International Journal of Scientific Research in Engineering & Technology
Volume 3, Issue 4 (July- August 2023), PP: 01-05.
https://www.doi.org/10.59256/ijsreat.20230304001
www.ijsreat.com ISSN No: 2583-1240

Driver Drowsiness and Alcohol Detection System

Nidhin K.V[1], Manikandan N R[2], Afna V N[3], Jesbin Joy[4], A S Sahadulla[5]
[1] Assistant Professor, Department of Electronics and Communication Engineering, Universal Engineering CollegeVallivattom, Thrissur, Kerala, India.
[2,3,4,5]Department of Electronics and Communication Engineering, Universal Engineering College Vallivattom, Thrissur, Kerala, India.

***To Cite this Article*:** *Nidhin K.V[1], Manikandan N R[2], Afna V N[3], Jesbin Joy[4], A S Sahadulla[5], "Driver Drowsiness and Alcohol Detection System", International Journal of Scientific Research in Engineering & Technology Volume 03, Issue 04, July-August 2023 ,PP: 01-05.*

Abstract: *Road accidents became a matter of concern due to the huge increase in traffic. The primary cause of accidents is due to the drowsiness of drivers in the nighttime. Fatigue and drowsiness are some of the leading causesof major accidents on Highways.*
Now a day's drowsiness due to drunken driving is increasing. If driver is found to be drowsiness in eyes more than 2secs, then the sensor senses the eye movement of driver, long with drowsiness alcohol detection is also detected by using alcohol MQ3 sensor. The alcohol is detected in driver's breathe.

Keywords: *Alcohol detection system, Vehicle control, Arduino, Eye blink sensor.*

I.INTRODUCTION

Driving while drowsy or in drunk state are the two main reasons for traffic accidents and its related financial losses.

One of the primaries agencies that conducts research on road and driver safety is the national highway traffic safety administration.Road accidents became a matter of concern due to the huge increase in traffic.

The primary cause of accidents is due to the drowsiness of drivers in the nighttime. Fatigue and drowsiness are some of the leadingcauses of major accidents on Highways. The only solution to this problem is detecting the drowsiness and alerting the driver.

II.COMPONENTS

- Microcontroller ATMEGA328
- MQ3 Sensor
- EYE BLINK Sensor
- DC Motor
- 5V Relay
- Buzzer

1. ATMEGA328:

❖ Advanced RISC Architecture
- 131 Powerful Instructions
- Most Single Clock Cycle Execution
- 32 x 8 General Purpose Working Registers

❖ AVR® 8-Bit Microcontroller with High Performance and Low Power
- Fully static operation
- Throughput up to 20 MIPS at 20 MHz2-cycle on-chip Multiplier

❖ Longevity 4/8/16/32K Bytes of In-System Self-Programmable Flash Program Memory
- Non-Volatile Memory Segments
- 256/512/512/1K Bytes EEPROM

❖ Data retention: 20 years at 85°C/100 years at 25°C
- Write/Erase Cycles: 10,000 Follow up after 6 weeks Flash/100,000EEPROM (1)
- Optional Boot Code Section with Independent Lock Bits for In-System Programming Programming Lock for Software Security
- Boot Program True Read-While-Write Operation

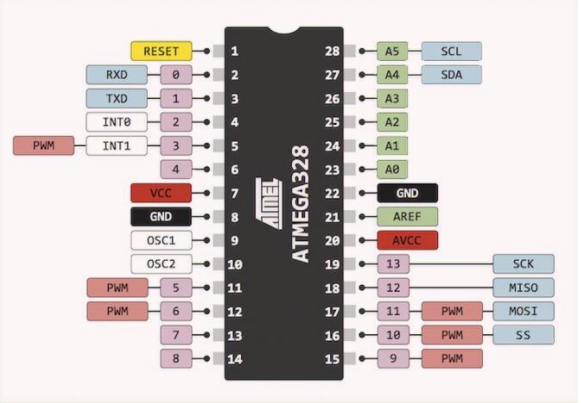

Fig 1: ATMEGA328

2. Alcohol Sensor(mq3 sensor):

To ensure sensor accuracy and system integrity, alcohol detector sensors must be calibrated and tested on a regular basis. MQ303A is an alcohol detection semiconductor sensor. It is useful for portable alcohol detectors because of its high sensitivity and quick response to alcohol. MQ303A reflects the influence of voltage variations on fixed and adjustable resistance, as well as gas load resistance relationships.

Normally, numerous concentrations and minutes of preheating are required for the sensor to enter into stable operation after being electrified; otherwise you might provide 2.20.2V high voltage for 5-10secs before testing, which would make the sensor quickly stable. MQ303A is a semiconductor alcohol sensor. It has a high sensitivity to alcohol and responds quickly, making it ideal for usein portable alcohol detectors.

Fig 2: Alcohol Sensor

Model No.			MQ-3
Sensor Type			Semiconductor
Standard Encapsulation			Bakelite (Black Bakelite)
Detection Gas			Alcohol gas
Concentration			0.04-4mg/l alcohol
Circuit	Loop Voltage	V_c	≤24V DC
	Heater Voltage	V_H	5.0V±0.2V AC or DC
	Load Resistance	R_L	Adjustable
Character	Heater Resistance	R_H	31Ω±3ΩRoom Tem.
	Heater consumption	P_H	≤900mW
	Sensing Resistance	R_s	2KΩ-20KΩ(in 0.4mg/l alcohol)
	Sensitivity	S	Rs(in air)/Rs(0.4mg/L Alcohol)≥5
	Slope	α	≤0.6(R_{300ppm}/R_{100ppm} Alcohol)
Condition	Tem. Humidity		20±2℃65%±5%RH
	Standard test circuit		Vc:5.0V±0.1V V_H: 5.0V±0.1V
	Preheat time		Over 48 hours

Table 1: Technical Data

3. Eye Blink sensor:

Infrared is used by the Eye Blink sensor to detect eye blink. As each eye blinks, the variation throughout the eye changes. The production is high while the eye is closed, but it is low otherwise. 3 pin female header Eye Blink Sensor EYE Sensor kit The Eye Blink sensor uses infrared to detect eye blink.. As each eye blinks, the variation throughout the eye changes. The output is high while the eye is closed, but low when it is open. An infrared sensor is used to detect eye blinking. On the top, in front of the driver, is the eye blink sensor. While driving, the eye blinks normally, which means that when the eye closes to a specific second, a buzzer will sound to alert him to wake up. This sensor is a dead zone-free short-range obstacle detector. It has a rather The dual version allows you to enlarge the detecting area. To improve the range, raise the brightness of the IR LEDs or add more IR LEDs. My test setup isshown below, with two phototransistors in parallel for the receiver and some IR LEDs (dark blue) as a light source. We could utilizeone of each, but we wanted to spread them out over a bigger area. This setup works in the same way as a Frits LDR, but with IR. It has a range of about 10-15cm when my hand is the identified item. A 1M resistor connects my two phototransistors in series. You could use only one transistor, but I wanted to cover more ground, so my transistors are slightly differently. More current will be permitted to flow if either detects IR.

Because voltage equals current times resistance, even a tiny increase in current causes a reasonable increase in voltage across the 1M resistor. Unfortunately, many AD converters' low input impedance will work as a small resistor in parallel

with the 1M resistor, decreasing the output to the CPU greatly. Our BC549 transistor comes to the rescue in this scenario. It amplifies the signal with the 1K and 10K resistors so that the analogue input on your CPU receives a robust signal. Any

general-purpose signaltransistor should suffice in place of the BC549 when measured with a multimeter my transistor had a hfe of 490.The LEDs and transistors can then be bent outward to cover a larger region. Junior's reverse sensor will cover a broad area to protect him from crashing into anything. I'll make individual Led/Phototransistor sensors for the front left and right. The phototransistors are in frontof the blue LEDs. This makes it impossible to detect stray LED light.

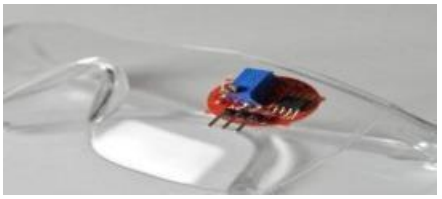

Fig 3: Eye Blink sensor

4. DC Motor:

The interplay of magnetic fields and current-carrying conductors in a dc motor produces mechanical energy. An alternator, generator, or dynamo is a device used to convert mechanical energy into electrical energy. Generators andelectric motors can be used interchangeably. A DC motor's input and output are current and voltage, respectively (speed).The armature, which rotates, and the field coils, which are immobile. The stator refers to the stationary component. Thediagrams show a typical DC motor, a typical DC armature, and a typical stator. As seen in the diagram, the armature ismade up of wire coils wrapped around a core with an extended shaft that revolves on bearings. You'll also see that thearmature's ends of each coil of wire are connected at one end. The brushes make electrical contact with the commutator,which allows electrical current to flow from the machine's fixed to rotating parts.

Fig 4: DC Motor

5. Relay:

Electricity controls a relay. In many relays, an electromagnet controls the switching mechanism, while different mechanisms are also used. Relays are used to control several circuits with a low-power signal. Long-distance telegraphcircuits were the first to use relays, which repeated and re-transmitted signals from one circuit to another. Relays were employed to execute logical processes in both phone exchanges and early computers. A contactor is a form of relay thatcan handle the high power needed to run an electric motor directly. Solid-state relays employ a semiconductor device that is triggered by light to regulate power circuits. To protect electrical circuits from overload or faults, relays with calibrated operating characteristics and, on occasion, several operational coils are utilize in modern electric power systems, digital instruments still referred to as "protection relays" perform similar roles.

Fig 5: Relay

6. Buzzer:

A buzzer, often known as a beeper, is a mechanical, electromechanical, or piezoelectric audio signalling device. Alarm clocks, timers, and to confirm human input such a mouse click or keyboard employ buzzers and beepers frequently. Electromechanical: Early devices used a similar electromechanical technology to that of an electric chime, but without the metal. A relay, for example, may be wired to interrupt its own actuating current, causing the contacts to buzz. As a sounding board, these units were commonly mounted on a wall or ceiling. The term "buzzer" comes from the rasping sound produced by electromechanical buzzers. Piezoelectric: These days, a Son alert or another highpitched ceramic- based piezoelectric sounder is more widely utilised. These were generally attached to "driver" circuits that altered the pitch or pulsed the sound on and off. A piezoelectric element can be powered by a piezoelectric audio amplifier, which is driven by an oscillating electronic circuit or another audio signal source. When a button is pressed, a click, a ring, ora beep is heard. A piezo buzzer is a sound-generating electrical gadget. Because of its light weight, simple construction,and affordable price, it can be utilised in a range of applications, including car/truck reversing indicators, computers, andcall bells.

Fig 6: Buzzer

7. ARDUINO IDE Software:

USB or external power can be used to power the Arduino Uno. The power supply is automatically selected. An AC-toDC adaptor (wall-wart) or a battery can be used to provide external (non-USB) power. A 2.1mm center-positive connector can be used to connect the adapter to the board. The POWER connector's GND and Vin pin headers can be utilised to connect battery leads. The board can be powered by a 6 to 20 volt external supply. The 5V pin may only produce five volts if less than 7V is supplied, leading the board to become unstable. The voltage regulator may overheatand destroy the board if you use more than 12V. 7 to 12 volts is the recommended voltage range. The following are the power pins:

- VIN: When powered by an external source, the Arduino board's input voltage. This pin can be used to supply or access voltage if voltage is supplied via the power jack.
- 5V: The microcontroller and other circuit elements are powered by a regulated power source. This can besupplied by Vin or another regulated 5V supply, or by USB or another regulated 5V supply.
- 3V3.The on-board regulator generates a 3.3-volt supply. There is a maximum current draw of 50milliamperes.
- Grinding pins (GND) for storing code, the Atmega328 has 32 KB of flash memory.
- By using the pin Mode (), digital Write (), and digital Read () functions, each of the Uno's 14 digital pins can beutilised as an input or output. They are powered by a 5 volt battery. Each pin has an inbuilt pull-up resistor of 20-50kOhm and can handle up to 40mA.

Several pins have specific purposes as well:

- 1 (TX) and 0 (RX) in serial (TX). This device receives (RX) and transmits (TX) TTL serial data. These pins areconnected to the equivalent pins on the ATmega8U2 USBto-TTL Serial chip.
- #2 and #3 External Interrupts a low value, a rising or falling edge, or a change in value can all be used to triggeran interrupt on these pins. For more information, see the attach Interrupt () function.
- PWM: 3, 5, 6, 9, 10, & 11. An 8-bit PWM signal is produced using the analogue Write () function.
- SPI: SS, MOSI, MISO, and MISO (SCK). These pins support SPI communication, which the Arduino language does not presently support despite the fact that the underlying hardware supports it.
- LED: 13. Digital pin 13 is connected to a built-in LED by a cable. The LED turns on when the pin is HIGH andturns off when the pin is LOW.

Fig 7: Arduino Uno

III.SYSTEM ARCHITECTURE & WORKING

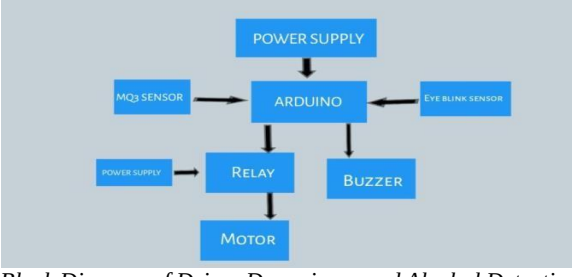

Fig 8: Block Diagram of Driver Drowsiness and Alcohol Detection System

Now, let's go through the step-by-step setup process:

- Connect the Arduino Uno to your computer using a USB cable.
- Place the alcohol sensor on the breadboard. Connect the VCC pin of the alcohol sensor to the 5V pin on the Arduino, GND to GND, and the digital output pin to any digital input pin on the Arduino.
- Connect the eye detection module to the Arduino. Using an infrared-based module, it will have separate pins for power, ground, and data. Connect the power pin of the module to 5V, ground pin to GND, and the data pin to any digital pin on the Arduino.
- Connect an LED to a digital pin on the Arduino. Connect the longer leg (anode) of the LED to the digital pin through a current-limiting resistor (around 220-470 ohms), and connect the shorter leg (cathode) to GND.
- Connect an Buzzer to a digital pin on the Arduino.
- Ensure that all the connections are secure and correctly wired.
- Open the Arduino IDE on your computer and create a new sketch.
- In the sketch, include the necessary libraries for the alcohol sensor and eye detection module.
- Write the code to initialize the components, read sensor values, and control the LED based on the detected alcohol level and eye status. This code will depend on the specific sensors and modules you are using. Consult the documentation and examples provided with the components to understand how to interface with them.
- Once you have written the code, upload it to the Arduino Uno.
- After uploading, the Arduino will start running the code, by observing the LED's behavior and alert system given by Buzzer.

IV.PROJECT OVERVIEW

In our proposed system, drowsiness of the driver is detected by using eye blink sensor. The eye blink rate is continuously being monitored by using Arduino. If the eye is closed for more than 2 seconds then the driver is found to be drowsy. Hence the buzzer starts buzzing and also the speed of the car slows down (here indicated by a dc motor).Also, alcohol is detected by using Mq3 sensor. The sensor is interfaced with Arduino. LED glows when alcohol is detected and the speed of DC motor varies according to the content of the alcohol present in the driver's breathe.

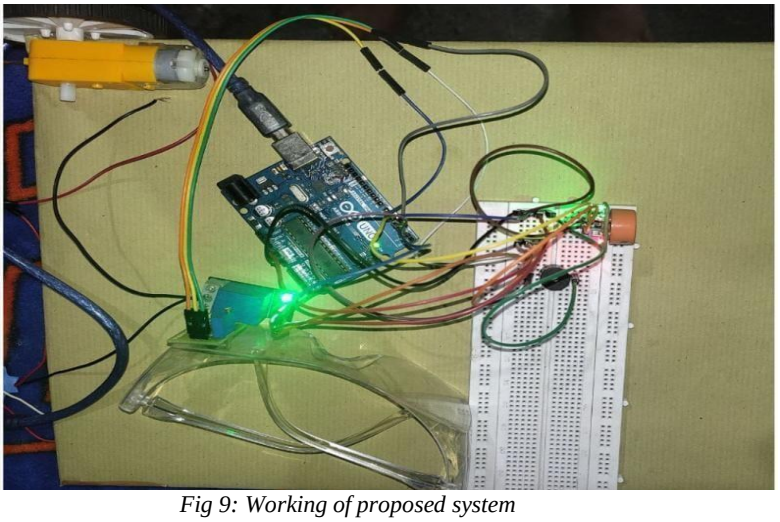

Fig 9: Working of proposed system

V.CONCLUSION AND FUTURE SCOPE

The driver drowsiness and alcohol detection system is used to detect the drowsiness of the driver and also detects the alcohol consumption of driver. If there is drowsiness or consumption then the motor of the car gets slowed down and the buzzer sounds until the eyes gets opened. The values of alcohol and the blink rate will be displayed in the serial monitor of the Arduino IDE. This proposed system helps in finding drowsiness and alcohol detection using Arduino. This helps in avoiding many accidents. Further we extend this project by using webcam to detect the drowsiness of the driver.

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