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Alcohol detection using Arduino with motor locking

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Abstract: The identification of alcohol with the locking mechanism of the engine decreases the spike of road accidents caused by drivers' extreme alcohol intake. The device controls alcohol in the driver's exhaled breath to activate the engine locking system. Alcohol sensor Arduino Mega microcontroller, DC motor, is used for system creation. The car engine is switched off, and the emergency siren is blown as soon as alcohol is detected, minimizing the likelihood of any potential mishaps. The prototype is also useful for preventing a catastrophic driver-induced crash. Previously, there was no technology to lock the vehicle engine after the alcohol was detected. Driver alcohol consumption too much, which was the main cause of the accident. It was the same manual checks after a particular distance on streets or freeways, but they will never be enough to halt the malfunctions. Driving any vehicle in a developing country like Malaysia takes great dedication, rapid thought, and drivers' judgment talents to help stop traffic accidents. Getting drunk alcohol beyond a certain quantity distorts a driver's standard brain function and mentality, which often leads to accidents that impact not only the driver but also his fellow passengers and people nearby. In turn, the family members may also suffer from fatal trauma. The proposed device would measure the many conditions that can cause an alarm to signify the driver's drunk or sober state when fitted on a steering wheel within the car. For the recommendation to improve the project in the future, particularly in preventing system cheats and device damage. Concerning anti-cheating, one common approach to cheating the device is to request another person to take a clean sample of a breath when starting the car. The recommended advancement and generations to work to mitigate this problem involve a face lock application for security to ensure that the car is the authorized driver taking the check procedure.

1.0 INTRODUCTION

The scenario indicates that most road events are triggered by drunk driving. Drivers drinking alcohol are not stable, so they drive belligerently. It takes place on the lane, which can both be dangerous for the lives of road users, including drivers. The vastness of the disruptive phenomenon is beyond limits.

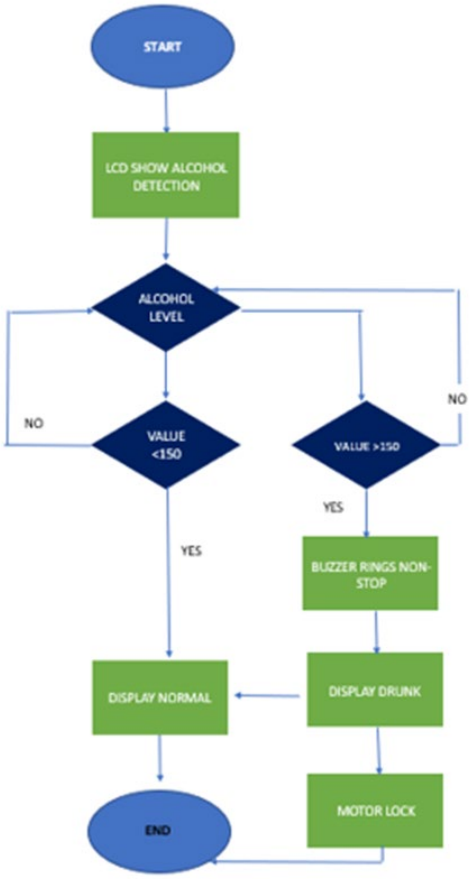
The known section currently discourages drivers from driving when drunk so that the fine will stop them from alcohol. Any framework of drunken drivers may be a problem. Police and road safety officers are justified in that humans are innately incapable of even being present as a State within the same house and moment. This efficient scope of law enforcement officials inhibits each other's manual efforts. Drink-drive to the edge. Consequently, an algorithm for alcohol screening is essential. This can work without time and space being confined.

Accidents involving drunk drivers in Malaysia became more serious when 67 accidents involving three fatalities occurred in just five months. The figure was found to have exceeded the total number of cases in 2018, namely 60 accidents and three fatalities. In the meanwhile, in 2019, there were 56 cases of accidents with four deaths.

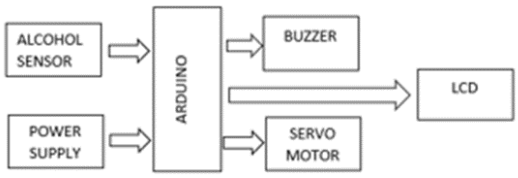
2.0 MATERIALS AND METHODS

For methodology, the reason for the systematic methods of theoretical analysis involves the progress and flow of projects to be carried out, such as block diagrams, flow charts and project planning. This section is a significant part of the project's activity regarding the method and methods used to ensure the functionality of the project. The research methodology used in the analysis will also be defined and explained.

FLOWCHART



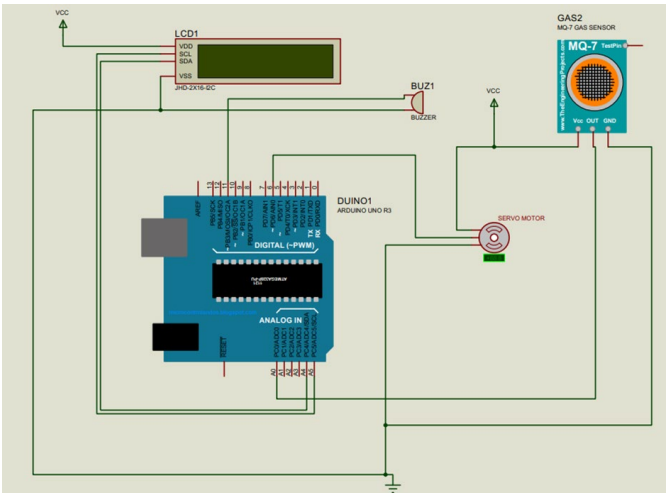
BLOCK DIAGRAM



The process in this block diagram is input, process and output that will explain more about the research development for alcohol detection using Arduino with motor locking. The first section is for the input is an Mq-3 sensor, the alcohol sensor. The detector will deliver the Arduino data if the sensor detects alcohol in the driver's breath. The Arduino then reads the data and passes it to the computer. The computer will display the data by the concentration of alcohol that the sensor detects by exhaling the driver's breath.

Next, after the procedure is completed, the alcohol level data measures whether the driver is intoxicated or not. If the driver drinks too much, the liquid crystal reveals, "DRUNK!!! "The buzzer is repeatedly beeping, and the rotor is automatically locked. If the sensor does not detect alcohol, the liquid crystal shows the buzzer "NORMAL", and the rotor is not locked.

CIRCUIT DIAGRAM

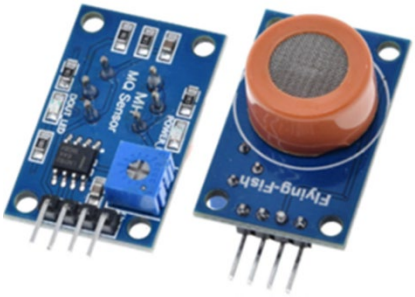


EQUIPMENT AND COMPONENTS

1. Arduino Uno

Arduino Uno is an open-source microsystem module produced by Arduino.cc and based on the ATmega328P microchip. The system contains digital and analogue input/output (I / O) pins connected to different expansion cards (shields) and other circuits. The board has 14 digital I / O pins (6 with PWM output) and six analogue I / O pins, which can be programmed over a USB B cable using Arduino IDE. It can be operated by a USB cable or external 9-volt battery but can handle 7 to 20-volt voltages. It's like an Arduino or Leonardo. It is distributed under the Creative Commons Share-Alike 2.5 permit and can be found on the Arduino website. Such programme versions also contain concept and product files.

2. Alcohol sensor

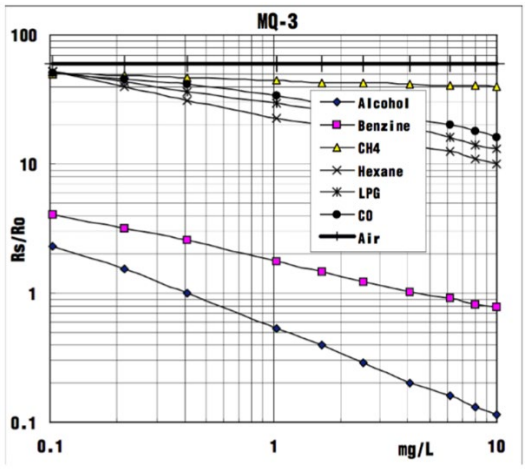


The alcohol sensor MQ-3 is very sensitive. It was made of SnO2 (Tin Dioxide). The composition is calculated so that alcohol is highly effective and benzene is minimal. It has an immediate drive mechanism to offer a vivid reaction, efficiency, and longer life. It has a simple style of interface. Port pins 1, 2 and 3 tend independently to the output on the sensor, VCC and GND. The sensor descriptions are shown in the table below.

Parameter Name	Sensor type	Detection gas	Concentration	Voltage	Load resistance (R_L)	Heater resistance (R_H)	Sensing resistance (Rs)	Slope	Temp humidity
	Semiconductor	Alcohol gas	0.04-4mg/l alcohol	±5.0V	Adjustable	31Ω ±3 Ω	2KΩ-20KΩ (in 0.4mg/l alcohol)	200–1000ppm	20±2; 65%±5%RH

MQ-3 Sensor Table

The alcohol sensor detects alcohol concentration and reads Arduino to secure whether the level concentration is decreased.



Gas Sensor Module

3. Buzzer

A buzzer is something item that can signal when liquor detection. When an alternating wave is transmitted thru the beep spool, the buzzer is triggered, and the buzzer disc fluctuates at a specific frequency equal to the driving signal. The beep confirms that vehicles are harmful to all of us.

4. Liquid crystal display 16 x 02 (LCD)

The liquid crystal display of the LCD1602 or 1602 in a dot matrix module shows letters, numbers, and symbols, respectively. It consists of a matrix position of 5x7 or 5x11; one character can be shown in each position.

A dot pitch exists between two symbols and a space between the lines separating characters and lines. 2 types of 16 characters are revealed in Model 1602. LCD1602 usually has parallel ports, meaning several pins can operate simultaneously. The 8-port and 4-port LCD1602 can be separated. All digital ports are nearly fully filled when an eight-port connection is used. No ports will be open if you want to connect more sensors. Here, therefore, the four-port relation is used for better use.

5. Servo motor

This servo motor rotates with very fast efficiency. This type of motor is typically fitted with a controller that provides feedback on the motor shaft's current position, enabling servo motors to rotate with extreme precision. If you want to rotate an object by a specific angle or distance, use a servomotor. Simply put, it is a servo-driven motor.

Motors are called DC servomotors when powered by a DC power source. When an AC power source powers a motor, the motor is called an AC servo motor. This lesson will cover the procedure of a DC servo motor in detail. Apart from these broad categories, numerous other servo motor layouts are based on gear systems.

6. Jumper wire

A jumper wires the wires that conduct electric in electric cable with a connector at each end. It is usually used in communication, connecting form two-part, components from the breadboard and so on.

Types of jumper wire:

- Solid tips
- Crocodile clips
- Banana connectors
- RCA connectors
- RF jumper cables

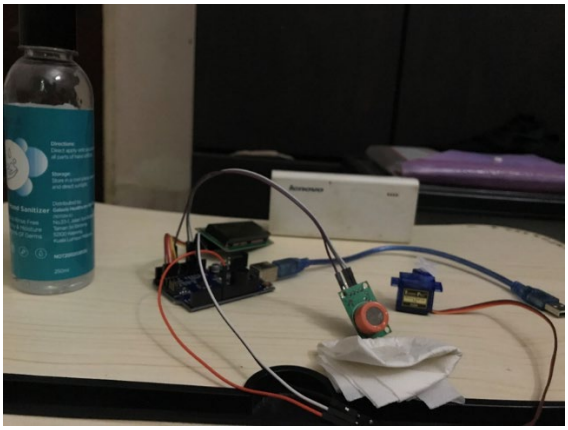
7. Power supply

The power bank is a typical battery size that the early transistor radios supplied. It has a rectangle with a rounded edge and a filtered snap connector at the end. Often used in walkie communications, clocks, and smoke alarms.

SOFTWARE DESIGN

Arduino IDE

3.0 RESULTS AND DISCUSSION



Prototype

This project aims to demonstrate the alcohol concentration for the drive system that uses an alcohol sensor. As a result, the driver's safety can be ensured by engine locking, which has been shown to reduce the number of accidents.

Figures 1 to 3 show the results of using the Alcohol Sensor to determine the existence of a silent in-vehicle breathalyzer detection system for the driver is currently unclear. Figure 1 shows a reading of 85.94 for the alcohol level. Because the level is less than 150, it is safe to assume that using the alcohol sensor, no alcohol composition was discovered in the driver's exhaled air. As a result, it could be regarded as an alcohol level that has gone undetected.

FIGURE 1. The alcohol level could be considered an undetected alcohol level.

Figure 2 reveals a Liquor Sensor reading of 87.89 that could be classified as "NORMAL" because the alcohol level is between 150 and 400. Therefore, the motor locking of the servo motor will not be engaged, and the driver can drive freely.

FIGURE 2. Alcohol level for 'NORMAL' condition

Figure 3 depicts an alcohol level reading ranging from 150 to 400 milligrams per litre. In the driver's exhaled breath, the sensor detects a bit of concentration of alcohol. As a result, a "DRUNK" message will appear on the screen, and the buzzer will begin to buzz loudly to alert the driver. The buzzer will continue to ring incessantly. The purpose of the system is to protect the folks when driving a vehicle by reducing the number of accidents caused by the engine locking system.

FIGURE 3. The alcohol level is between 300 to 400 for 'DRUNK!!! condition.

Normal Sensor Readings	**16**	**20**	**24**	**26**	**27**	**30**	**35**	**40**
Experimental Readings	17	23	26	28	30	34	37	41

Table 1: Alcohol sensor reading.

PPM (PART PER MILLION)	PERCENTAGE (%)
0	0
100	10
200	20
300	30
400	40
500	50
600	60
700	70
800	80
900	90
1000	100

Table 2: Sensitivity level characteristic

LEVEL OF DRUNKNESS			
Alcohol level (raw value)	50-100	100-149	150-400
Lcd display	Normal	Normal	Drunk
Buzzer	off	off	on
Motor locking	off	off	on

Table 3: Level of drunkenness

Raw value	Motor Locking
50	off
100	off
140	off
150	on
350	on

Table 4 – Result raw value and motor locking test.

4.0 DISCUSSION

The design of an alcohol detection using Arduino with motor locking was carried out to decrease car crashes. Two scenarios in this project for alcohol concentration are from 50 to 100 and 150 to 400. Keep in mind that the Liquid crystal display (LCD) also shows the concentration of alcohol even there no alcohol was detected.

The 'NORMAL' condition indicates a blood alcohol concentration of between under <150 alcohol concentration. It allows the people who want to drive and start the vehicle. If the condition "DRUNK" is exceeded, the message "DRUNK" will be shown on the LCD.

When the alcohol concentration level is less than 150, the buzzer will sound, indicating that the car's driver has consumed a small amount of alcohol. A driver, however, is still permitted to start the car. If the alcohol detector reading exceeds the set value of 150, a message stating" DRUNK" will be displayed.

This proves that the driver consumed an excessive amount of alcohol. Nonetheless, the driver could not start the engine and drive at this point. Additionally, the driver must wait until the level of alcohol in their exhaled breath has decreased.

5.0 CONCLUSION AND RECOMMENDATION

Based on the finding of this research, the approach was used to screen for the existence of liquor throughout the driver's exhaled air. There are three objectives accomplished in this proposal to create a device in such a sense that it only senses the concentration of alcohol on the driver's breath, to reduce accidents by using this project caused by alcohol upper limit, and to stop and deter innocent people, accidents cause death or fatal injury and ensure driver safety by the locking of the engine. This can be assumed that the device checks for contaminated drivers efficiently. A secure trip is feasible, lowering the number of wounded in car crashes and the number of drunk driver accidents. The project can be upgraded by incorporating GPS and GSM vehicle tracker technology to identify the location of a drunk driver's car.

For the recommendation to improve the project in the future, particularly in preventing system cheats and device damage. Concerning anti-cheating, one common approach to cheating the device is to request another person to take a clean sample of a breath when starting the car. The recommended advancement and generations to work to mitigate this problem involve a face lock application for security to ensure that the car is the authorized driver taking the check procedure. The next improvement is using fingerprint images to test the alcohol detection motor lock to stop another person from operating the vehicle than the registered driver. Moreover, the next improvement is taking a DNA test for the driver that accesses the breathalyzer test that the individual to take test is the right person.

For anti-tamping problems, one solution is to make all alcohol detection using Arduino for motor locks in cars wirelessly connected to the central headquarters so that all devices are monitored life, and any attempts to tamper are informed immediately to authorities.

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