DRUNKEN DRIVE DETECTION SYSTEM IN AUTONOMOUS VEHICLES

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ABSTRACT:
The "Automatic Drunken Driving Detection System for Autonomous Vehicles" project provides a state-of-the-art response to the widespread problem of drunk driving, which is a major cause of traffic accidents worldwide. Our novel method incorporates the MQ-3 Sensor, which can detect high blood alcohol content in a car. When it detects anything, the system sounds an alarm and displays a graphic to provide the driver and passengers important information. What sets our approach apart is its capacity to prevent accidents caused by drunk driving by implementing preventative measures. This program is a major step towards creating safer driving conditions and lessening the terrible effects of drunk driving. Preventing accidents and saving lives is the ultimate goal.

I. INTRODUCTION

1.1. INTRODUCTION TO THE PROJECT

The "Automatic Drunken Driving Detection System for Autonomous Vehicles" project provides a state-of-the-art response to the widespread problem of drunk driving, which is a major cause of traffic accidents worldwide. Our novel method incorporates the MQ-3 Sensor, which can detect high blood alcohol content in a car. When it detects anything, the system sounds an alarm and displays a graphic to provide the driver and passengers important information. What sets our approach apart is its capacity to prevent accidents caused by drunk driving by implementing preventative measures. This program is a major step towards creating safer driving conditions and lessening the terrible effects of drunk driving. Preventing accidents and saving lives are the ultimate goals.

The present reality indicates that most traffic accidents are caused by intoxicated drivers. Driving while intoxicated or under the influence is the offence or crime. Drinking and driving drives drivers insane, which leads to reckless driving on the roads that puts everyone's life, including the driver, in risk. When someone drinks alcohol, their blood alcohol content is often tested in order to determine the extent of their intoxication. Blood alcohol content (BAC) is the proportion of alcohol in a person's blood. Legally, 0.08 percent is deemed drunk, whereas 0.08–0.40% is considered seriously impaired. The NCRB study indicates that drunk driving is a significant contributor to traffic accidents. Additionally, it asserts that 99.9% of accidents that happen outside of municipal boundaries are caused by drunk drivers. Driving after intoxication is presently prohibited in India. Nevertheless, the engine system has been automated as it has become a tedious chore to manually test for drunk driving. All systems are now automated in order to satisfy new demands. These days, automated solutions are more adaptable, dependable, accurate, and need less human processes. Therefore, we propose a plan to stop these kinds of things from happening. The alcohol sensor in our gadget will track the driver's breath. It's going to be close to the driver. When a drunk driver tries to operate a car, the system locks the wheels when it senses alcohol on the driver's breath. In a different situation, the system will detect alcohol in the driver's breath and lock the wheels to prevent the vehicle from speeding further if the driver is not intoxicated when the car is started but becomes so after the engine starts. We demonstrated the idea using an LCD screen, a motor, and an Arduino controller interacting with an alcohol sensor. In this instance, the alcohol sensor sends a signal to the controller after continually analysing the driver's breath. Wheels are only released when the driver's blood alcohol content is less than a certain threshold.

PROBLEM STATEMENT

Worldwide, drunk driving is regarded as a significant contributing factor to accidents. Alcohol-impaired drivers exhibit a glaring impairment in perception, identification, and vehicle control. Thus, this accident happens.

EXISTING MODEL

An ignition interlock device is a commonly used technology that incorporates a breathalyser into the ignition system of a car. The driver has to provide a sample of their breath in order to start the car. The car stays immobilised if the system detects alcohol levels over a certain threshold [5]. By outright prohibiting intoxicated drivers from operating a vehicle, it has a track record of lowering the number of occurrences involving drunk driving. But it just addresses alcohol detection; other types of impairment are not taken into consideration. Furthermore, there's a chance to get around it if someone else gives a sample of their clean breath. Although it's a useful weapon in the battle against drunk driving, it can't keep up with how autonomous cars are developing.

II. LITERATURE REVIEW

A well-liked concept by J. Dai [4] was carried out using an Android phone. The device comes with an Android app that keeps information on the average speed at which a vehicle accelerates and the abrupt braking mechanism. The software was supposed to sound a jarring alert and prompt abrupt braking if the car went above the speed limit. The disadvantage of this method was that it relied on the phone application's proper operation and the network as a whole, all of which were based on a single algorithm. Despite the method's simplicity of use and efficiency, there was a notable rise in the margin of error.

Z. Xiaoronget [5] put out a model that relies on the MQ-3 sensor and Internet of Things for alcohol detection. To determine the amount of alcohol in the breath, the primary components were an alcohol sensor and an STC12C516A microcontroller. The car would begin to buzz, the ignition would be shut off, and the precise position of the vehicle would be sent to neighbouring police if the alcohol concentration was found to be above the legal limit.

One of the system's shortcomings was that, although being simple to set up, the whole configuration relied on the MQ-3 sensor, whose failure would make the entire system ineffective.

III. DESIGN OF HARDWARE

This chapter provides a quick explanation of the hardware. It goes into great depth about each module's circuit diagram.

ARDUINO UNO

A microcontroller board based on the ATmega328 is called the Arduino Uno (datasheet). It has a 16 MHz ceramic resonator, 6 analogue inputs, 14 digital input/output pins (six of which may be used as PWM outputs), a USB port, a power connector, an ICSP header, and a reset button. It comes with everything required to support the microcontroller; all you need to do is power it with a battery or an AC-to-DC converter or connect it to a computer via a USB connection to get going.The FTDI USB-to-serial driver chip is not used by the Uno, setting it apart from all previous boards. As an alternative, it has the Atmega16U2 (or Atmega8U2 up to version R2) configured as a serial-to-USB converter. The 8U2 HWB line on the Uno board is pulled to ground by a resistor, which facilitates DFU mode entry. The Arduino board now includes the following updates:

• 1.0 pin out: two further new pins, the IOREF, are positioned next to the RESET pin, the SDA and SCL pins that were introduced, and they enable the shields to adjust to the voltage supplied by the board. Shields will eventually work with both the Arduino Due, which runs on 3.3V, and the boards that utilise the AVR, which runs on 5V. The second pin is unconnected and set aside for future uses.

• A more robust RESET circuit.

• The 8U2 is replaced with an ATMega 16U2.

"Uno" is an Italian word for one, and it was chosen to commemorate the impending introduction of Arduino 1.0. Going future, the Arduino reference versions will be the Uno and version 1.0. The Uno is the most recent in a line of USB Arduino boards and the platform's standard model; see the index of Arduino boards for a comparison with earlier iterations.

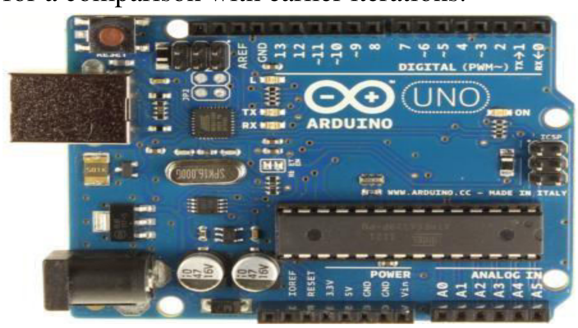


Fig: ARDUINO UNO

POWER SUPPLY:

The purpose of the power supplies is to convert the high voltage AC mains energy into a low voltage supply that is appropriate for use in electronic circuits and other devices. One may disassemble a power supply into a number of blocks, each of which carries out a specific task. "Regulated D.C. Power Supply" refers to a d.c. power supply that keeps the output voltage constant regardless of differences in the a.c. main or the load.

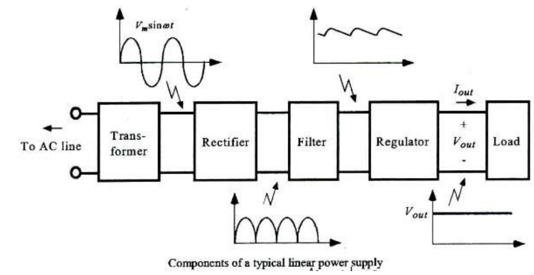


Fig: Block Diagram of Power Supply

LCD DISPLA

The model shown here is the one that is most often utilised in practice due to its cheap cost and enormous potential. Its HD44780 microcontroller (Hitachi) platform allows it to display messages in two lines of sixteen characters each. All of the alphabets, Greek letters, punctuation, mathematical symbols, etc., are shown. Furthermore, it is possible to show custom symbols created by the user. Some important features are the automatic changing of the message on the display (shift left and right), the presence of the pointer, the lighting, etc.

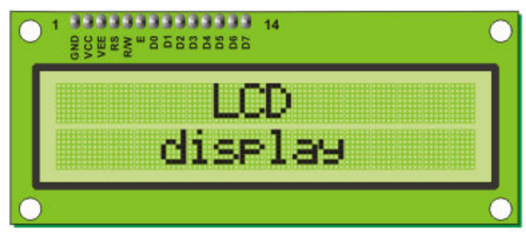
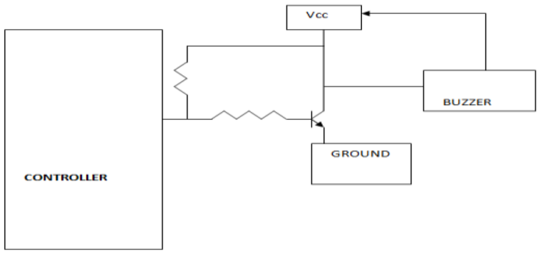


Fig: LCD

BUZZER

Relays, buzzer circuits, and other circuits cannot be driven by the current available on digital systems and microcontroller pins. The microcontroller pin can provide a maximum of 1-2 milliamps of current, even though these circuits need around 10 milliamps to work. Because of this, a driver—such as a power transistor—is positioned between the buzzer circuit and microcontroller.



GSM (Global System for Mobile communications)

GMobile phones connect to the cellular network known as the Global System for Mobile Communications (SM) by looking for nearby cells. GSM networks operate within four distinct frequency bands. The majority of GSM networks use the 900 MHz or 1800 MHz bands for operation. Because the 900 and 1800 MHz frequency channels were previously assigned, several American nations utilise the 850 MHz and 1900 MHz frequencies. Some governments have allocated the more elusive 400 and 450 MHz frequency bands, which were formerly used for first-generation systems.

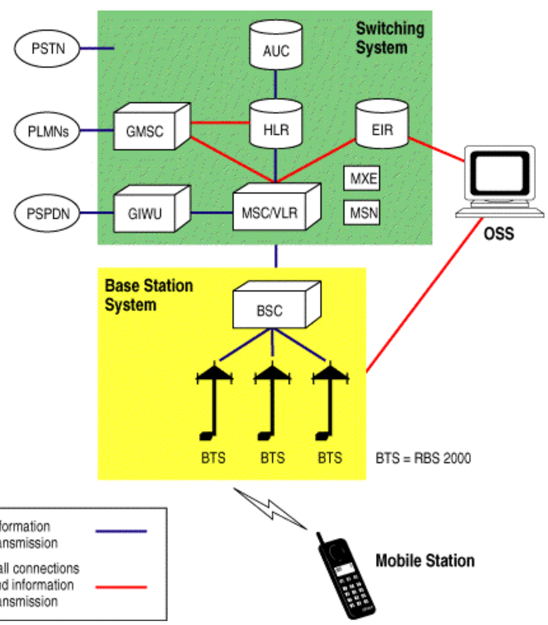
Using a frequency range of 890–915 MHz for uplink (information sent from the mobile station to the base station) and 935–960 MHz for downlink (information sent in the other way), GSM-900 offers 124 RF channels (numbers 1 through 124) that are spaced 200 kHz apart. 45 MHz is the duplex spacing utilised. The GSM-900 band has been expanded to encompass a wider frequency range in some nations. This "extended GSM," or E-GSM, adds 50 channels (numbers 975 to 1023 and 0) to the original GSM-900 band, using 880–915 MHz (uplink) and 925–960 MHz (downlink). Each radio frequency channel may support up to eight full-rate or sixteen half-rate voice channels using time division multiplexing. A TDMA frame is made up of eight radio timeslots, which provide eight burst periods. In the same timeslot, half rate channels utilise different frames. The frame time is 4.615 milliseconds, and the channel data rate is 270.833 kbit/s.

GSM Advantages:

Additionally, GSM introduced the Short Message Service (SMS, popularly known as "text messaging"), a low-cost alternative to voice calls for the network carrier that is now supported by various mobile protocols. The fact that the standard contains the one emergency phone number in the world, 112, is an additional benefit. Travellers from other countries will find it simpler to contact emergency services without needing to know the local emergency number thanks to this.

The GSM Network:

GSM offers suggestions rather than mandates. The GSM standards do not include hardware; instead, they provide a detailed definition of the functionality and interface requirements. The switching system (SS), base station system (BSS), and operation and support system (OSS) are the three main systems that make up the GSM network.



MQ3 Alcohol Gas Sensor Module

This module is built using the MQ3 Alcohol Gas Sensor. It is a cheap semiconductor sensor that can identify alcohol gases at concentrations between 0.05 and 10 mg/L. SnO_2, the sensitive substance utilised in this sensor, has a reduced conductivity in clean air. As the concentration of alcohol gases rises, so does its conductivity. It is very sensitive to alcohol and resists disruptions from petrol, smoke and vapour well. There are analogue and digital outputs available on this module. It is simple to link the MQ3 alcohol sensor module with microcontrollers, Arduino boards, Raspberry Pis, and other devices.

IV. PROJECT DESCRIPTION

4.1. BLOCK DIAGRAM:

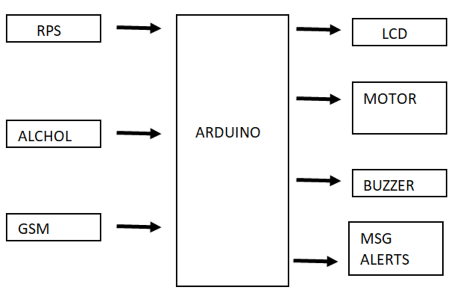


Fig 6.1 block diagram

4.2. SOFTWARE REQUIREMENTS:

- Arduino IDE
- Proteus

4.3. HARDWARE REQUIREMENTS:

- RPS
- Lcd
- Gas sensor
- Air sensor
- Arduino

4.4 working

The purpose of the drunken driving detection system is to identify when a motorist has consumed alcohol and to stop them from operating a vehicle while inebriated. The MQ-3 alcohol sensor, GSM module, buzzer, LCD display, and motor control are some of the features that this Arduino microcontroller-based system employs to make sure the car is safe. A thorough, step-by-step breakdown of the system's operation is provided below:

1. Detection of Alcohol using the MQ-3 Sensor

The main element in charge of determining the amount of alcohol in the air is the MQ-3 alcohol sensor. It is intended to detect alcohol in the breath of the operator.

The sensor starts to check the air for alcohol vapours as soon as the driver gets inside.

Continually sending analogue signals to the Arduino microcontroller, the sensor reports the amount of alcohol it has detected.

The car may still be driven if the detected alcohol level is below a set threshold, or safe limit. The system initiates preventative actions if the alcohol content rises over this cutoff.

2. Arduino Microcontroller processing

Processing the input from the MQ-3 sensor, the Arduino serves as the system's brain.

When the amount of alcohol consumed beyond the predetermined threshold, the Arduino simultaneously initiates several actions:

limits or halts the vehicle's ability to move.

Sets off an alarm to warn onlookers and the driver.

uses the GSM module to transmit an emergency message.

The Arduino permits regular car driving if the alcohol content is safe, but the system stays on to constantly check for changes.

3. Deactivating the Motor to Immobilise the Vehicle

The Arduino notifies the motor driver to either restrict or stop the vehicle's motor when it detects excessive alcohol use.

This essentially immobilises the car until the drunk driver's blood alcohol content drops below the threshold, preventing them from starting or operating it further.

4. A buzzer-equipped alert mechanism

The device not only turns off the engine but also sounds an alert using a buzzer. This calls attention to the hazardous situation and warns the motorist and others in the vicinity.

The buzzer warns the motorist before they try to operate the car, acting as an instant deterrent.

5. GSM Module for Alert Transmission

The system sends real-time SMS notifications to pre-configured recipients (such family members, law enforcement, or emergency agencies) via a GSM module.

In addition to the detected alcohol levels, the alarm message may also provide the position of the vehicle if it is equipped with a GPS system.

In the event of a risky circumstance, this function makes sure that others are informed, allowing for prompt assistance if needed.

6. LCD Display Monitoring in Real Time

An LCD display included into the device provides data on alcohol levels recorded by the sensor in real time.

The status of the system, such as whether the car is immobilised or whether the legal drinking limit has been surpassed, is also shown on the display.

The driver can see the precise alcohol content and comprehend why the car won't start if the threshold is crossed thanks to this visual feedback.

7. Constant Observation and Verification

Since the system works in real time, it will continue to monitor the driver's breath even if alcohol is detected and the car is immobilised.

The Arduino has the ability to turn on the motor again and resume regular operation of the car if the alcohol content falls back to a safe level (below the threshold).

V. CONCLUSION

An inventive way to counter the dangers of drunk driving is the Drunken Drive Detection System for driverless cars. This system guarantees a high degree of safety in real-time by combining cutting-edge sensor technology, such as the MQ-3 alcohol sensor, with Arduino, GSM connectivity, buzzer alarms, and motor control. It actively checks the driver's breath for alcohol residue, forbids driving while inebriated, and notifies emergency contacts or law enforcement so they may take prompt action.

By enhancing the safety characteristics of autonomous and semi-autonomous cars, this technology improves road safety for all users—vehicles, passengers, and pedestrians. This method encourages safe driving practices and greatly reduces the number of alcohol-related traffic accidents by using an automatic preventive mechanism. The system is a useful complement to current car safety technology since it is practical and scalable, using inexpensive, easily accessible components.

Finally, the Drunken Drive Detection System represents a significant advancement in the development of intelligent, responsible transportation systems by avoiding accidents, saving lives, and encouraging safer roads.

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