver is punished under traffic laws

B. Proposed System

The proposed system works automatically. An **MQ-3 alcohol sensor** is placed near the driver to sense alcohol from breath. The sensor sends data to the **Arduino Uno**. If the alcohol level is higher than the set limit, the Arduino turns off the engine by stopping the DC motor.

This method is not always accurate because every person's body is different. Factors like body weight, surrounding temperature, and breathing style can affect alcohol readings. Because of this, a smarter and automatic system is needed.

In this project, Arduino Uno is used because it is easy to use, low cost, and open source. The system checks alcohol using an MQ-3 sensor, which can sense alcohol from a short distance of about 5 to 10 cm. This helps the sensor detect alcohol only from the driver and not from others. For this reason, the sensor is placed near the steering wheel.

If the detected alcohol level is more than the safe limit, the system immediately stops the engine, which is shown using a DC motor. At the same time, an alert message is sent through a GSM module to the concerned person or authority. This system is designed to protect not only the people inside the vehicle but also people outside on the road.

SYSTEM BLOCK

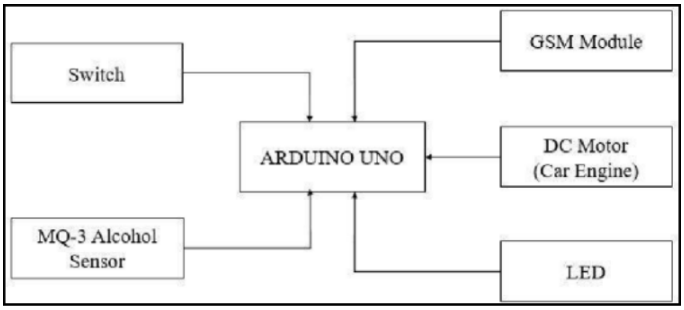

Fig 2. Block Diagram for alcohol detection

The block diagram of the proposed system is shown in Fig 2. It consists of a switch which is used to start the system. It is analogous to starting the car engine. The MQ-3 alcohol sensor is used to detect the presence of alcohol that crosses the specified threshold value.

LITERATURE SURVEY

Many researchers have worked on systems to prevent drunk driving.

Vijay Savania and team suggested a system that uses an alcohol sensor along with an ultrasonic sensor to avoid accidents. The information is sent through GSM to a nearby contact.

M. S. Malathi and team proposed a system where the alcohol sensor is placed on the steering wheel. They also added a seat-belt system that locks automatically, so the vehicle cannot start without wearing the seat belt.

Dada Emmanuel Gbenga and team developed a model using Arduino Uno, alcohol sensor, LCD, and DC motor. When alcohol is detected, the engine is stopped immediately.

Aryan Mathur and team designed a system where alcohol detection is done from the steering wheel. The system locks or unlocks the vehicle key based on alcohol detection and also warns the driver about accident-prone areas.

Prof. Dr. D. G. Jha and team proposed a system that checks alcohol even while the vehicle is moving. If alcohol is detected during driving, the vehicle slows down and stops safely.

SYSTEM COMPONENTS

1. **Arduino Uno**

Fig. 3. Arduino Uno Board

Arduino Uno is a small control board used to manage all operations in the system. It work like as a brain of hardware device.it is connected to a computer using This method is not always accurate because every person's body is different. Factors like body weight, surrounding temperature, and breathing style can affect alcohol readings. Because of this, a smarter and automatic system is needed.

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2. **MQ3 SENSOR:**

Fig 4. MQ-3 alcohol sensor

The MQ-3 is a sensor that is used to detect alcohol in the air. It is mainly used in projects like alcohol detection systems in vehicles to check whether a driver has consumed alcohol. The sensor works in a simple way. When alcohol vapor comes near the sensor, its internal resistance changes. Because of this change, the sensor produces a voltage output. If the alcohol level is high, the output voltage will also be high. This voltage can be read by a microcontroller like Arduino, which can then take action (for example, stopping the vehicle from starting).
The MQ-3 sensor is very sensitive to alcohol. It does not react much to other gases like smoke, petrol, or benzene, which makes it more reliable for alcohol detection.

Specifications

- It works on a 5V power supply.
- It can detect alcohol concentration between 0.4 mg/L to 4 mg/L.
- It gives output in analog voltage form.
- Its sensitivity range is between 200 ppm to 1000 ppm.
- It has a fast response time.

3. **DC Motor**

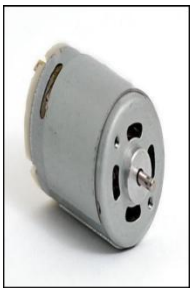

Fig 6. shows DC motor

The DC motor in this system works like the engine of a car. It represents the vehicle's running condition. When alcohol is detected above the set limit, the motor automatically stops, just like a car engine would stop to prevent driving under the influence. If the alcohol level is lower than the predefined safe limit, the motor starts running again normally.

The DC motor is connected to pin number 9 of the microcontroller, which controls its operation based on the alcohol sensor's readings.

Specifications of the DC Motor:

- A Standard 130 Type DC motor is used.
- It works with a voltage between 4.5V and 9V.
- The recommended voltage for proper operation is 6V.
- At no load, it consumes a maximum current of about 70mA.
- Its speed without load is approximately 9000 revolutions per minute (rpm).

4. **GSM Module:**

- The GSM module sends an alert message to the registered mobile number.

Fig 7. shows GSM Module

A GSM is device that is use to communicate wireless. A GSM module Communication: RS232), power supply and some types of indicators.

We can connect the GSM Module with an external computer or a microcontroller with the help of this communication interface. The GSM module used here is SIM900.

Specifications:

- It requires a supply voltage between 3.4V to 4.5V
- It also helps to provide GPRS connectivity with the help of GPRS multi-slot class 10 (default

A. Algorithm:

Step 1:
Power on the system. The Arduino initializes all components such as the MQ-3 sensor, ultrasonic sensor, GSM module, buzzer, and DC motor.

Step 2:
Press the start button. The DC motor begins to run, indicating the system is active.

Step 3:
The MQ-3 sensor continuously monitors the alcohol level in the driver's breath and sends the data to the Arduino.

Step 4:
The Arduino compares the detected alcohol value with the preset safe limit.

Step 5:
If the alcohol level is higher than the safe limit,
- The DC motor stops immediately.
- The system restricts further operation.

Step 6:
If the alcohol level is within the safe range, the DC motor continues running normally.

Step 7:
The ultrasonic sensor starts checking for nearby obstacles by measuring the distance in front of the vehicle.

Step 8:
If an obstacle is detected within 20 cm, the Arduino stops the motor to prevent collision.

Step 9:
If no obstacle is detected within the set range, the motor continues to operate smoothly.

Step 10:
The system keeps monitoring alcohol leve FLOW CHART:

B. Flowchart:

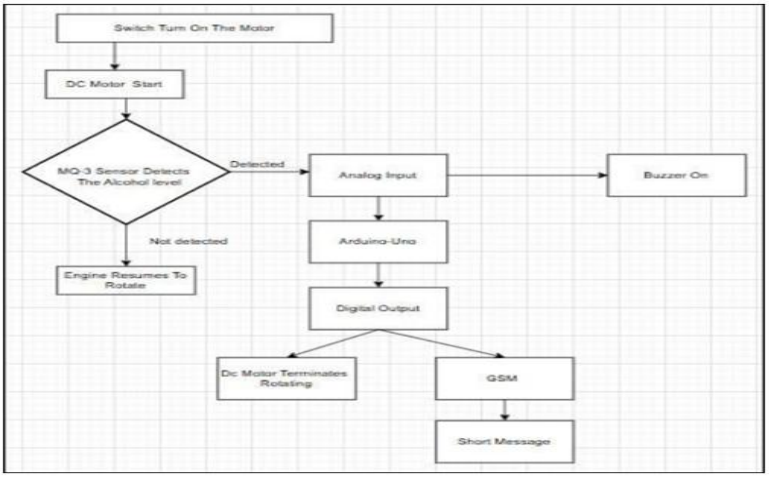

Fig 9. Flowchart of the system

The flowchart of the system can be divided into three main sections. The first section represents the ignition process. When the start button is pressed, the DC motors begin operating and the LED turns on. The key component in this stage is the

alcohol sensor, which detects the presence of alcohol when a person breathes directly onto it.

The second section is the control unit. In this part, the microcontroller reads the signal produced by the alcohol sensor. Based on the detected alcohol level, the controller decides whether the DC motors should continue running or stop. At the same time, the LED provides a visual indication of the system's current status.

The third section handles the output operations. The measured alcohol value and system status are displayed on the serial monitor.

RESULT

The developed system successfully integrates alcohol detection and obstacle sensing to improve safety. The MQ-3 sensor accurately identifies the presence of alcohol in the driver's breath. When the detected alcohol level exceeds the preset safe limit, the Arduino immediately stops the DC motor and sends an alert message to the registered mobile number through the GSM module. This prevents the vehicle from operating under unsafe conditions.

When the alcohol level is within the acceptable range, the motor continues to run normally. At the same time, the ultrasonic sensor effectively monitors the distance of nearby objects. If an obstacle is detected within 20 cm, the motor stops automatically to avoid collision. If no obstacle is present, the vehicle continues to operate smoothly.

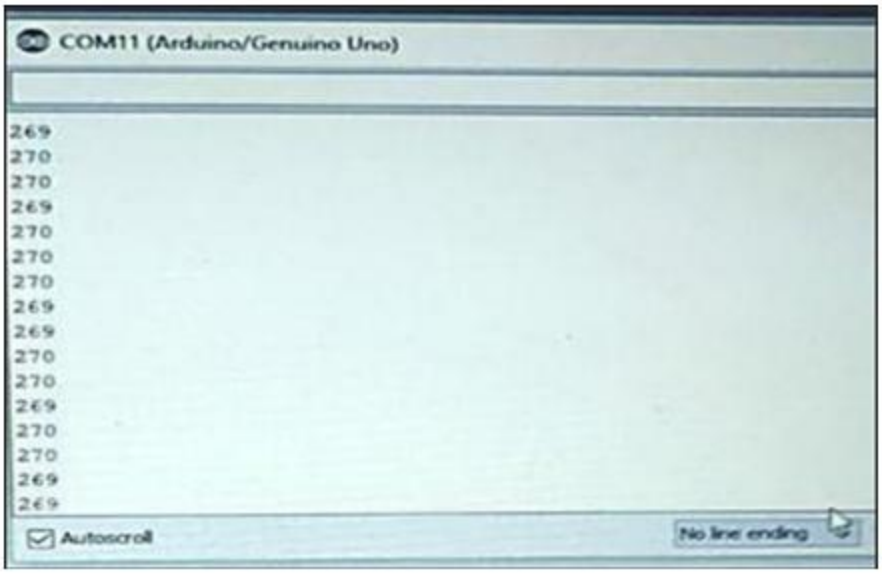

Fig 10: System configuration

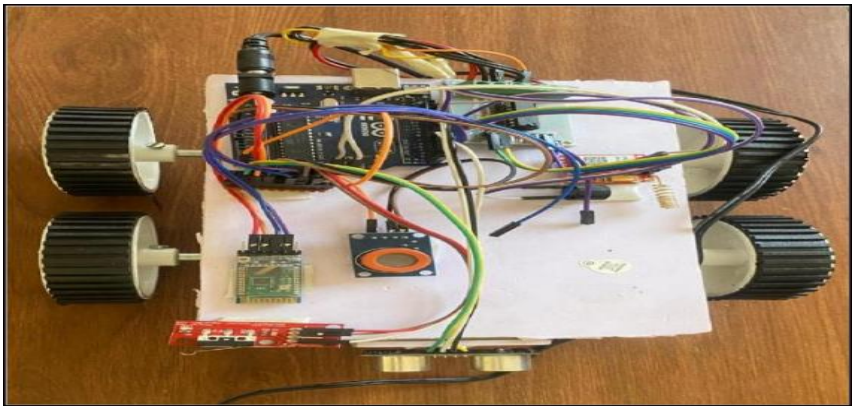

Fig 11: COM port terminal output

Indicating the absence of alcohol due to which the LED is turned on and the DC motor initiates spinning.

The values observed in the COM terminal determine the absence of alcohol in part per million (ppm), as they are below the threshold value 400 parts per million (ppm). Hence the interpreted conclusion determines the absence of alcohol.

The values obtained in the COM terminal conclude the presence of alcohol depicting the range above 400 ppm the predefined value

Fig 14: GSM module Transmitted short message to the respective authority

CONCLUSION

The alcohol detection and obstacle avoidance system is designed to improve road safety by preventing accidents caused by drunk driving and collisions. The MQ-3 sensor effectively detects alcohol levels, and the Arduino microcontroller takes quick action based on the sensor readings. If alcohol is found above the safe limit, the system stops the DC motor and sends an alert message through the GSM module. In addition, the ultrasonic sensor helps in avoiding accidents by detecting nearby obstacles and stopping the motor when an object is too close.

Overall, the system works efficiently by combining alcohol detection, automatic motor control, obstacle sensing, and alert messaging.

REFERENCES

[1]. Arduino Official Documentation – Arduino Uno Board and Programming Guide. Available at: https://www.arduino.cc
[2]. MQ-3 Alcohol Sensor Datasheet –working principle of the MQ-3 gas sensor.
[3]. HC-SR04 Ultrasonic Sensor Datasheet – Distance measurement
[4]. SIM800 / SIM900 GSM Module AT Command Manual – GSM communication and message transmission guide.
[5]. https://www.arduino.cc/en/Main/ArduinoBoa rdUno
[6]. https://www.sparkfun.com/datasheets/Sensors/MQ-3.pdf
[7]. https://cdn.sparkfun.com/datasheets/Sensors/ Proximity/HCSR04.pdf
[8]. https://simcom.ee/documents/SIM800x/SIM8 00%20Series_AT%20Command%20Manual. pdf
[9]. https://www.schandpublishing.com