A

Mini project report

On

MICROCONTROLLER BASED AUTOMATC ENGINE SYSTEM FOR DRUNKEN DRIVERS

Submitted in partial fulfillment of the Requirements for the award of Degree of

BACHELOR OF TECHNOLOGY

ELECTRONICS & COMMUNICATION ENGINEERING

BY

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DEPT. OF ELECTRONICS & COMMUNICATION ENGINEERING

CHRISTU JYOTHI INSTITUTE OF TECHNOLOGY & SCIENCE

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Colombo Nagar, Yeshwanthapur, Jangaon-506167, Telangana

2024-2025

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DEPT. OF ELECTRONICS & COMMUNICATION ENGINEERING

CERTIFICATE

This is to certify that that the report entitled **“MICROCONTROLLER BASED AUTOMATIC ENGINE LOCKING SYSTEM FOR DRUNKEN DRIVERS”** that is being submitted by **P. UDAYASRI (22681A0443), P. SHIVASHANKAR (23685A0411), E. SAIKUMAR (22681A0421), G. VISHAL (22681A0422)** in partial fulfillment for the requirement for the award of the Degree of Bachelor of Technology in **“Electronics & communication engineering”** and submitted to **Christu Jyothi Institute of Technology and Science, Jangaon,** is a record of Bonafide work carried out by them under our guidance and supervision.

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DEPT. OF ELECTRONICS & COMMUNICATION ENGINEERING

Institution Vision and Mission

VISION

To admit and groom students from rural background and be a truly rural technical institution benefiting society and nation as a whole institute.

MISSION

- The mission of the institution is to create, deliver and refine knowledge. Being a rural technical institute, our mission is to.
- Enhance our position to one of the best technical institutions and to measure our performance against the highest defined standards.
- Provide highest quality learning environment to our students for their greater well-being so as to equip them with highest technical and professional ethics.
- Produce engineering graduates fully equipped to meet the ever-growing needs of industry and society

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2024-2025

DEPT. OF ELECTRONICS & COMMUNICATION ENGINEERING

Department Vision and Mission VISION

To be an established center of excellence in Electronics and Communication Engineering facilitating youth towards professional, leadership and industrial needs.

MISSION

- Impart theoretical and practical technical education of high standard with quality resources and collaborations.
- Organize trainings and activities towards Overall personality development in time with industrial need.
- Promote innovation towards sustainable solutions with multi discipline team work with ethics.

HOD

DECLARATION

We hereby declare that the document entitled **"MICROCONTROLLER BASED AUTOMATIC ENGINE LOCKING SYSTEM FOR DRUNKEN DRIVERS"** submitted to the **Christu Jyothi Institute of Technology and Science** in partial fulfillment of the requirements for the award of the degree of Bachelor of Technology (B-Tech) in Electronics and communication engineering is a record of an original work done by under the guidance of **Mr. B. Sandeep kumar Asst. Prof,** and this document has not been submitted to any other university for the award of any other.

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ABSTRACT

This project presents a novel approach to prevent accidents caused by drunk driving. An intelligent engine locking system is designed and developed using a microcontroller and breathalyzer sensor and automatically locks the engine. The proposed system is sufficient, reliable and can be integrated with existing vehicle system.

This innovation has the potential to significantly reduce the risk of accidents caused by drunk driving, promoting road safely and responsible driving habits. The system consists of a microcontroller, breathalyzer sensor, relay module, LCD display, motor driver and buzzer. The micro controller processes the sensor data and controls the engine locking system. The system provides a safe and efficient solution to prevent accidents caused by drunken driving. Its accuracy, reliability, and ease of use make it a viable solution for implementation in vehicles.

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LIST OF FIGURES

ACRONYMS

ADC	Analog to Digital Converter
GND	Ground
LCD	Liquid Crystal Display
EEPROM	Electrically Erasable Programmable Read-Only Memory
RAM	Random Access Memory BO
MOTOR	Battery Operated
MQ3	Methane Gas sensor
LED	Light Emitting Diode

AI	Artificial Intelligence
UI	User Interface
GUI	Graphical User Interface
MCU	Microcontroller Unit
ECU	Electronic Control Unit
ARDUINO IDE	Integrated Development Environment
DC	Direct Current
AC	Alternating Current
USB	Universal Serial Bus
I2C	Inter Integrated Circuits
SPI	Serial Peripheral Bus
MOSI	Master Output Slave Input
MISO	Master Input Slave Output
SDA	Serial Data Line
SCL	Seral clock Line
EN	Enable
RST	Reset
IC	Integrated Circuit

CHAPTER 1

INTRODUCTION OF EMBEDDED SYSTEM

1.1 INTRODUCTION

An embedded system is a special-purpose computer system designed to perform one or a few dedicated functions, sometimes with real-time computing constraints. It is usually embedded as part of a complete device including hardware and mechanical parts.

In contrast, a general-purpose computer, such as a personal computer, can do many different tasks depending on programming. Embedded systems have become very important today as they control many of the common devices we use.

Since the embedded system is dedicated to specific tasks, design engineers can optimize it, reducing the size and cost of the product, or increasing the reliability and performance. Some embedded systems are mass-produced, benefiting from economies of scale. Physically embedded systems range from portable devices such as digital watches and MP3 players, to large stationary installations like traffic lights, factory controllers, or the systems controlling nuclear power plants. Complexity varies from low, with a single microcontroller chip, to very high with multiple units, peripherals and networks mounted inside a large chassis or enclosure.

In general, "embedded system" is not an exactly defined term, as many systems have some element of programmability. For example, Handheld computers share some elements with embedded systems such as the operating systems and microprocessors which power them — but are not truly embedded systems, because they allow different applications to be load and peripherals to be connected. An embedded system is some combination of computer hardware and software, either fixed in capability or programmable, that is specifically designed for a particular kind of application device. Industrial machines, automobiles, medical equipment, cameras, household appliances, airplanes, vending machines, and toys (as well as the more obvious cellular phone and PDA) are among the myriad possible hosts of an embedded system. An embedded system is some combination of computer hardware and software, either fixed in capability or programmable, that PDA) are among the myriad possible hosts of an embedded system.

An embedded system is some combination of computer hardware and software, either fixed in capability or programmable, that is specifically designed for a particular kind of application devices, programmable, that is specifically designed for a particular kind of application device system is some combination of computer hardware and software, either fixed in capability or programmable, that is specifically designed for a particular kind of application device. Industrial machines, automobiles, medical equipment, cameras, household appliances,

An embedded system is some combination of computer hardware and software, either fixed in capability or programmable, that is specifically designed for a particular kind of application device. Industrial machines, automobiles, medical equipment, cameras, household appliances, airplanes, vending machines, and toys (as well as the more obvious cellular phone and PDA) are among the myriad possible hosts of an embedded system. Embedded systems that are programmable are provided with a programming interface, and embedded systems programming is a specialized occupation. Certain operating systems or language platforms are tailored for the embedded market, such as Embedded Java and Windows XP Embedded.

1.2 THE VISION

Embedded vision systems incorporate image capture and image processing, from a hardware and software perspective, into the same device.

The distinction between embedded vision systems and machine vision systems is not always clear. Essentially, embedded vision systems combine both image capture and image processing capabilities into one device. Traditional machine vision systems, on the other hand, often require a large camera and lens for image capture, along with a standardized interface and cable that transmits raw image data to a separate industrial PC.

In the early days of machine vision, cameras and PCs were large and expensive, restricting them to tightly controlled industrial applications. Over time, processing and image components shrank dramatically, enabling entirely new vision system constructions. Today, vision systems can be made small enough to be embedded in other devices, such as a smartphone, radically changing the functionality of that device.

Embedded vision is still in its infancy, but it has the potential to transform entire industries.

1.3 DEFINITION OF EMBEDDED SYSTEM

An embedded system is a combination of computer hardware and software designed for a specific function. Embedded systems might also function within a larger system. These systems can be programmable or have a fixed functionality. Embedded systems are used today to control numerous devices. For example, they're used in industrial machines, consumer electronics, agricultural and processing industry devices, automobiles, medical devices, cameras, digital watches, household appliances, airplanes, vending machines, toys and mobile devices.

Embedded systems typically contain a microprocessor -- or a microcontroller-based system, memory and input/output (I/O) devices, all of which share a dedicated function within a larger system. While embedded systems are computing systems, they can range from having no user interface (UI) -- for example, on devices designed to perform a single task -- to complex graphical user interfaces (GUIs), such as in mobile devices. UIs can include buttons, light-emitting diodes (LEDs) and touchscreen sensing. Some systems use remote user interfaces as well.

According to Global Markets Insight, the embedded systems market was valued at $110.3 billion in 2023 and is predicted to grow to more than $190 billion by 2032. Chip manufacturers for embedded systems include many well-known technology companies, such as Apple, IBM, Intel and Texas Instruments. The expected growth is partially due to the continued investment in artificial intelligence (AI), mobile computing and the need for chips designed for high-level processing.

Examples of embedded systems

Embedded systems are used in a wide range of technologies across an array of industries. Embedded systems are used in a wide range of technologies across an array of industries.

- Smart watches
- Fitness tracker
- Home automation system
- Industrial robotics

1.4 APPLICATIONS OF EMBEDDED SYSTEMS

We are living in the Embedded World. You are surrounded with many embedded59 products and your daily life largely depends on the proper functioning of these gadgets. Television, Radio, CD player of your living room, Washing Machine or Microwave Oven in your kitchen, Card readers, Access Controllers, Palm devices of your work space enable you to do many of your tasks very effectively. Apart from all these, many controllers embedded in your car take care of car operations between the bumpers and 9 most of the times you tend to ignore all these controllers.

- **Robotics:** industrial robots, machine tools, Robocop soccer robots
- **Automotive:** cars, trucks, trains
- **Aviation:** airplanes, helicopters
- Home and Building Automation
- **Aerospace:** rockets, satellites
- **Energy systems:** windmills, nuclear plants
- **Medical systems:** prostheses, revalidation machine.

1.5 CHARACTERISTIC OF EMBEDDED SYSTEMS

- **Real-time operation**: Embedded systems can respond to external events or inputs immediately or within a strict time frame.
- **Energy efficient**: Embedded systems are efficient at using energy, managing memory, and processing information.
- **Compact size**: Embedded systems are small in size compared to other traditional systems.
- **Reliability:** Operates consistently and accurately.
- **Microcontroller-based:** Uses a microcontroller or microprocessor.
- **Limited I/O:** Limited input/output interfaces.
- **Specialized Peripherals:** Includes specialized components (e.g., timers, counters).
- **Low-level Programming:** Programmed using low-level languages.

CHAPTER 2 LITERATURE SURVEY

The development of microcontroller-based automatic engine locking systems to prevent drunken driving has garnered significant attention due to its potential to save lives. This literature survey explores various research efforts, technologies, and methods used in these systems, along with the key authors and contributions.

Introduction to Microcontroller-Based Engine Locking Systems

Microcontroller-based systems are essential in automotive safety, and the integration of alcohol detection systems with these devices has gained momentum. These systems primarily use sensors like alcohol detectors, interfaced with microcontrollers (MCUs) to prevent the engine from starting if the driver is found to be intoxicated.

Key Authors and Contributions

Some notable works on this topic include the development of microcontroller-based systems using alcohol detection sensors, various mechanisms of engine locking, and the integration of intelligent systems.

- Singh et al. (2018) – "Design of a Microcontroller-Based Vehicle Anti-Drunk driving system″
- In this study, Singh and colleagues proposed an alcohol detection system that uses a gas sensor connected to a microcontroller. The system is designed to prevent the vehicle from starting if the detected alcohol level exceeds the legal limit (0.08%). The microcontroller processes the data from the sensor and sends a signal to cut off the ignition circuit if alcohol is detected in the driver's breath. This study highlights the importance of alcohol sensors (semiconductor-based sensors) in the accurate detection of ethanol vapors in the breath.
- Reference: Singh, A., Mehta, N., & Kapoor, R. (2018). Design of a microcontroller-based vehicle anti-drunk driving system. International Journal of Innovative research in Electrical, Electronics, Instrumentation, and Control Engineering, 6(2), 1-8.
- Sharma et al. (2019) – "Automated Vehicle Engine Locking System Based on Alcohol Detection" Sharma and his team worked on integrating an alcohol detection system using electrochemical sensors with a microcontroller to automate the vehicle's engine locking mechanism. Their work highlighted the use of real-time monitoring and the incorporation of GSM modules.
- Moulick et al. (2020) – "Development of Alcohol-Based Engine Locking System for preventing drunken driving”.

- In this work, the authors designed a microcontroller-based system using a fuel cell sensor for alcohol detection. The system was built to provide a reliable solution for preventing drunk driving. The authors explored various sensor technologies, including semiconductor and electrochemical sensors, and concluded that fuel cell sensors provided the most accurate results for alcohol detection. The system utilized a relay-based ignition control to disable the vehicle starter motor
- Reference: Moulick, A., Sinha, P., & Verma, M. (2020). Development of alcoholbased engine locking system for preventing drunken driving.
- Proceedings of the International Conference on Emerging Trends in Electronics and Communication Engineering, 1(1), 50-55.
- Venkatesh & Ramesh (2021) – "A Smart Drunken Driving Prevention System Using Microcontroller and the alcohol sensor.
- They discussed the integration of both alcohol and motion sensors into a unified system that could automatically lock the vehicle's engine if it detected alcohol consumption above the permissible limit. They also highlighted the importance of real-time data processing to minimize false positives.
- Reference: Venkatesh, S., & Ramesh, G. (2021). A smart drunken driving prevention system using microcontroller and alcohol sensor. International Journal of Engineering and Advanced Technology (IJEAT), 9(4), 112-117.
- Patel & Pate (2022) – "Drunk Driving Prevention System Using Microcontroller and Alcohol. This paper presents a system that integrates a smartphone app with the vehicle's onboard microcontroller to manage drunk driving prevention. Using a Bluetooth-enabled alcohol sensor, the system detects the driver's alcohol level and prevents the engine from starting if the BAC exceeds the legal threshold. The authors also discussed the implementation of an SMS-based alert system that sends notifications to the vehicle owner or designated emergency. Reference: Patel, S., & Pate, R. (2022). Drunk driving prevention system using microcontroller and alcohol sensor. International Journal of Computer Science and Mobile Computing, 11(3), 56-63.

3. Alcohol Detection Technologies and Sensors

- The research focuses extensively on the various types of sensors used in these systems to detect alcohol Semiconductor Gas Sensors: These are inexpensive Electrochemical Sensors: These sensors use a chemical reaction to detect alcohol in breath.

  Example: Sharma et al. (2019) used electrochemical sensors for their vehicle antidrunk driving.

CHAPTER 3 OVER VIEW OF THE PROJECT

3.1 INTRODUCTION

Most of these days, we hear a lot of accidents that happens all over the world. In the accidents mentioned Alcohol consumed accidents are raising as days passes by. The National crime records bureau's report on accidental deaths in India 2015 suggests that about 1.5 percent of total 4.64 lakh road accidents were caused by drunken drivers or influence of drug or alcohol resulting injuries to 6,295 people. According to the report, among 3000 deaths more than 8 deaths every day accounting for just over 2 percent of all fatalities in road accidents. The report of Road Accidents in India 2015 puts the number of accidents caused by drivers under the influence of alcohol as the fatalities, much 3.3 percent of road accidents and 4.6 percent of fatalities from road accidents.

At Tamil Nadu the drunken drivers who got their license suspended in the year from Jan to Dec of 2017 is 30,393. From Jan to Dec of 2018 is 45,113. In Jan 2019 alone is 2,046. This shows that the drunken driving is cumulative as years passes by and the measures taken were seem to be having no effect in the reduction of the drunken drivers.

Indicates the global burden of road traffic injuries is excessive in countries that can least afford to meet the health services, economic, and social challenges that are faced by them.

The life led by the low-income and the middle-income countries under these circumstances is precarious in the view of limited resources which was classified as per the World Bank website. These project the highlights of the basic needs and priority of road-traffic affecting the low-income and middle-income countries to take preventive measures to safe guard the life and to provide better road for travelling and reduce the rate of road traffics that cumulate and to stop them from being the victim's hereafter. States that majorly three groups are affected mainly in the road accidents, about 70% of fatalities are pedestrians, next is the passengers commuting on buses, minibuses, trucks., and the last is the cyclists. Even much more protection is needed based on the local evidence and research by the road safety management in the developing countries, buses, minibuses, trucks., and the last is the cyclists. Even much more protection is needed based on the local evidence and research by the road safety management in the developing countries. on the local evidence and research by the road safety management in the developing countries.

Accounts the major risks-based factors in the road safety precautions where the children and adolescence are too affected. The WHO accounts state nearly 5-35% of the cases registered are ones due to the drunk driving and raise the risk of crashing into pedestrians and self- -injury through insolent behavior of reckless driving. And 43 countries representing 2.3 billion people are now currently have the best practice of enforcing the drinking laws. Shows the comparison of the road fatality rate which is six times greater than that of the United States which has 1.6 of 100,000 vehicles where in India its 14.

The world federation of road safety has estimated that the western countries are likely to reduce the road fatalities to less than two percent in two years where as in India its rising rapidly this shows the emergency response facility of our country with others is too low and their effort to reduce to eliminate the road accidents.

The police's lackadaisical attitude along with the corrupted politics towards enforcing laws has an extraordinarily high contribution and will reduce the rising of road accidents where by effective policing can bring Indian people to reduce the number of dying on its roads. Under the supervision of the state government the polices have done an investigation on the causes of the road accidents.

It is found that nearly 90 black spots were identified in the state highways and national highways after the incident of a lorry container crashed with the Kerala State Transport Corporation (KSRTC) bus in Tirupur. Black spot analysis was done under the supervision the officials commanded by the Supreme Court Committee on Road Safety. Major of the black spots are still under the maintenance as of said its 43 and still proceeding to eliminate the black spots to reduce the accidental rates. Accounts that with reference to the WHO and National Crime Records Bureau (NCRB), every hour 40 people die in road accidents under the age of 25.

3.2 EXISTING SYSTEM

The existing system for preventing drunk driving is marred by limitations, including inconvenience, ineffectiveness, and limited coverage. Ignition interlock devices, breathalyzers, and sobriety checkpoints can be time-consuming and may not always detect drunk drivers. Moreover, DUI laws and penalties may not be effectively enforced, allowing drunk drivers to continue posing a risk on the roads. In contrast, a microcontroller-based automatic engine locking system for drunken drivers offers a more comprehensive and effective solution.

This system can be installed in all vehicles, providing real-time detection and prevention of drunk driving. By leveraging advanced technology, this system can help reduce the incidence of drunk driving and improve road safety. The system can also provide valuable data and insights to support enforcement efforts and inform policy decisions.

Furthermore, the system can be integrated with other safety features, such as advanced driver-assistance systems (ADAS), to provide a more robust safety net. Additionally, the system can be designed to accommodate various types of vehicles, including commercial and public transportation vehicles, to ensure that all drivers and passengers are protected.

Overall, a microcontroller-based automatic engine locking system for drunken drivers has the potential to significantly enhance road safety and reduce the risks associated with drunk driving. By adopting this technology, we can take a major step towards creating a safer and more responsible driving environment.

Limitations:

- False positives/negatives
- Limited sensor accuracy
- Signal interface

3.3 PROPOSED SYSTEM

The proposed microcontroller-based automatic engine locking system for drunken drivers aims to prevent impaired driving by using an alcohol detection sensor, such as the MQ-3 the microcontroller triggers a relay to lock the ignition, preventing the engine from starting. Additionally, the system includes a status indicator (LED or LCD) to inform the driver whether they are safe to drive and an alarm to alert them if they are over the legal limit.

The system may also offer remote notifications via a mobile app or a central monitoring system, providing real-time updates to authorized contacts. For added security, a user authentication system (such as a PIN code or fingerprint scanner) can be incorporated to ensure only authorized users can bypass the system. Furthermore, a backup power supply ensures that the system remains operational even in the event of power failure. This advanced system offers an enhanced, reliable solution for preventing drunk driving and improving road safety.

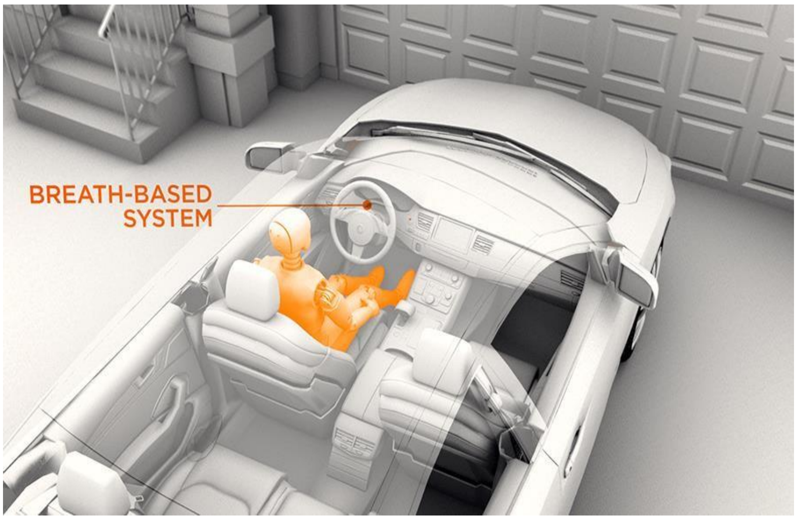


Fig 3.1: Breath based system

3.3.1 BLOCK DIAGRAM OF PROPOSED SYSTEM

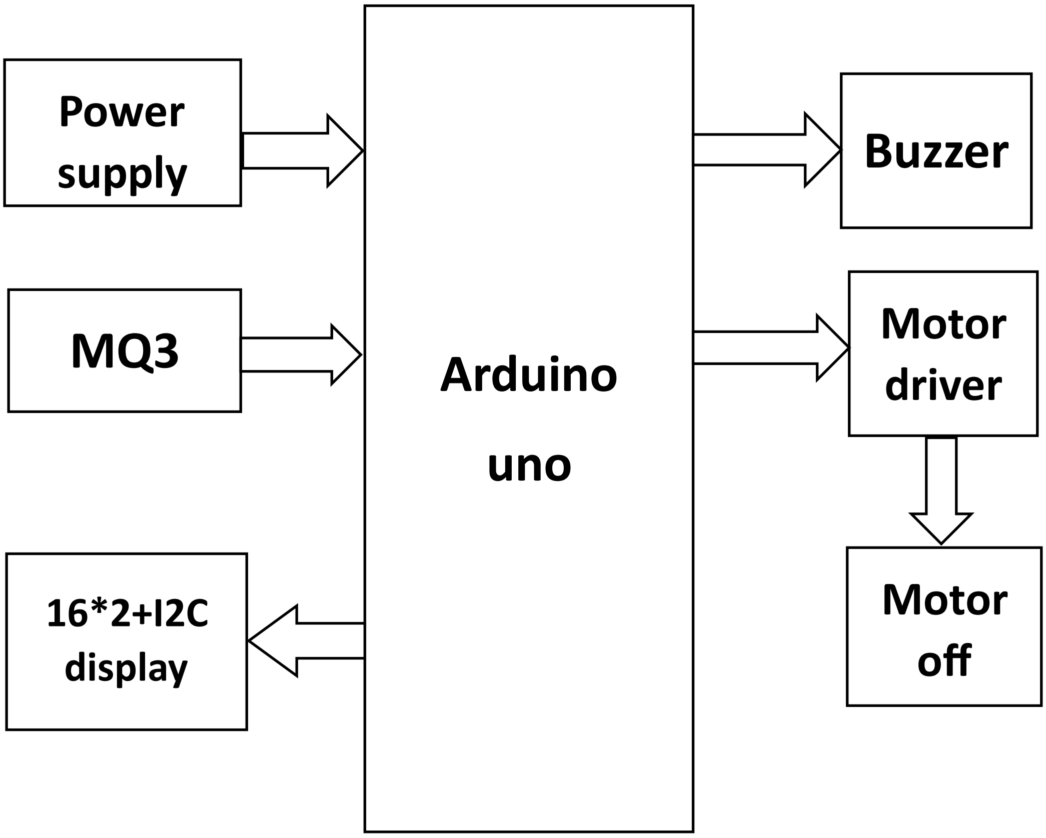


Fig 3.2: Block diagram of Microcontroller based automatic engine locking system for drunken drivers

3.4 WORKING PRICIPLE OF PROPOSED SYSTEM

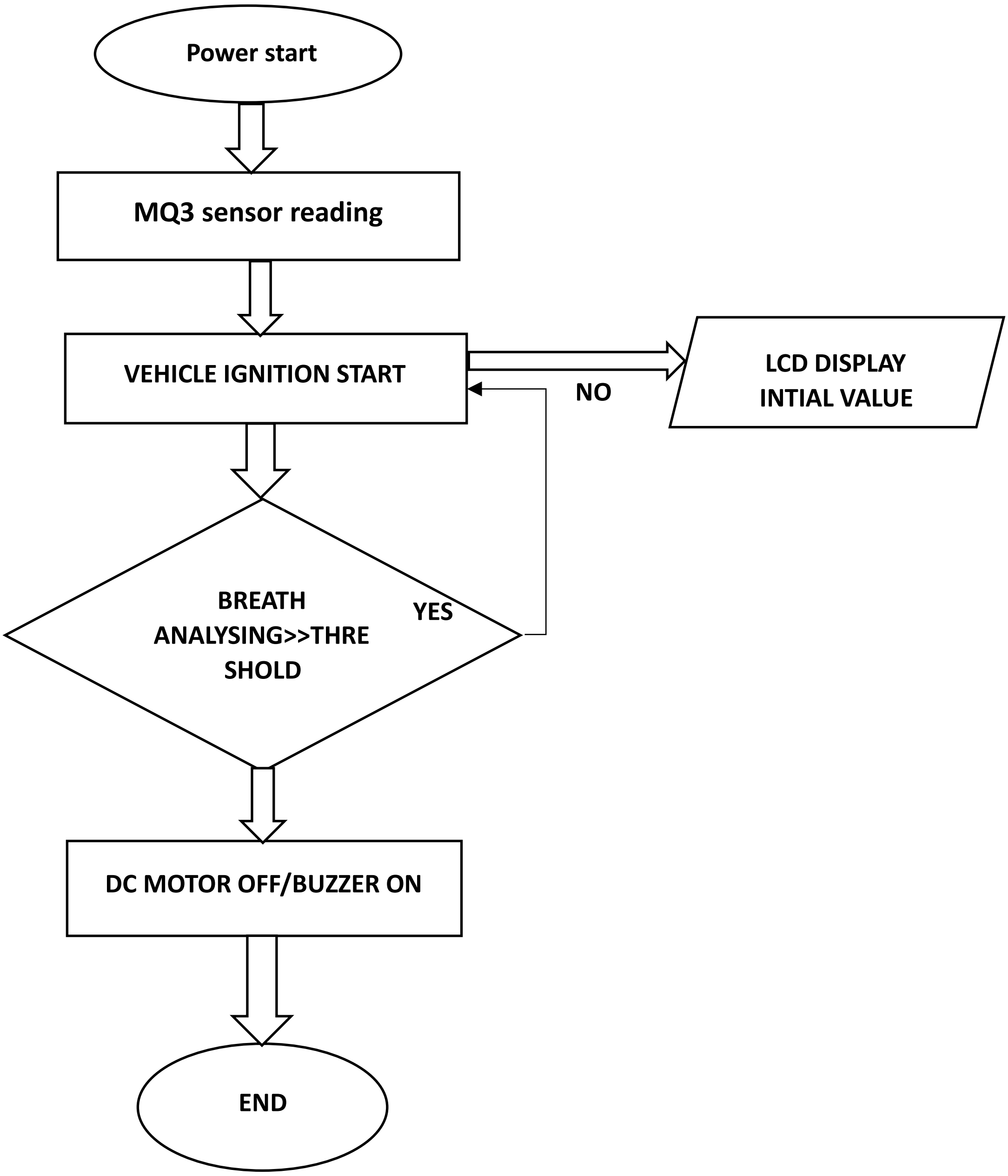


Fig 3.3: working principle of Microcontroller based automatic engine locking system for drunken drivers

EXPLANATION:

1. **Power start:** The system initiates.

2. **MQ3-Sensor Reading:** the MQ3 sensor, commonly used for detection, takes a reading of the breath sample.
3. **Vehicle ignition start & LCD Display initial value:** Simultaneously, the Vehicle attempts to start, and the LCD screen displays an initial value.
4. **Breath Analyzing>>Threshold:** The system compares the breath alcohol reading to a pre-set threshold.
5. **Decision:** ○ **No:** If the breath alcohol level is above the threshold, the system loops back to the

   "LCD Display Initial Value" and the vehicle won't start.

○ **Yes:** If the breath alcohol level is below the threshold, the system proceeds.

6. **DC Motor OFF/BUZZER On:** The DC Motor (representing the vehicle engine) is allowed to operate, and a buzzer may activate to indicate a safe level.
7. **End:** The Process concludes, and the vehicle can be operated.

A microcontroller-based automatic engine locking system for drunken drivers uses an alcohol sensor to detect alcohol in the driver's breath, and if a pre-set threshold is exceeded, the system locks the engine, preventing the vehicle from starting or continuing to drive.

Alcohol Detection:

- Alcohol Sensor: The system utilizes an alcohol sensor, such as the MQ-3, to detect the presence and concentration of alcohol in the driver's breath.
- Signal Processing: The sensor generates a signal proportional to the alcohol concentration, which is then sent to the microcontroller.

Microcontroller:

- Threshold Setting: The microcontroller compares the sensor's output with a predetermined threshold value representing a safe alcohol level.
- Decision Making: If the alcohol concentration exceeds the threshold, the microcontroller activates the engine locking mechanism.
- Engine Locking: The microcontroller can control the engine's ignition system or fuel supply to prevent the vehicle from starting or to stop it from running.

So here the alcohol sensor is used to monitor driver breath and constantly sends signals to the microcontroller. The microcontroller on encountering high alcohol signal from the alcohol sensor displays alcohol detection on LCD screen and also stops the motor engine.

Several sensor technologies commonly used in alcohol detection mainly include semiconductor sensor, electrochemical sensor, colorimetric technology, infrared detection technology, gas chromatography analysis technology, etc. Among them, the most commonly used are electrochemical sensor technology and semiconductor sensor technology.

When the driver enters the car and tries to start it:

- The system immediately checks the breath.
- If no alcohol is detected → The car starts normally.
- If alcohol is detected → The engine remains locked and may alert authorities.

Limitations:

- **False Positives:** The system may incorrectly detect a driver as intoxicated.
- **Sensor Accuracy:** The accuracy of the alcohol sensor may vary.
- **User Acceptance:** Some drivers may resist using

CHAPERT 4 HARDWARE COMPONENTS

4.1 POWER SUPPLY

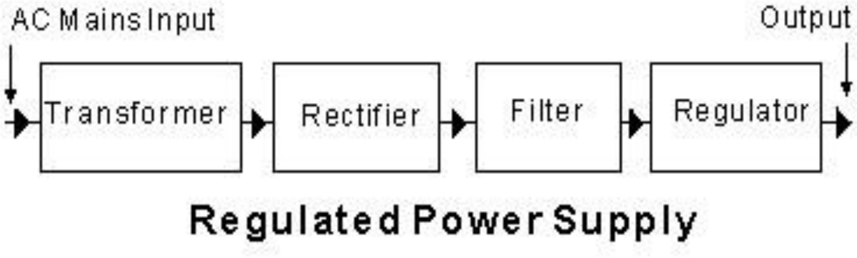


Fig 4.1: power supply

Transformer

- A transformer is an electrical device that transfers electrical energy from one circuit to another through electromagnetic induction.
- It's used to step up or step down the input voltage to the required level.

Rectifier

- A rectifier is an electrical device that converts AC (Alternating Current) voltage to DC (Direct Current) voltage.
- The rectifier uses diodes to convert the AC voltage to DC voltage. **Filter**

- A filter is an electrical device that removes unwanted components from a signal.
- In a power supply, the filter is used to remove ripples and noise from the DC voltage.

Regulator

Regulators are available in different types, including linear regulators, switching regulators, and voltage references.

4.2 ARDUINO UNO

Arduino is an open-source electronics platform designed for easy prototyping and programming of interactive devices. It features a microcontroller, digital and analog pins for input and output, and is powered via USB or an external source. Ideal for rapid development, education, and DIY projects, Arduino is user-friendly and flexible, supporting a wide range of sensors and actuators. Its open-source nature encourages innovation, though it has limitations in processing power and memory, making it less suitable for highly complex tasks.

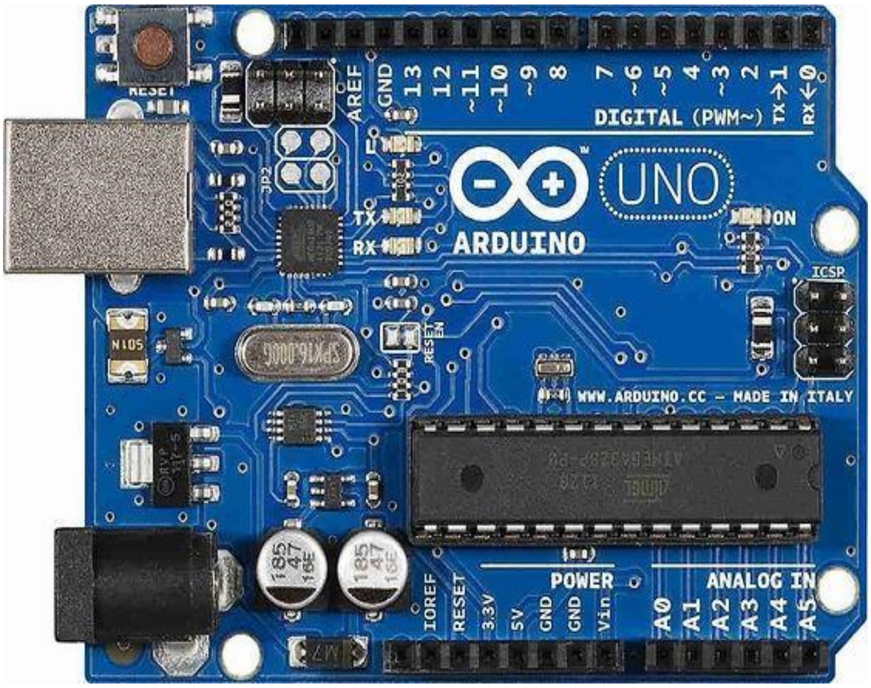


Fig 4.2: Arduino UNO Features:

- **Open-source** hardware and software
- **Easy-to-use** for beginners, flexible for advanced users
- **Compatible with most Arduino shields**
- Can be **powered via USB** or external power supply

Applications:

- **Robotics:** Robotics projects, such as line followers, obstacle avoiders, and robotic arms.
- **Home Automation:** Controlling lights, fans, and other appliances remotely.
- **Wearables:** Wearable devices, such as smartwatches and fitness trackers.
- **IoT Projects:** Internet of Things projects, such as sensor networks and smart devices.

- **Industrial Control:** Industrial control systems, such as motor control and process control.
- **Medical Devices:** Medical devices, such as defibrillators and ventilators.
- **Aerospace and Defense:** Aerospace and defense projects, such as missile guidance and radar systems.

4.2.1 ARDUINO UNO PIN DESCRIPTION

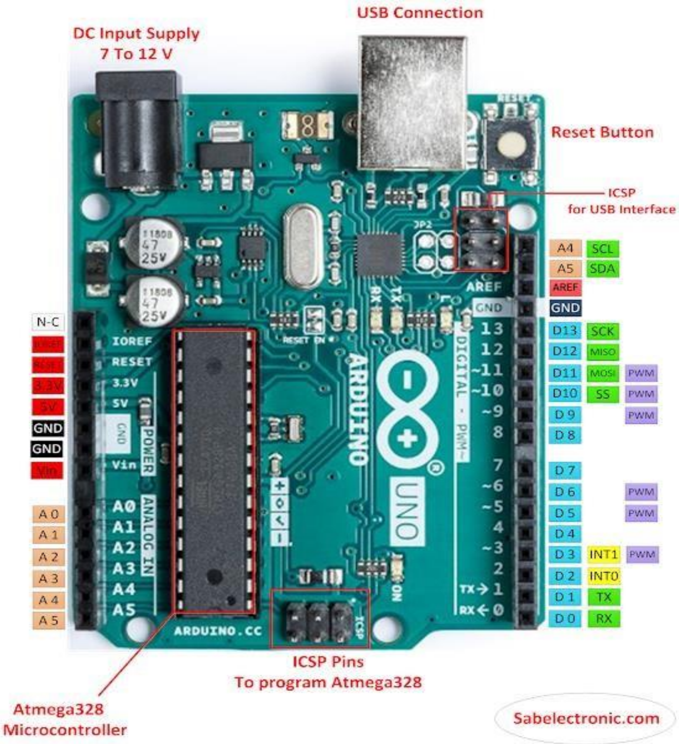


Fig 4.3: pin description of Arduino UNO

Digital Pins (0-13): For digital input and output; pins 0 and 1 are used for serial communication (TX/RX).

Analog Pins (A0-A5): Read analog signals and convert to digital values; some boards have extra analog pins.

PWM Pins (3, 5, 6, 9, 10, 11): Digital pins with Pulse Width Modulation capability.

Power Pins: - 3.3V: Provides 3.3V power.

- 5V: Provides 5V power**.**

Power Pins: - 3.3V: Provides 3.3V power.

- 5V: Provides 5V power**.**

GND: Ground**.**

Vin: External power input (7-12V).

Serial Communication:

- **TX (Pin 1):** Transmit data.

- **RX (Pin 0):** Receive data.

- **Interrupt Pins (e.g., 2, 3):** Trigger interrupts to respond to signal changes.

I2C Pins:

- SDA (A4 on Uno): Data line.

- SCL (A5 on Uno): Clock line.

SPI Pins:

- MISO (Pin 12), MOSI (Pin 11), SCK (Pin 13),

- SS (Pin 10): For SPI communication.

- LED_BUILTIN (Pin 13): Built-in LED for status indication.

- AREF: External reference voltage for analog inputs.

- RESET: Resets the board.

4.3 L293D

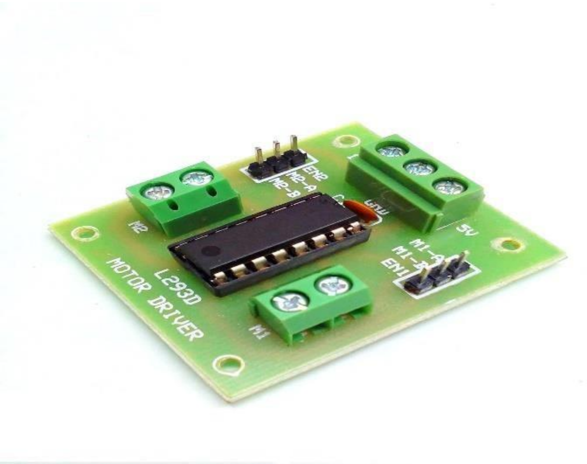


Fig 4.4: L293D

L293D is a basic motor driver integrated chip (IC) that enables us to drive a DC motor in either direction and also control the speed of the motor. The L293D is a 16 pin IC, with 8 pins on each side, allowing us to control the motor.

It means that we can use a single L293D to run up to two DC motors. L293D consist of two H-bridge circuit. H-bridge is the simplest circuit for changing polarity across the load connected it.

There are 2 OUTPUT pins, 2 INPUT pins, and 1 ENABLE pin for driving each motor.

It is designed to drive inductive loads such as solenoids, relays, DC motors, and bipolar stepper motors, as well as other high-current/high-voltage loads.

Technical Specification:

- Wide Supply-Voltage Range: 4.5 V to 36 V
- Output Current: 600 mA Per Channel
- Peak Output Current: 1.2 A Per Channel
- Supply Voltage to the IC: 4.5V to 7V
- Operating Temperature: -40°C to 150°C
- Storage Temperature: -55°C to 150°C
- Current Consumption: 20mA

4.4 LCD (Liquid crystal display)

LCD or Liquid Crystal Display, is a flat-panel display technology used in a wide range of electronic devices such as televisions, computer monitors, smart phones, and digital watches. It operates on the principle of manipulating light using liquid crystals, which are sandwiched between two layers of glass or plastic. LCDs are known for their thin profile, light weight, and low power consumption compared to older display technologies like CRTs. They work by applying an electric current to the liquid crystals, which alters their alignment and thus controls the passage of light through the display.

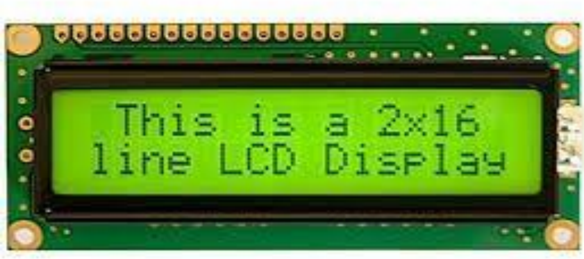


Fig 4.5: LCD

This manipulation creates images or text with high resolution and sharp clarity. LCDs are favored for their versatility, offering color reproduction and brightness suitable for various indoor and outdoor environments, making them ubiquitous in modern digital displays.

LCDs (Liquid Crystal Displays) are used because they offer advantages like being thin, lightweight, energy-efficient, and produce sharp, vibrant images, making them suitable for a wide range of applications.

LCD stands for Liquid Crystal Display. This technology uses liquid crystals, which are substances with properties of both liquids and solids, to create images on a screen. When an electric current is applied, the liquid crystals align to allow or block light, creating the images you see on the display.

1. The backlight shines light through the polarizers.

2. The liquid crystals change their orientation when an electric current is applied.

3. The polarizers control the amount of light that passes through the liquid crystals.

4. The combination of light and liquid crystals creates images on the screen.

- Thin and lightweight
- Low power consumption
- High resolution
- Flat panel design
- No image distortion

Characteristics:

- **Screen Size:** The physical size of the display, measured in inches.
- **Resolution:** The number of pixels that make up the display, measured in pixels (e.g., 1080p, 2160p).
- **Aspect Ratio**: The ratio of the display's width to its height (e.g., 16:9, 4:3).
- **Display Type:** The technology used to create the display (e.g., TN, IPS, VA, OLED).
- **Response Time:** The time it takes for pixels to change color, measured in milliseconds.
- **Refresh Rate:** The number of times the display updates per second, measured in Hz (e.g., 60Hz, 120Hz).
- **Contrast Ratio:** The difference between the brightest and darkest areas of the display, measured in ratio (e.g., 1000:1).
- **Input Ports:** The types of connections available for inputting signals (e.g., HDMI, DisplayPort, VGA).
- **Output Ports:** The types of connections available for outputting signals (e.g., HDMI, DisplayPort).
- **USB Ports:** The types of USB connections available (e.g., USB-A, USB-C).

Specifications:

- Screen Size: 24", 32", 40"
- Resolution: 1080p, 1440p, 2160p
- Aspect Ratio: 16:9, 4:3
- Display Type: TN, IPS, VA, OLED
- Response Time: 5ms, 8ms

4.5 BO MOTOR

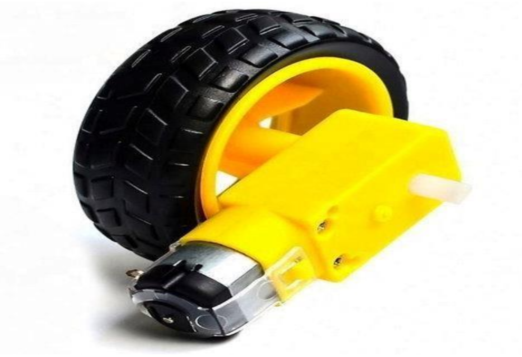


Fig 4.6: BO motor

A BO motor is a small, low-cost DC geared motor commonly used in robotics, DIY projects, and educational purposes. The "BO" in the name likely refers to "Battery Operated" as they are typically designed to run on low DC voltages supplied by batteries (usually in the range of 3V to 12V). Here's a more detailed breakdown of BO motors:

Key Characteristics:

- **DC Motor:** They operate on direct current.
- **Geared Motor**: A gearbox is attached to the DC motor to reduce the output speed and increase the output torque. This makes them suitable for applications requiring more force at a lower speed.
- **Low Voltage Operation:** Designed to work efficiently with battery power, making them ideal for portable and battery-powered robots and devices.
- **Compact and Lightweight:** Their small size and low weight make them easy to integrate into various projects without adding significant bulk or inertia.
- **Plastic Gearbox:** Typically feature a plastic gearbox, which contributes to their low cost and lightweight design. While generally sufficient for light to medium loads, plastic gears may have a lower lifespan under heavy continuous use compared to metal gears.
- **Various RPM Ratings:** Available in a wide range of Revolutions Per Minute (RPM) ratings after the gear reduction (e.g., 30 RPM, 60 RPM, 100 RPM, 150 RPM, 300 RPM, etc.) to suit different speed requirements.
- **Single and Dual Shaft Options:** You can find BO motors with a single output shaft or a dual output shaft. Dual-shaft motors allow for driving two components simultaneously or for attaching encoders on one shaft for feedback.
- **Easy to Interface:** Simple to control the direction (clockwise/counterclockwise) by reversing the polarity of the DC power supply. Speed control can be achieved using Pulse Width Modulation (PWM) from a microcontroller.
- **Mounting Options:** Often come with mounting holes on the motor body for easy attachment to robot chassis or other structures.
- **Cost-Effective:** One of the most affordable geared DC motor options available, making them popular for hobbyists and educational purposes.

Applications of BO Motors:

- Driving wheels in small robots, robot arms, and other mobile platforms.
- Ideal for teaching basic motor control and robotics principles.
- Used in various automated gadgets, toys, and mechanisms.
- Their controllable speed and torque are suitable for these applications.
- Used for movement and navigation.
- Can power small belts or rollers.
- Used in toy cars, trains, and other models.

Typical Specifications:

- Operating Voltage- 3V - 12V DC (optimal performance often around 5V-6V)
- Rated Speed (After Reduction)- 100 RPM
- No-Load Current- 40-180 mA (varies with voltage)
- Rated Torque- 0.35 kg-cm to 1 kg-cm (varies by model and voltage)
- Shaft Length- 7-8.5 mm
- Shaft Diameter- 5.5 mm (often a "D-shaped" shaft for better grip with wheels)
- Motor Dimensions- Approximately 55-70mm (length) x 20-35mm (width) x 1822mm (height)
- Weight- Around 30 grams
- Gearbox Type- Straight (most common) or L-shaped
- Gear Material- Plastic

4.6 MQ3 (sensor)

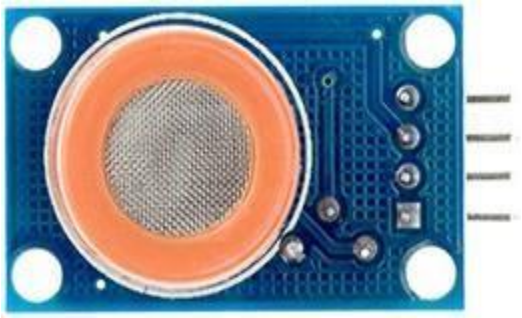


Fig 4.7: MQ3

The MQ3 sensor is a semiconductor-based gas sensor primarily designed for the detection of *alcohol (ethanol)* vapor concentration in the air. It's commonly used in breathalyzers, alcohol testers, and various safety monitoring systems.

Here's a more detailed overview of the MQ3 sensor:

The MQ3 sensor utilizes a *tin dioxide (SnO2) sensitive layer. In clean air, SnO2 has low electrical conductivity. When alcohol vapor is present, it reacts with the oxygen adsorbed on the surface of the SnO2, causing electrons to be released into the semiconductor material. This process increases the conductivity of the SnO2 layer. The change in conductivity is proportional to the concentration of alcohol vapor.

Essentially, the sensor's resistance changes depending on the alcohol concentration in the surrounding air. Higher alcohol concentration leads to lower resistance, and lower concentration results in higher resistance. This change in resistance can be measured by a microcontroller to determine the alcohol level. The sensor typically requires a heater to operate at an optimal temperature for this chemical reaction to occur efficiently.

Key Features and Specifications:

- **Target Gas:** Primarily Alcohol (Ethanol), but it can also have some sensitivity to other gases like benzene, methane, hexane, CO, and LPG. However, its sensitivity is highest to alcohol.
- **Detection Range:** Typically, 0.05 mg/L to 10 mg/L alcohol concentration (some sources mention 25-500 ppm or 0.04 mg/L to 4 mg/L, so refer to the specific datasheet). This range is suitable for breathalyzer applications.
- **Operating Voltage:** Usually, 5V DC for both the circuit and the heater.
- **Heater Voltage:** Typically, around 5V DC.
- **Heater Resistance:** Approximately 29Ω to 33Ω.
- **Load Resistance (RL):** Adjustable, typically recommended to be between 20 kΩ to 47 kΩ (or 200 kΩ in some configurations) to set the sensor's sensitivity.
- **Sensitivity:** High sensitivity to alcohol with good resistance to interference from smoke, vapor, and gasoline.
- **Response Time:** Fast, usually less than 10 seconds.
- **Operating Temperature:** -10°C to 50°C (or -10°C to 70°C in some datasheets).
- **Humidity:** Less than 95% RH.

- **Output:** Provides both analog (AO) and digital (DO) outputs.
- **Analog Output (AO):** The output voltage is proportional to the alcohol concentration. Higher concentration means higher output voltage. This allows for measuring the approximate level of alcohol.
- **Digital Output (DO):** Features an onboard comparator and a potentiometer for adjusting the sensitivity threshold. The DO pin goes LOW when the detected alcohol concentration exceeds the set threshold and HIGH otherwise.

Pin Configuration (Typical Module): A typical MQ3 sensor module has 4 pins:

1. **VCC:** Positive power supply (usually 5V).

2. **GND:** Ground.

3. **AO (Analog Output):** Outputs an analog voltage proportional to the alcohol concentration.

4. **DO (Digital Output):** Provides a digital signal (HIGH/LOW) based on the alcohol concentration exceeding a set threshold.

4.7 BUZZER

Fig 4.8: Buzzer

A Buzzer is an electromechanical or piezoelectric device that produces a distinct audible tone or sound. They are commonly used for alarms, notifications, feedback signals, and various other alerting applications in electronic devices and systems.

Characteristics of Buzzers (General):

- **Sound Pressure Level (SPL):** Measured in decibels (dB), this indicates the loudness of the sound produced at a specific distance and voltage.
- **Operating Voltage:** The voltage range at which the buzzer is designed to operate.
- **Operating Current:** The current drawn by the buzzer during operation.
- **Resonant Frequency (for Piezo):** The frequency at which the piezoelectric element vibrates most efficiently and produces the loudest sound.
- **Size and Mounting:** Buzzers come in various sizes and with different mounting options (e.g., through-hole, surface mount, panel mount).
- **Enclosure:** Some buzzers are enclosed in a plastic or metal case for protection and sound amplification.

When selecting a buzzer for this project, consider the required sound level, operating voltage, current consumption, size constraints, and whether you need the simplicity of an active buzzer or the flexibility of a passive buzzer for generating specific tones and frequencies. For passive buzzers, you'll also need to consider how you will generate the driving signal using a microcontroller or other oscillator circuit.

CHAPTER 5 SOFTWARE COMPONENTS

5.1 ARDUINO IDE

Arduino is an open-source electronics platform that combines easy-to-use hardware and software to facilitate the creation of interactive electronic projects. It features a range of microcontroller boards, like the Arduino Uno, which are programmed through the Arduino IDE using a simplified version of C/C++. This userfriendly approach, along with extensive libraries and community support, makes Arduino ideal for prototyping, educational purposes, and hobbyist projects, enabling users to interface with sensors, actuators, and other components to build various applications.

- **Cross-platform:** Works on multiple operating systems (Windows, macOS, Linux).
- **Free and Open-source:** Free to use, modify, and distribute.

- **User-friendly:** Easy to use, even for beginners.
- **Syntax Highlighting:** Color-codes code for easier reading.
- **Auto-completion:** Suggests code completions as you type.
- **Code Folding:** Hides and shows sections of code.

The key features are:

- Arduino board are able to read analog or digital input signals from different sensors and turn it into an output such as activating a motor, turning LED on/off, connect to the cloud and many other actions.
- Can control your board functions by sending a set of instructions to the microcontroller on the board via Arduino IDE (referred to as uploading software).
- Unlike most previous programmable circuit board, Arduino does not need an extra piece of hardware (called a programmable) in order to load a new code onto the board. You can simply use a USB cable.
- Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program.
- Finally, Arduino provides a standard from factors that breaks the functions of the microcontroller into a more accessible package.

After learning about the main parts of the Arduino UNO board. We are ready to learn how to set up the Arduino IDE. Once we learn the, we will ready to upload our program on the Arduino board.

5.1.1 ARDUINO DATA TYPES:

Data types in C refers to an extensive system used for declaring variable or functions of different types. The type of a variable determines how much ace it occupies in the storage and how the bit pattern stored is interpreted.

The following table provides all the data types that you will use during Arduino programming.

Void:

The void keyword is used only in function declaration. It indicates that the functions is expected to return no information to the functions from which it was called.

Example:

```
Void Loop ()
```

```
{
// rest of t code
}
```

Boolean: A Boolean holds one of two values, true or false. Each Boolean variable occupies one byte of memory.

Chart: A data type that takes up one byte of memory that stores a character value. Character literals are written in single quotes like this: 'A' and for multiple characters, strings use double quotes: "ABC".

However, characters are stored as numbers. You can see the specific encoding in the ASCII chart. This means that it is possible to do arithmetic operations on characters, in which the ASCII value of the character is used. For example, 'A' +1 has the value 66, since the ASCII value of the capital of the capital letter a is 65.

Unsigned char is an unsigned data type that occupies one byte of memory. The unsigned char data type encodes numbers from 0 to 255. **Byte:** A byte stores an 8-bit unsigned number, from 0 to 255.

Int: Integers are the primary data-type for numbers storage. int stores a 16-bit (2-byte) value. This yields a range of -32,768 to 32,767 (minimum value of -2^15 and a maximum value of (2^15)-).

The Int size varies from board to board. On the Arduino due, for example, an int stores a 32-bit (4-byte) value.

Unsigned int: Unsigned int (unsigned integers) are the same as int in the way that they store a 2byte value. Instead of storing negative numbers, however, they only store positive values, yielding a useful range of 0 to 65,535 (2^16). The due stores a 4byte (32-bit) value, ranging from 0 to 4,294.967.295 (2^32-).

Word: On the Uno and other A TMEGA based boards, a word stores a 16-bit unsigned number. On the due and zero, it stores a 32-bit unsigned number.

Long: Long variables are extended size variable for number storage, and store 32 bit (4 bytes), from 2,147,483,648 to 2,147,483,647.

Unsigned long: Unsigned long variables are extended size variables for number storage and store 32 bits (4 bytes). Unlike standard longs, unsigned longs will not store negative numbers, making their range from 0 to 4,294,967,295 (2^32 - 1).

Short: A short is a 16-bit data-type. On all Arduinos (AT Mega and ARM based), a short stores a 16-bit (2-byte) value. This yields a range of -32,768 to 32,767 (minimum value of -2^15 and a maximum value of (2^15) - 1).

Float: Data type for floating-point number is a number that has a decimal point. Floating-point numbers are often used to approximate the analog and continuous values because they have greater resolution than integers. Floating-point numbers can be as large as 3.4028235E+38 and as low as 3.4028235E+38. They are stored as 32 bits (4 bytes) of information.

Double: On the Uno and other ATMEGA based boards, Double precision floatingpoint number occupies four bytes. That is, the double implementation is exactly the same as the float, with no gain in precision. On the Arduino Due, doubles have 8-byte (64 bit) precision.

In this section, we will learn in easy steps, how to set up the Arduino IDE on our computer and prepare the board to receive the program via USB cable.

Step 1: First you must have your Arduino board (you can choose your favorite board) and a USB cable. In case you use Arduino UNO, Arduino duemilanove, Nano, Arduino Mega2560, or Decimal, you will need a standard USB cable (A plug to B plug), the kind you would connect to a USB printer as shown in the following image.

Fig 5.1: USB cable

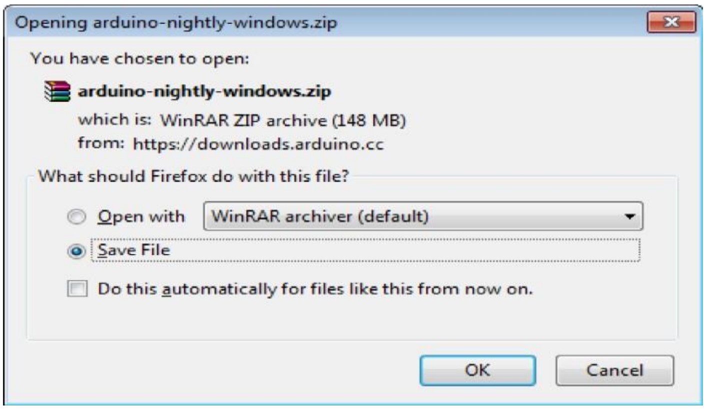
Step 2: Download Arduino IDE Software.

You can get different versions of Arduino IDE from the Download page on the Arduino Official website. You must select your software, which is compatible with your operating system (Windows, IOS, or Linux). After your file download is complete, unzip the file.

Step 3: Power up your board.

The Arduino Uno, Mega, Duemilanove and Arduino Nano automatically draw power from either, the USB connection to the computer or an external power supply. If you are using an Arduino Decimal, you have to make sure that the board is configured to draw power from the USB connection. The power source is selected with a jumper, a small piece of plastic that fits onto two of the three pins between the USB and power jacks. Check that it is on the two pins closest to the USB port. Connect the Arduino board to your computer using the USB cable

Step 4: Launch Arduino IDE.



Opening arduino-nightly-windows.zip

You have chosen to open:

arduino-nightly-windows.zip

which is: WinRAR ZIP archive (148 MB)
from: https://downloads.arduino.cc

What should Firefox do with this file?

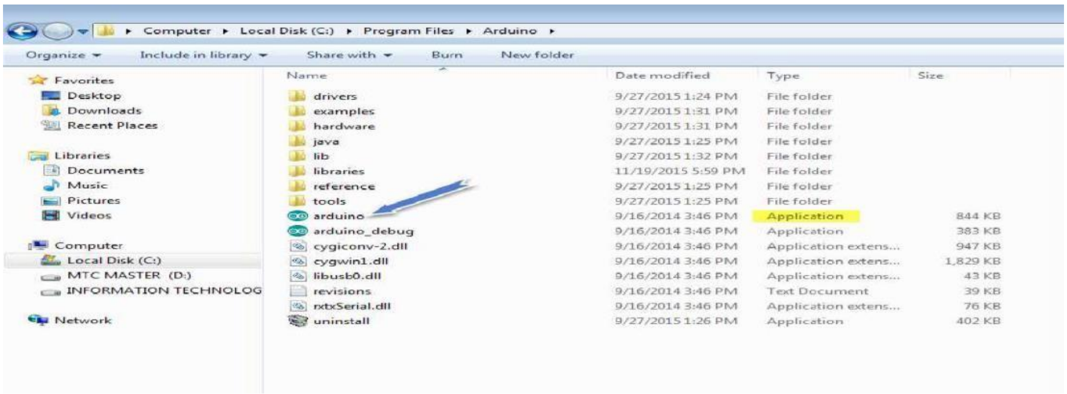
○ Open with WinRAR archiver (default)

● Save File

□ Do this automatically for files like this from now on.

Fig 5.2: Launch Arduino IDE

After your Arduino IDE software is downloaded, you need to unzip the folder. Inside the folder, you can find the application icon with an infinity label (application.exe). Double click the icon to start the IDE.



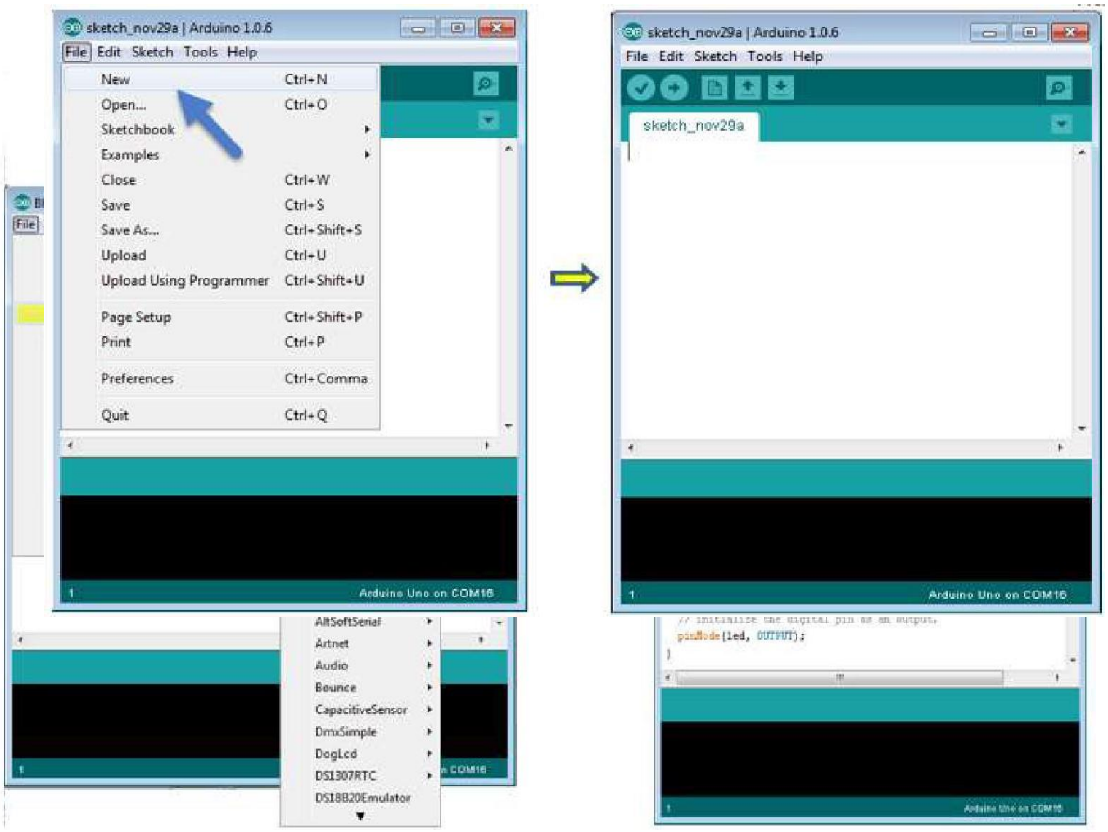
Name	Date modified	Type	Size
drivers	9/27/2015 1:24 PM	File folder	
examples	9/27/2015 1:31 PM	File folder	
hardware	9/27/2015 1:31 PM	File folder	
java	9/27/2015 1:25 PM	File folder	
lib	9/27/2015 1:32 PM	File folder	
libraries	11/19/2015 5:59 PM	File folder	
reference	9/27/2015 1:25 PM	File folder	
tools	9/27/2015 1:25 PM	File folder	
arduino	9/16/2014 3:46 PM	Application	844 KB
arduino_debug	9/16/2014 3:46 PM	Application	383 KB
cygiconv-2.dll	9/16/2014 3:46 PM	Application extens...	947 KB
cygwin1.dll	9/16/2014 3:46 PM	Application extens...	1,829 KB
libusb0.dll	9/16/2014 3:46 PM	Application extens...	43 KB
revisions	9/16/2014 3:46 PM	Text Document	39 KB
rxtxSerial.dll	9/16/2014 3:46 PM	Application extens...	76 KB
uninstall	9/27/2015 1:26 PM	Application	402 KB

Step 5: Open your first project.

Once the software starts, you have two options:

- Create a new project.
- Open an existing project example.

To create a new project, select File --> New. To open



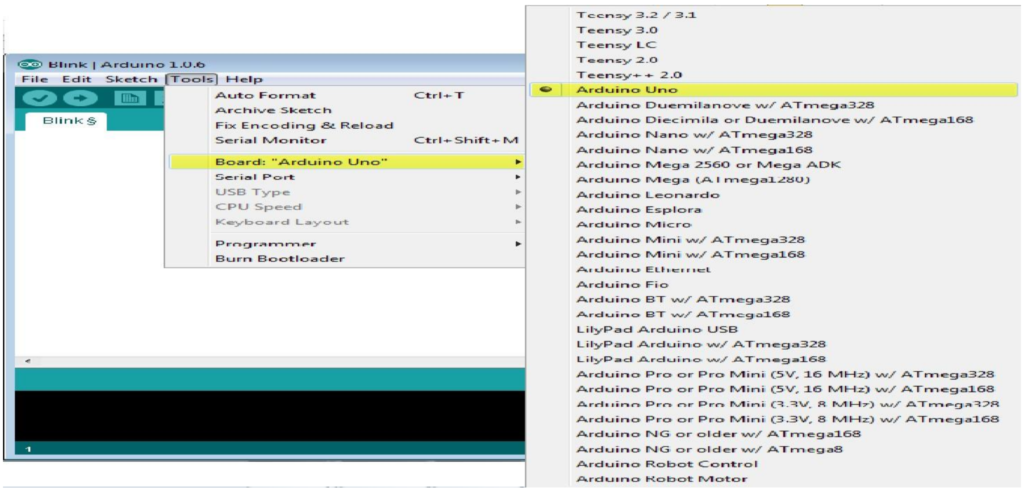
```
  // initialize the digital pin as an output.
  pinMode(led, OUTPUT);
}
```

To open an existing project example, select File -> Example -> Basics -> Blink.

Here, we are selecting just one of the examples with the name **Blink**. It turns the LED on and off with sometime delay. You can select any other example from the list.

Step 6: Select your Arduino board.

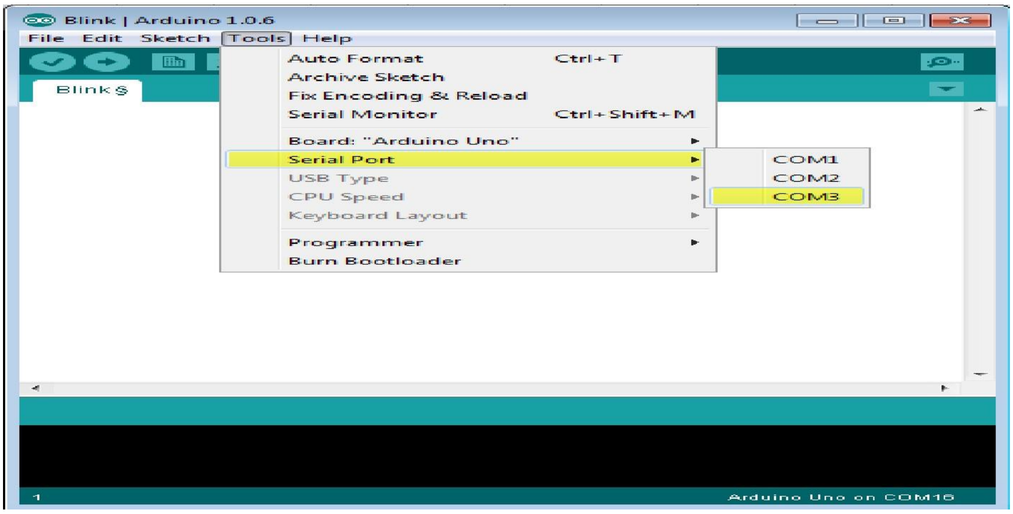
To avoid any error while uploading your program to the board, you must select the correct Arduino board name, which matches with the board connected to your computer.


Blink | Arduino 1.0.6
File Edit Sketch Tools Help
Blink §
Auto Format Ctrl+T
Archive Sketch
Fix Encoding & Reload
Serial Monitor Ctrl+Shift+M
Board: "Arduino Uno"
Serial Port
USB Type
CPU Speed
Keyboard Layout
Programmer
Burn Bootloader
Teensy 3.2 / 3.1
Teensy 3.0
Teensy LC
Teensy 2.0
Teensy++ 2.0
Arduino Uno
Arduino Duemilanove w/ ATmega328
Arduino Diecimila or Duemilanove w/ ATmega168
Arduino Nano w/ ATmega328
Arduino Nano w/ ATmega168
Arduino Mega 2560 or Mega ADK
Arduino Mega (ATmega1280)
Arduino Leonardo
Arduino Esplora
Arduino Micro
Arduino Mini w/ ATmega328
Arduino Mini w/ ATmega168
Arduino Ethernet
Arduino Fio
Arduino BT w/ ATmega328
Arduino BT w/ ATmega168
LilyPad Arduino USB
LilyPad Arduino w/ ATmega328
LilyPad Arduino w/ ATmega168
Arduino Pro or Pro Mini (5V, 16 MHz) w/ ATmega328
Arduino Pro or Pro Mini (5V, 16 MHz) w/ ATmega168
Arduino Pro or Pro Mini (3.3V, 8 MHz) w/ ATmega328
Arduino Pro or Pro Mini (3.3V, 8 MHz) w/ ATmega168
Arduino NG or older w/ ATmega168
Arduino NG or older w/ ATmega8
Arduino Robot Control
Arduino Robot Motor
1

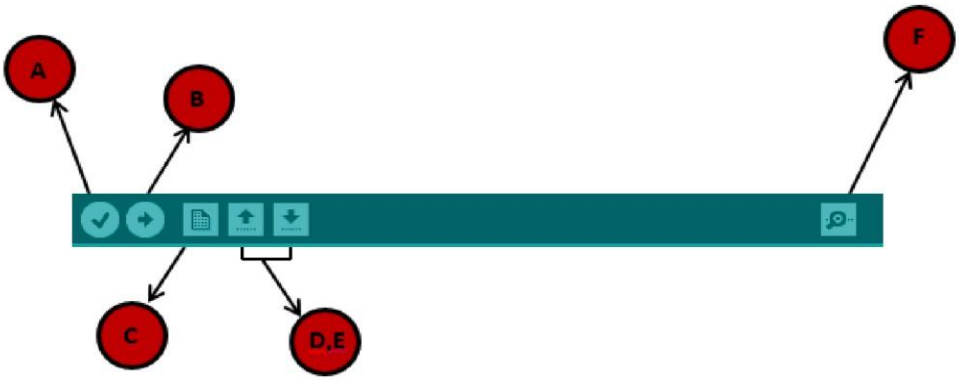
Go to Tools -> Board and select your board

Here, we have selected Arduino Uno board according to our tutorial, but you must select the name matching the board that you are

Step 7: Select your serial port. Select the serial device of the Arduino board. Go to **Tools** ->**Serial Port** menu. This is likely to be COM3 or higher (COM1 and COM2 are usually reserved for hardware serial ports). To find out, you can disconnect your Arduino board and re-open the menu, the entry that disappears should be of the Arduino board. Reconnect the board and select that serial port.



Step 8: Upload the program to your board. Before explaining how we can upload our program to the board, we must demonstrate the function of each symbol appearing in the Arduino IDE toolbar.



A- Used to check if there is any compilation error.

B- Used to upload a program to the Arduino board.

C- Shortcut used to create a new sketch.

D- Used to directly open one of the example sketch.

E- Used to save your sketch.

F- Serial monitor used to receive serial data from the board and send the serial data to board.

Now, simply click the "Upload" button in the environment. Wait a few seconds; you will see the RX and TX LEDs on the board, flashing. If the upload is successful, the message "Done uploading" will appear in the status bar.

Note: If you have an Arduino Mini, NG, or other board, you need to press the reset button physically on the board, immediately before clicking the upload button on the Arduino Software.

Arduino programming structure

In this chapter, we will study in depth, the Arduino program structure and we will learn more new terminologies used in the Arduino world. The Arduino software is open-source. The source code for the Java environment is released under the GPL and the C/C++ microcontroller libraries are under the LGPL.

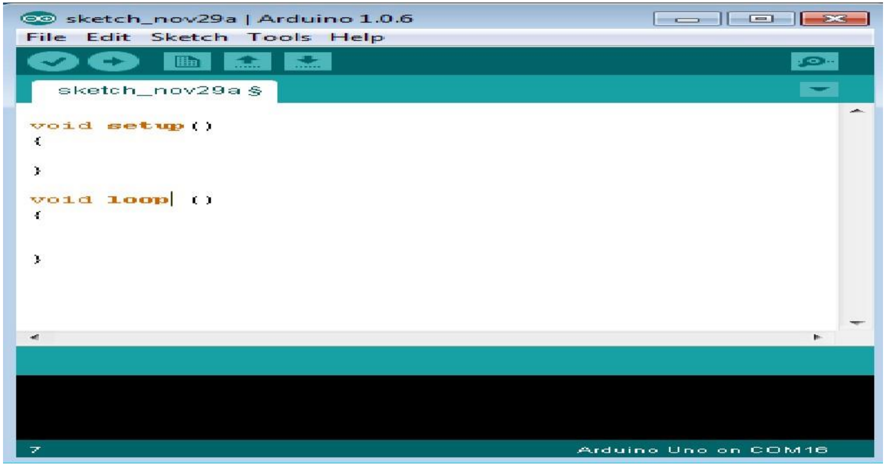
Sketch: The first new terminology is the Arduino program called “**sketch**”.

Structure

Arduino programs can be divided in three main parts: **Structure**, **Values** (variables and constants), and **Functions**. In this tutorial, we will learn about the Arduino software program, step by step, and how we can write the program without any syntax or compilation error.

Let us start with the **Structure**. Software structure consist of two main functions:

- Setup( ) function
- Loop( ) function



```
void setup()
{
}
void loop ()
{

}
```

Void setup ( )

{

}

PURPOSE:

The **setup ()** function is called when a sketch starts. Use it to initialize the variables, pin modes, start using libraries, etc. The setup function will only run once, after each power up or reset of the Arduino board.

INPUT

OUTPUT

RETURN

Void Loop ()

{

}

PURPOSE:

After creating a **setup ()** function, which initializes and sets the initial values, the **loop ()** function does precisely what its name suggests, and loops secutively, allowing your program to change and respond. Use it to actively control the Arduino board.

CHAPTER 6 RESULT

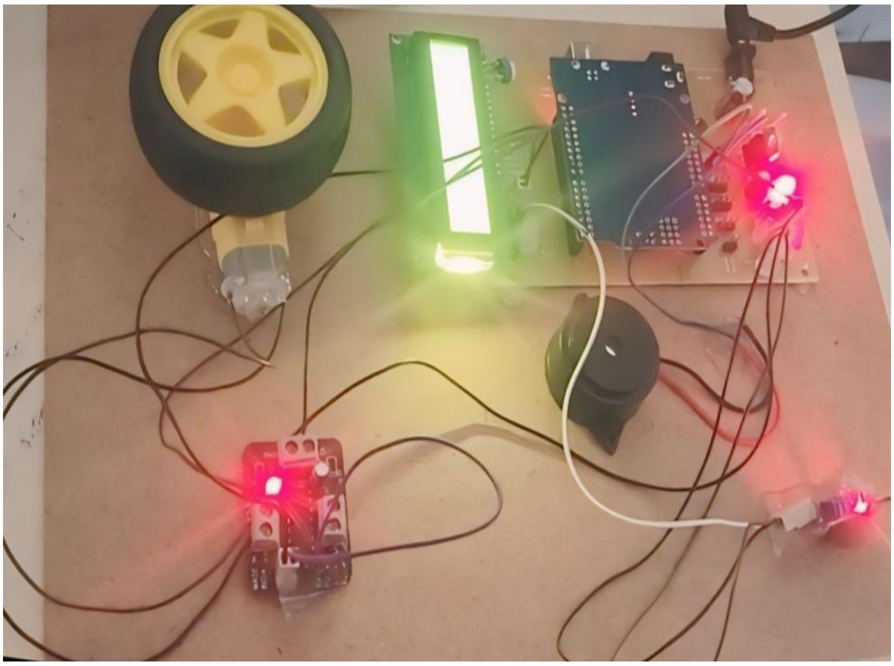


Fig 6.1: Result

- A microcontroller-based automatic engine locking system for drunken drivers aims to prevent accidents by detecting alcohol levels in the driver's breath and automatically locking the engine
- If the limit is exceeded, thereby preventing intoxicated individuals from driving.

CHAPTER 7

ADVANTAGES & APPLICATIONS

7.1 ADVANTAGES

- **Prevents Drunk Driving:** Automatically locks the engine to prevent drunk driving.
- **Reduces Accidents:** Helps reduce the number of accidents caused by drunk driving.
- **Saves Lives:** Can potentially save lives by preventing fatal accidents.
- **Easy to Install:** Can be easily installed in vehicles.
- **Low Cost:** Relatively low cost compared to other safety features.
- **High Accuracy:** Uses advanced sensors to detect drunk driving.
- **Real-time Monitoring:** Continuously monitors the driver's condition.
- **Increased Safety:** Provides an additional layer of safety for drivers and passengers.
- **Reduced Liability:** Can reduce liability for vehicle owners and operators.
- **Improved Road Safety:** Contributes to improved road safety and reduced traffic fatalities.

7.2 APPLICATIONS

- **Commercial Vehicles:** Can be installed in commercial vehicles, such as trucks and buses.
- **Private Vehicles:** Can be installed in private vehicles, such as cars and SUVs.
- **Public Transportation:** Can be installed in public transportation vehicles, such as taxis and ride-sharing services.
- **Emergency Vehicles:** Can be installed in emergency vehicles, such as ambulances and fire trucks.
- **Military Vehicles:** Can be installed in military vehicles to prevent drunk driving.
- **Racing Vehicles:** Can be installed in racing vehicles to prevent drunk driving.
- **Fleet Management:** Can be used in fleet management systems to monitor and prevent drunk driving.
- **Ride-Sharing Services:** Can be installed in ride-sharing services to prevent drunk driving.

CHAPTER 8 CONCLUSION & FUTER SCOPE

8.1 CONCLUSION

The Microcontroller-based Automatic Engine Locking System for Drunken Drivers is a crucial innovation aimed at improving road safety by preventing intoxicated individuals from operating vehicles. The system works by detecting alcohol levels through a breathalyzer module interfaced with a microcontroller. Once the alcohol concentration exceeds a predefined limit, the system automatically disables the vehicle's ignition, effectively locking the engine and preventing the driver from starting the vehicle.

This system is an effective solution to reduce the number of alcohol-related accidents. By integrating a microcontroller with sensors and an engine-locking mechanism, it provides an automated, reliable way to ensure that a vehicle can't be driven by a person under the influence of alcohol.

The microcontroller-based automatic engine locking system represents a significant advancement in automotive security, offering a sophisticated, reliable, and costeffective solution to prevent unauthorized access and theft. By utilizing a microcontroller to control the locking and unlocking mechanism based on predefined conditions such as proximity or authentication, the system provides enhanced safety features. The integration of sensors, actuators, and intelligent software allows for realtime monitoring and seamless operation, ensuring that the vehicle's engine remains locked when not in use.

This automatic system reduces the chances of human error and enhances the overall user experience, providing convenience and peace of mind. Furthermore, as vehicle security needs evolve, this system can be easily adapted to integrate with other advanced security features like biometric authentication or remote control, proving the versatility and scalability of microcontroller-based solutions in the automotive industry.

8.2 FUTURE SCOPE

- We can implement GSM technology to inform the relatives or owner of the vehicle about the alcohol consumption.
- We can directly make this product to inbuilt with the existing automobiles.
- By using such technique, the rate of road accidents can be prevented whose main cause is drink and drive. It can also prevent the vehicles from theft.
- It can be Integrated Drunk and Drive Detection system detects solely the driver's state.
- This could even be extended by incorporating an extra alcohol odor sensor at the traveler seats to discover the presence of alcohol within the air within the vehicle cabin.
- Once alcohol is detected, the system problems each a voice alert and a message alert on the navigation system monitor.
- The Microcontroller-based Automatic Engine Locking System for Drunken Drivers has a promising future scope, with potential integrations with emerging technologies like Artificial Intelligence, Internet of Things, and Cloud Computing.

The microcontroller-based automatic engine locking system for drunken drivers has a promising future scope. With advancements in sensor technology, artificial intelligence, and machine learning, the system can become even more accurate and effective. Integration with the Internet of Things (IoT) and cloud connectivity can enable remote monitoring and control, making it a valuable tool for improving road safety. The system can also be integrated with autonomous vehicles, smart cities, ridesharing services, and commercial vehicles to prevent drunk driving. However, regulatory frameworks, public acceptance, technical challenges, and cost affordability need to be addressed to promote widespread adoption. Collaborations and partnerships with industry partners, governments, and other stakeholders can help overcome these challenges and make the technology a reality.

REFERENCES

1. Vinand M Nantulya, Michael Rerich. The neglected epidemic: road traffic injuries in developing countries. BMJ, 2002, 324; 11391~141.
2. Hayakawa H, Fischbeck PS, Fish boff B. Traffic accident statistics and risk perception in Japan and the United States[J]. Accid and Prev,2000,32:827~835.
3. Norris FH, Matthens BA, Raid JK. Characterological, situational and behavioral risk factors for motor vehicle accident: a prospective examination[J] Accid Anal Prev,2000, 32:505~515.
4. Kenneth heng, Stephen hargarten, Peter layde. etal. Moderate alcohol intake and motor vehicle crashes. The conflict between health advantage and at-risk use [J]. Alcohol & alcoholism, 2006, 41:451~454.
5. Rod G. Gullberg. Estimating the measurement uncertainty in forensic breath alcohol analysis. Accreditation and Quality Assurance: Journal for Quality, Comparability and Reliability in Chemical Measurement, 2006(11):562~568.
6. Arnedt JT, Wilde GJ, MuntPW, etal. Simulated driving performance following prolonged wakefulness and alcohol consumption: separate and combined contributions to impairment [J]. Sleep Res, 2000, 9:233~234.
7. Kenneth heng, Stephenhargarten, Peter layde.et al. Moderate alcohol intake and motor vehicle crashes. The conflict between health advantage and at-risk use [J]. Alcohol &alcoholism, 2006, 41:451~454.

APPENDIX

```
#include <LiquidCrystal.h>
```

```
// initialize the library by associating any needed LCD interface pin
// with the arduino pin number it is connected to const int rs
= 13, en = 12, d4 = 11, d5 = 10, d6 = 9, d7 = 8;
LiquidCrystal lcd(rs, en, d4, d5, d6, d7);

#define buzzer A0
#define mq3 3

#define in1 6
#define in2 7

bool gas = 0;

void beep(int x = 1) {   for
(uint8_t i = 0; i < x; i++) {
digitalWrite(buzzer, HIGH);
delay(500);
digitalWrite(buzzer, LOW);

delay(300);
  }
}



void motorOn() {
digitalWrite(in1, 1);
digitalWrite(in2, 0);
delay(1000);

}
```

```
void motorOff() {
digitalWrite(in1, 0);
digitalWrite(in2, 0);
delay(1000);
}

void setup() {
Serial.begin(9600);
lcd.begin(16, 2);
lcd.clear();

  // Print a message to the LCD.
lcd.print("Initializing Sensor!");
pinMode(buzzer, OUTPUT);   pinMode(mq3,
INPUT);
  beep(); }

void updateLcd(String text, String text2) {
lcd.clear();   lcd.print(text);
lcd.setCursor(0, 1);   lcd.print(text2);
}

void loop() {   gas =
digitalRead(mq3);
Serial.print("Gas : \t");
Serial.println(gas);
  // 0  means on 1 means off
 IF     (GAS     ==     0)     {
motorOff();
```

```
    updateLcd("Alcohol detected", "MOTOR OFF");
Serial.println("Alcohol dtected");    beep(2);
delay(2000);


  } else {
    updateLcd("No       Alcohol",       "MOTOR       ON");
motorOn();
  }
delay(500);
}
```